학생교육원 대천임해 별관동 내진보강 구조설계 용역

2023.06

㈜제이텍구조엔지니어링

서울특별시교육청 교육시설관리본부

학생교육원 대천임해 별관동
내진보강 구조설계 용역

2023. 06.

㈜제이텍구조엔지니어링
송파구 백제고분로 413 제이텍빌딩
TEL : 02)404-1521 FAX : 02)424-1665
jtec@jtecceng.com

등록번호 제 서울 - 146 호

안전진단전문기관등록증

상　　호 : (주)제이텍구조엔지니어링

대 표 자 : 김 진 영

사무소소재지 : 서울특별시 송파구 백제고분로 413, 3층

(송파동, 제이텍빌딩)

분　　야 : 건 축

등록연월일 : 2011년 05월 12일

「시설물의 안전관리에 관한 특별법」 제9조에 따른 안전진단 전문기관으로 등록합니다.

2017년 08월 07일

서 울 특 별 시 장

제2022-정밀건축B-0102호

교 육 수 료 증

성　　명 : 김진영
생년월일 : 1969년 07월 08일
소　　속 : 개인
교육과정 : 정밀안전진단과정
교육종류 : 보수교육
교 육 명 : 정밀안전진단(건축반) 보수교육
교육기간 : 2022년 10월 26일 ~ 2022년 11월 02일 (14시간)

위 사람은 「시설물의 안전 및 유지관리에 관한 특별법」 시행령 제9조, 시행규칙 제10조, 지침 제94조에 따라 위의 교육과정을 수료하였으므로 이 증서를 수여합니다.

2022년 11월 02일

(재)건설산업교육원장

제 출 문

서울특별시교육청 교육시설관리본부 귀중

귀 청에서 의뢰하신『**학생교육원 대천임해 별관동 내진보강 구조설계 용역**』을 성실히 수행하고 그 결과를 보고서로 제출합니다.

2023년 06월

㈜제이텍구조엔지니어링 **대표이사 / 건축구조기술사**

송파구 백제고분로 413 제이텍빌딩
TEL : 02)404-1521 FAX : 02)424-1665
jtec@jteceng.com

김 진 영 (인)

참 여 기 술 자 명 단

□ 과 업 명 : 학생교육원 대천임해 별관동 내진보강 구조설계 용역

참여분야	성 명	기술자격구분	기술등급
책임기술자	김 진 영	건축구조기술사	건축특급기술자
참여기술자	이 상 진	건축기사	건축특급기술자
	권 오 준	건축기사	건축특급기술자
	임 영 진	건축기사	건축고급기술자
	조 용 혁	건설안전기사	건축고급기술자
	최 중 일	학경력자	건축초급기술자

위 치 도 및 전 경 사 진

대상 건축물 위치
(충청남도 보령시 해수욕장2길 19)

대상 건축물 전경사진

내 진 보 강 설 계 요 약 문

□ 건축물 개요

<table>
<tr><td>건 물 명</td><td colspan="4">학생교육원 대천임해 별관동</td></tr>
<tr><td>건물위치</td><td colspan="4">충청남도 보령시 해수욕장2길 19</td></tr>
<tr><td>규 모</td><td colspan="2">지상4층/지하1층</td><td>연 면 적</td><td>5,992.61㎡</td></tr>
<tr><td>구조형식</td><td colspan="2">철근콘크리트조</td><td>준공년도</td><td>1996년</td></tr>
<tr><td>내진등급</td><td colspan="2">내진Ⅰ등급</td><td>용 도</td><td>수련시설</td></tr>
<tr><td>지역계수</td><td colspan="4">0.176g (유효지반가속도, 국가지진위험지도)</td></tr>
<tr><td>지반등급</td><td colspan="4">S4 (지반조사보고서)</td></tr>
<tr><td rowspan="7">재료강도</td><td rowspan="2">콘크리트</td><td>C28.54
(fck=28.54MPa)</td><td>기존부</td><td rowspan="2">코어채취</td></tr>
<tr><td>C27.55
(fce=27.55MPa)</td><td>증측부</td></tr>
<tr><td rowspan="2">철근</td><td>SD300
(fy=300MPa)</td><td>기존부</td><td>건설연도별
재료강도</td></tr>
<tr><td>SD400
(fy=400MPa)</td><td>증측부</td><td>설계도서</td></tr>
<tr><td>철골</td><td>SS400
(Fy=235MPa)</td><td>기존부</td><td>추정</td></tr>
<tr><td>조적허리벽</td><td rowspan="2">fa=6.2MPa
(양호)</td><td rowspan="2">기존부</td><td rowspan="2">전차 용역
현장조사에
따름</td></tr>
<tr><td>조적채움벽</td></tr>
</table>

□ 용역 목적

본 과업은「기존 시설물(구조물) 내진성능 평가요령(2021)」에 따라 내진성능평가를 통해 내진보강이 필요하다고 판단된 기관에 대하여「기존 공공시설물(건축물) 내진보강 업무처리 가이드라인(행안부)」및 「기존 시설물(건축물) 내진성능 평가요령(국토부)」기준에 맞춰 내진보강 필요 여부를 확인하고, 필요한 경우 해당 기관에 적합한 내진보강공법으로 내진보강설계(최적화)를 수행하는 데 그 목적이 있다.

□ 구조안전성 검토결과

현장조사 결과를 토대로 구조 안전성을 검토한 결과, 수직하중(고정하중, 활하중)을 고려한 주요 구조부재(보, 기둥, 벽체)는 모두 소요하중에 대하여 구조적 안전성을 확보하고 있는 것으로 나타났다.

□ 기존 구조물 내진성능평가 결과

학생교육원 대천임해 별관동 기존구조물에 대한 내진성능평가 결과는 다음과 같다

< 내진성능 예비평가 결과 >

구분		1400 년 재현주기 지진력		2400 년 재현주기 지진력	
		X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표	인명안전		붕괴방지	
	성능수준	검토불가	검토불가	검토불가	검토불가
	검토결과	검토불가		검토불가	
		검토불가		검토불가	
증측부	성능목표	인명안전		붕괴방지	
	성능수준	붕괴방지	붕괴방지	붕괴	붕괴
	검토결과	붕괴방지		붕괴	
		목표성능 불만족		목표성능 불만족	

※ 기존부의 경우 일부 철골조로 이루어져 있어 예비평가 대상에 포함되지 않음.(기존시설물(건축물) 내진성능 평가요령에서 내진성능 예비평가의 범위는 철골조가 포함되어있지 않음.)

예비평가는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가하기에 보수적인 결과의 산정될 수 있다.

따라서, 예비평가는 상세평가의 비교 검증 및 참고용으로 의미가 있으며 본 용역에선 정밀해석인 내진성능 상세평가를 통해 대상 구조물의 내진성능 수준을 판정한다.

< 기존구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	붕괴	붕괴	붕괴	붕괴
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	보강 후 만족			
	검토결과		붕괴		붕괴	
			성능목표 불만족		성능목표 불만족	
증측부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	거주가능	거주가능	거주가능	거주가능
		층간변위비	거주가능	거주가능	거주가능	거주가능
		기초 검토	만족			
	검토결과		거주가능		거주가능	
			성능목표 만족		성능목표 만족	

< 기존구조물 내진성능 상세평가 결과 – 선형동적절차(m계수 1.33배) >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
증측부	성능목표		인명안전		붕괴방지	
	보유성능	연직하중 저항능력	거주 가능	거주 가능	거주 가능	거주 가능
		층간변위비	거주 가능	인명 안전	인명 안전	인명 안전
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

기존 구조물 내진성능평가 결과,

기존부는 조적 허리벽으로 인한 기둥 단주효과로 기둥의 전단파괴가 발생하였고, 또한 연직하중 저항능력에 대해서 목표성능에 따른 허용기준을 불만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 불만족하는 것으로 나타나 내진보강이 필요한 것으로 판단된다.

증측부는 고차모드 영향성검토에서 고차모드가 지배적인 구조물로 나타나 비선형정적절차 (Pushover), 선형동적절차 (m계수 1.33배)를 함께 수행하여 불리한 결과값으로 내진성능을 판정하였으며, 두 가지 절차 모두 연직하중 저항능력, 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 별도의 내진보강은 필요하지 않은 것으로 판단된다.

□ 보강 구조물 내진성능평가 결과

학생교육원 대천임해 별관동 보강구조물에 대한 내진성능평가 결과는 다음과 같다

< 보강구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	인명안전	거주가능	인명안전	거주가능
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	만족			
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

보강 구조물 내진성능평가 결과,

기존부는 X,Y방향 모두 연직하중 저항능력 및 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 보강 후 구조물에 대해서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 적절한 내진보강이 이루어진 것으로 판단된다.

□ 조적벽체 면외 안전성 검토

구조물의 비구조 요소인 조적벽체에 대하여 전도 여부를 검토한 결과, 모든 조적허리벽 및 조적채움벽은 설계지진력에 대하여 면외전도에 대한 안정성을 확보한 것으로 나타났다.

□ 기초 안전성 검토

기초 안전성 검토 결과, 별도의 기초보강은 필요하지 않은 것으로 나타났다.

□ **결론**

본 용역은 성능기반 평가법에 따라 내진보강 여부를 확인하고 필요한 경우 해당 시설물에 적합한 내진보강공법을 선정하여 내진보강설계를 수행하는데 그 목적이 있다.

기존 구조물 내진성능평가 결과, 기존부의 경우 목표성능을 만족하지 못하는 것으로 검토되어 '허리벽 양단 컷팅' 보강안을 제시하였다. 보강 구조물에 대한 내진성능평가 결과 설계기준 및 지침에서 제시하는 목표성능을 만족하는 것으로 나타나 적절한 내진보강설계가 이루어 진 것으로 판단된다. 증측부는 고차모드 영향성검토에서 고차모드가 지배적인 구조물로 나타나 비선형정적절차 (Pushover), 선형동적절차 (m계수 1.33배)를 함께 수행하여 불리한 결과값으로 내진성능을 판정하였으며, 두 가지 절차 모두 연직하중 저항능력, 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 별도의 내진보강은 필요하지 않은 것으로 판단된다.

다만, 본 보고서는 2023년 6월 용역을 수행한 구조물에 대한 검토결과이며, 추후 리모델링 혹은 증축이 이루어질 경우 현 구조물의 상태(구조부재, 하중 등)가 바뀌게 되므로 본 보고서 결과는 유효하지 않다. 따라서 리모델링 혹은 증축이 이루어질 경우 정밀안전진단 및 구조 안전성 검토를 재수행하여야 한다.

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제1장 일반사항

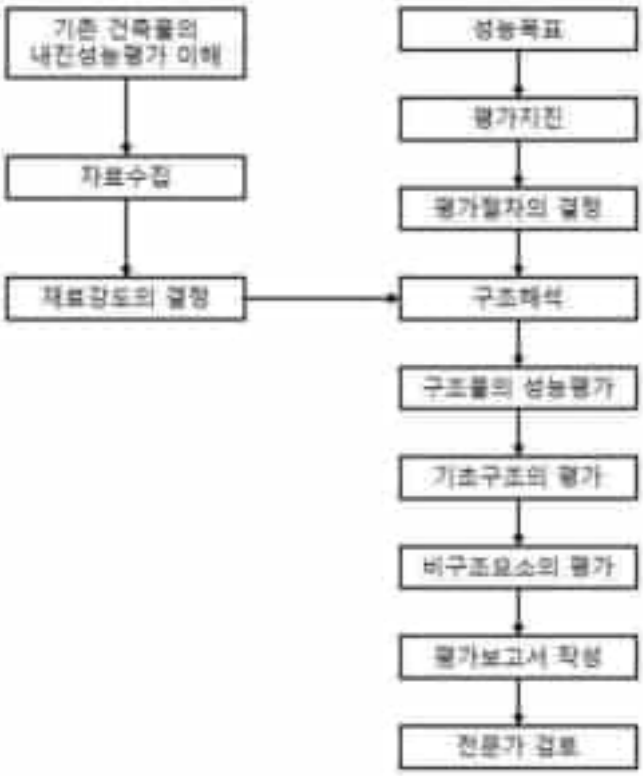
1.1 일반사항
1.2 해석 일반사항
1.3 구조 해석모델
1.4 적용 하중
1.5 적용 재료강도
1.6 연직하중 안전성 검토
1.7 소결

1. 일반사항

1.1 일반사항

본 용역 대상 건축물의 내진성능평가는 국토안전관리원에서 발간한 '기존 시설물(건축물) 내진성능 평가요령(2021)'에 준하여 실시하였다.

해당 요령에 따른 기존 건축물 내진성능 평가절차는 다음과 같다.



[그림 1.1.1] 내진성능평가 절차

기존 시설물(건축물) 내진성능 평가요령(2021)에 따른 기존 건축물의 내진성능 평가절차는 예비평가와 상세평가로 구성되어 있어 평가의 목적에 따라 적절한 방법을 선택한다. 상세평가에서는 예비평가보다 대상 건축물에 대한 더 많은 정보를 요구하며 결과가 정확하다. 상세평가에서도 선형절차보다 비선형절차가, 정적절차보다 동적절차가 좀 더 정확한 평가결과를 도출한다.

1.2 해석 일반사항

적용 기준 : 건축물 내진설계기준 (KDS 41 17 00)

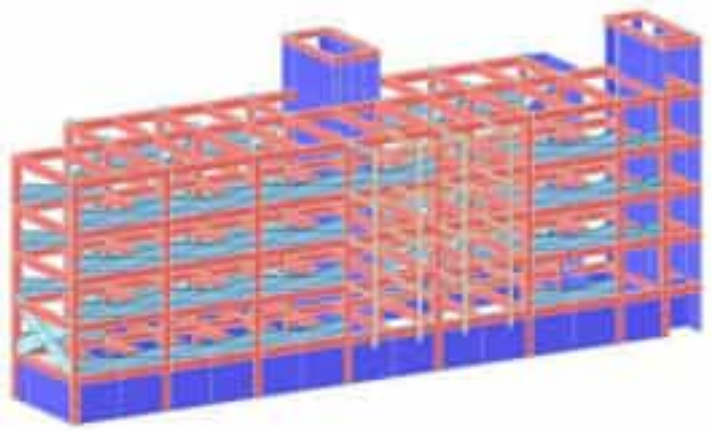
적용 지침 : 기존 시설물(건축물) 내진성능 평가요령 (2021)

해석프로그램 : Midas Gen 2023 (Ver. 940 R2)

[그림 1.1.2] 학생교육원 대천 임해 별관동 평면

1.3 구조 해석모델

1) 기존부

<table>
<tr><th>항 목</th><th colspan="4">내 용</th></tr>
<tr><td>검토 목적</td><td colspan="4">본 검토는 1996년에 준공된 학생교육원 대천임해 별관동-기존부를 대상으로 중력하중에 대해 건축구조기준(KDS 41)에서 제시하하고 있는 보유내력을 확보하고 있는지 검토하고 내력이 부족한 경우 적절한 보강을 통해 구조물의 안전성을 확보하고자 한다.</td></tr>
<tr><td rowspan="7">적용 규준</td><td colspan="2">구 분</td><td>내 용</td><td>비 고</td></tr>
<tr><td colspan="2">적 용 기 준</td><td>·건축구조기준 (KDS 41)</td><td>-</td></tr>
<tr><td colspan="2">검 토 하 중</td><td>·검토하중 참조</td><td>현행 설계기준
활하중적용</td></tr>
<tr><td colspan="2">건 물 규 모</td><td>·지상4층</td><td>-</td></tr>
<tr><td rowspan="2">재료
강도</td><td>콘크리트압축강도</td><td>·fck = 28.54MPa</td><td>코어테스트</td></tr>
<tr><td>철근항복강도</td><td>·f_y = 300MPa</td><td>건설연도별 재료의
기본값</td></tr>
<tr><td colspan="2">기초 형식</td><td>· 알수없음</td><td>-</td></tr>
<tr><td>평가 등급</td><td colspan="4">부재별 내력에 대한 안전성 평가등급 기준(세부지침, 2021. 12)
<table>
<tr><th>평가등급</th><th>평가기준"</th><th>대표값</th></tr>
<tr><td>A</td><td>SF ≥ 100%</td><td>1</td></tr>
<tr><td>B</td><td>SF ≥ 100% (경미한 손상 있음)</td><td>3</td></tr>
<tr><td>C</td><td>90% ≤ SF < 100%</td><td>5</td></tr>
<tr><td>D</td><td>75% ≤ SF < 90%</td><td>7</td></tr>
<tr><td>E</td><td>SF < 75%</td><td>9</td></tr>
</table></td></tr>
<tr><td>모 델 링</td><td colspan="4">  </td></tr>
</table>

2) 증측부

<table>
<tr><th>항 목</th><th colspan="4">내 용</th></tr>
<tr><td>검토 목적</td><td colspan="4">본 검토는 2004년에 준공된 학생교육원 대천임해 별관동-증측부를 대상으로 중력하중에 대해 건축구조기준(KDS 41)에서 제시하하고 있는 보유내력을 확보하고 있는지 검토하고 내력이 부족한 경우 적절한 보강을 통해 구조물의 안전성을 확보하고자 한다.</td></tr>
<tr><td rowspan="8">적용 규준</td><td colspan="2">구 분</td><td>내 용</td><td>비 고</td></tr>
<tr><td colspan="2">적 용 기 준</td><td>·건축구조기준 (KDS 41)</td><td>-</td></tr>
<tr><td colspan="2">검 토 하 중</td><td>·검토하중 참조</td><td>현행 설계기준
활하중적용</td></tr>
<tr><td colspan="2">건 물 규 모</td><td>·지상4층</td><td>-</td></tr>
<tr><td rowspan="2">재료
강도</td><td>콘크리트압축강도</td><td>·fck = 27.55MPa</td><td>코어테스트</td></tr>
<tr><td>철근항복강도</td><td>·fy = 400MPa</td><td>설계도서 참고</td></tr>
<tr><td colspan="2">기초 형식</td><td>· 알수없음</td><td>-</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>평가 등급</td><td colspan="4">부재별 내력에 대한 안전성 평가등급 기준(세부지침, 2021. 12)
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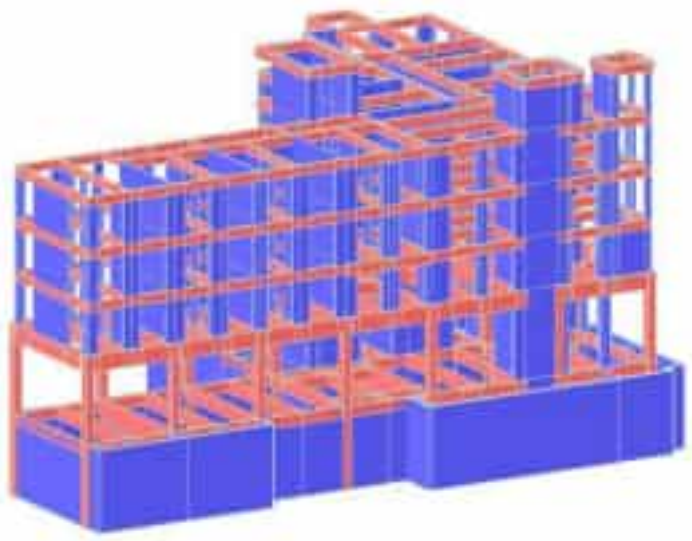
<tr><td>모 델 링</td><td colspan="4">  </td></tr>
</table>

1.4 적용하중

검토하중은 대상 건축물의 고정하중과 현재 사용중인 용도를 참고하여 적재하중을 적용하였으며, 적용한 하중은 다음과 같다.

1) 기존부

[표 1.4.1] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
홀 (1F)	대리석 몰탈 Con'c Slab Celling	20 50 150	27 20 24	0.54 1.00 3.60 0.30			
				5.44	**5.00**	**10.44**	**14.53**
복도 (1F)	몰탈 & 방수 Con'c Slab Celling	30 150	20 24	0.60 3.60 0.20			
				4.40	**5.00**	**9.40**	**13.28**
화장실 (1F)	몰탈 & 마감 Con'c Slab Celling	60 150	20 24	1.20 3.60 0.30			
				5.10	**3.00**	**8.10**	**10.92**
실 (1F)	판넬히팅 & 마감 Con'c Slab Celling	150	24	1.30 3.60 0.30			
				5.20	**2.00**	**7.20**	**9.44**
옥외 휴게공간 (2F)	무근콘크리트 & 방수 몰탈 Con'c Slab Celling	67 24 165	23 20 24	1.54 0.48 3.96 0.30			
				6.28	**3.00**	**9.28**	**12.34**
실 (2F)	판넬히팅 & 마감 Con'c Slab Celling	165	24	1.30 3.96 0.30			
				5.56	**2.00**	**7.56**	**9.87**

[표 1.4.2] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
복도 (2F)	몰탈 & 방수 Con'c Slab Celling	30 165	20 24	0.60 3.96 0.30			
				4.86	**5.00**	**9.86**	**13.83**
세미나실 (2F)	몰탈 & 방수 Con'c Slab Celling	60 165	20 24	1.20 3.96 0.30			
				5.46	**5.00**	**10.46**	**14.55**
화장실 (2F)	몰탈 & 방수 Con'c Slab Celling	60 165	20 24	1.20 3.96 0.30			
				5.46	**2.00**	**7.46**	**9.75**
실 (3~4F)	판넬히팅 & 마감 Con'c Slab Celling	135	24	1.30 3.24 0.30			
				4.84	**2.00**	**6.84**	**9.01**
화장실(3~ 4F)	몰탈 & 마감 Con'c Slab Celling	60 135	20 24	1.20 3.24 0.30			
				4.74	**2.00**	**6.74**	**8.89**
화장실 (3~4F)	몰탈 & 마감 Con'c Slab Celling	60 135	20 24	1.20 3.24 0.30			
				4.74	**2.00**	**6.74**	**8.89**

[표 1.4.3] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
ELEV. 기계실	몰탈 & 마감	60	20	1.20			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.10	**5.00**	**10.10**	**14.12**
지붕층	무근콘크리트 & 마감	100	23	2.30			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				7.20	**3.00**	**10.20**	**13.44**
지붕층 (옥외정원)	무근콘크리트 & 마감	100	23	2.30			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				7.20	**5.00**	**12.20**	**16.64**
옥탑 지붕층	몰탈 & 방수	60	20	1.20			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.10	**1.00**	**6.10**	**7.72**
계단	화강석마감	30	27	0.81			
	몰탈	30	20	0.60			
	Con'c Slab	230	24	5.52			
				6.93	**5.00**	**11.93**	**16.32**
원장실 지원실 사무실	몰탈 & 마감	30	27	0.81			
	Con'c Slab	150	20	3.00			
	Celling			0.30			
				4.11	**2.50**	**6.90**	**9.28**

2) 증축부

[표 1.4.4] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
홀 (1F)	대리석	20	27	0.54			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.44	**5.00**	**10.44**	**14.53**
화장실 (1F)	몰탈 & 마감	60	20	1.20			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.10	**3.00**	**8.10**	**10.92**
다목적 강당 (1F)	합성목후로링	48	7	0.34			
	몰탈	24	20	0.48			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				4.72	**5.00**	**9.72**	**13.66**
필로티 (1F)	무근콘크리트 & 마감	100	23	2.30			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				7.20	**5.00**	**12.20**	**16.64**
실 (1F)	판텔히팅 & 마감			1.30			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.20	**2.00**	**7.20**	**9.44**
옥외휴게 공간 (2F)	무근콘크리트 & 방수	67	23	1.54			
	몰탈	24	20	0.48			
	Con'c Slab	165	24	3.96			
	Celling			0.30			
				6.28	**3.00**	**9.28**	**12.34**

[표 1.4.5] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
실 (2F)	판텔히팅 & 마감 Con'c Slab Celling	 165 	 24 	1.30 3.96 0.30			
				5.56	**2.00**	**7.56**	**9.87**
복도 (2F)	몰탈 & 방수 Con'c Slab Celling	60 165 	20 24 	1.20 3.96 0.30			
				5.46	**5.00**	**10.46**	**14.55**
세미나실 (2F)	몰탈 & 방수 Con'c Slab Celling	60 165 	20 24 	1.20 3.96 0.30			
				5.46	**5.00**	**10.46**	**14.55**
화장실 (2F)	몰탈 & 방수 Con'c Slab Celling	60 165 0	20 24 	1.20 3.96 0.30			
				5.46	**2.00**	**7.46**	**9.75**
실 (3~4F)	판넬히팅 & 마감 Con'c Slab Celling	 135 	 24 	1.30 3.24 0.30			
				4.84	**2.00**	**6.84**	**9.01**
복도 (3~4F)	몰탈 & 방수 Con'c Slab Celling	30 135 	20 24 	0.60 3.24 0.30			
				4.14	**5.00**	**9.14**	**12.97**

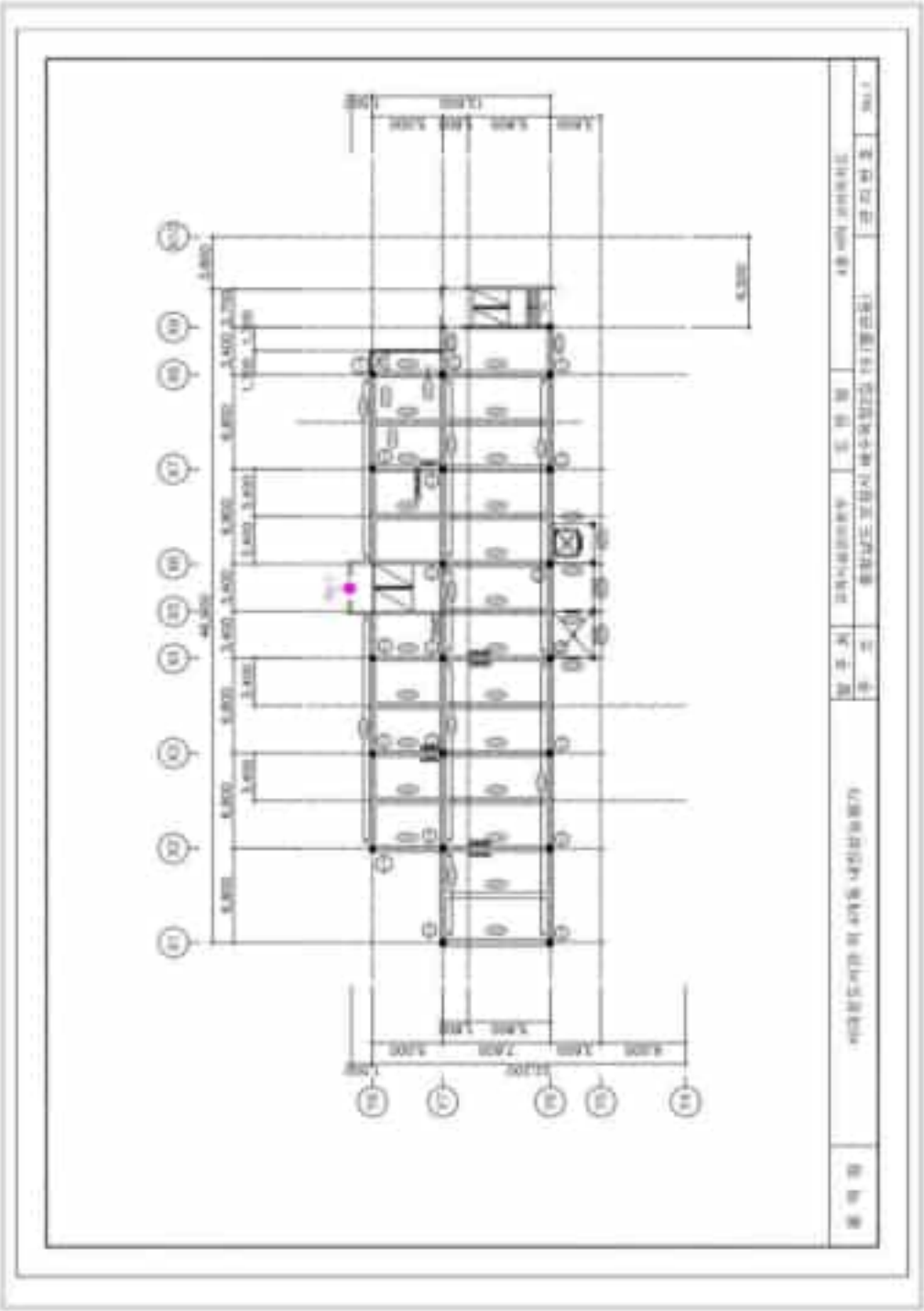
[표 1.4.6] 하중표 (단위 : kN/m2)

용도	재료	두께(mm)	비중(kN/m3)	고정하중	적재하중	사용하중	계수하중
세미나실 (3~4F)	몰탈 & 방수	60	20	1.20			
	Con'c Slab	135	24	3.24			
	Celling			0.30			
				4.74	**5.00**	**9.74**	**13.69**
화장실 (3~4F)	몰탈 & 마감	60	20	1.20			
	Con'c Slab	135	24	3.24			
	Celling			0.30			
				4.74	**2.00**	**6.74**	**8.89**
ELEV. 기계실	몰탈 & 마감	60	20	1.20			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.10	**5.00**	**10.10**	**14.12**
지붕층	무근콘크리트 & 마감	100	23	2.30			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				7.20	**3.00**	**10.20**	**13.44**
지붕층 (옥외정원)	무근콘크리트 & 마감	100	23	2.30			
	몰탈	50	20	1.00			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				7.20	**5.00**	**12.20**	**16.64**
옥탑 지붕층	몰탈 & 방수	60	20	1.20			
	Con'c Slab	150	24	3.60			
	Celling			0.30			
				5.10	**1.00**	**6.10**	**7.72**
계단	화강석마감	30	27	0.81			
	몰탈	30	20	0.60			
	Con'c Slab	230	24	5.52			
				6.93	**5.00**	**11.93**	**16.32**

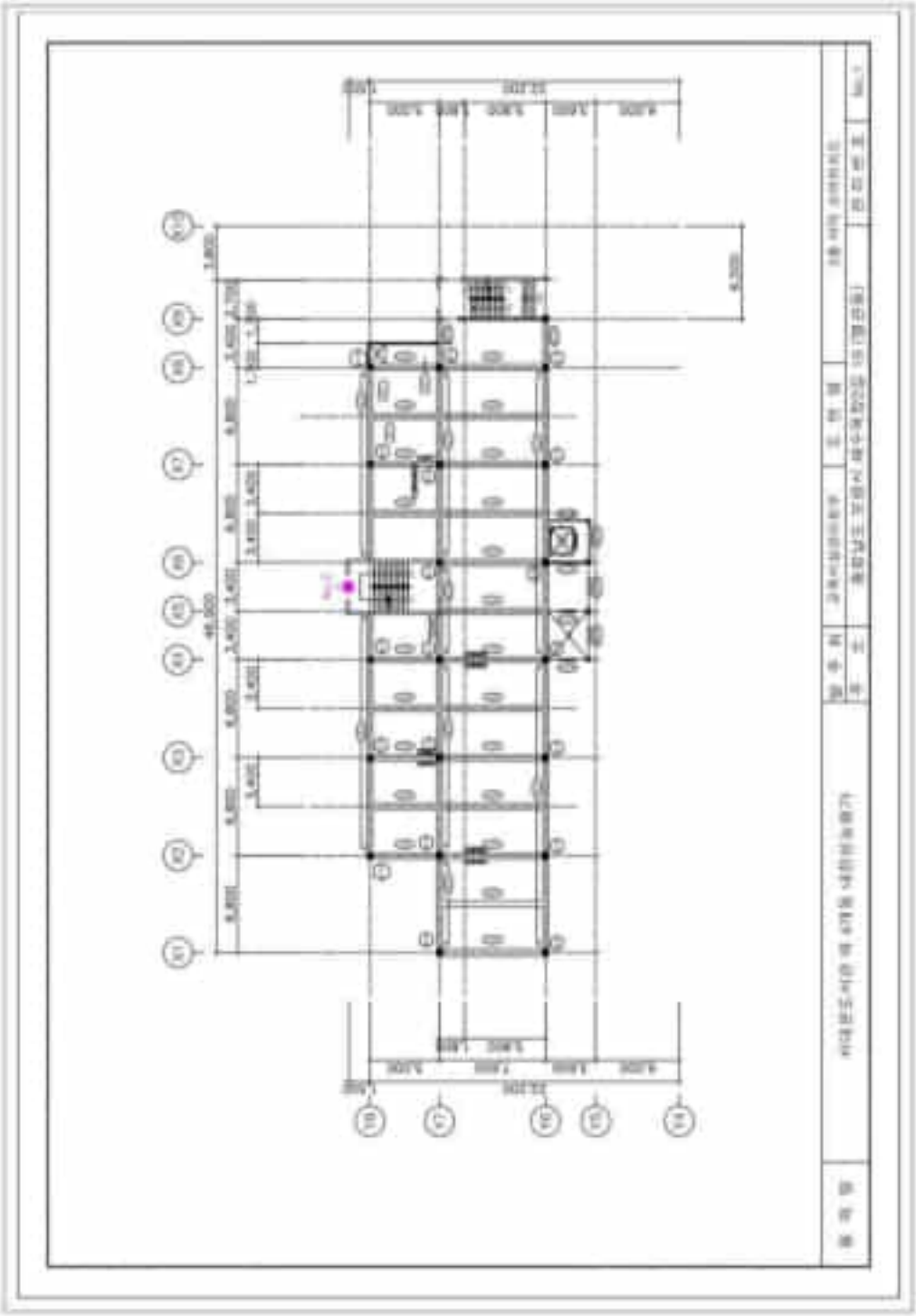
1.5 적용 재료강도

1.5.1 콘크리트

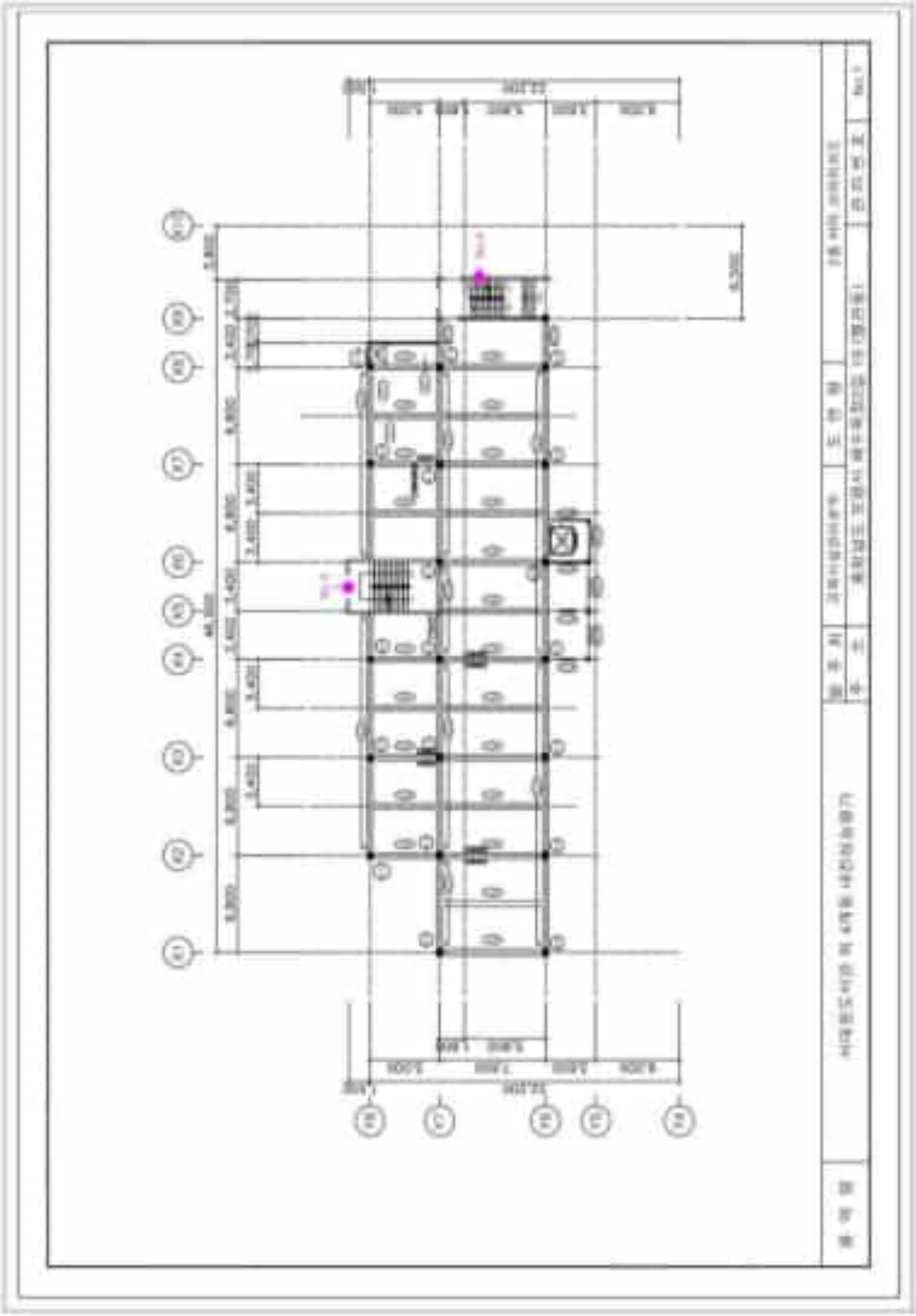
1) 기존부



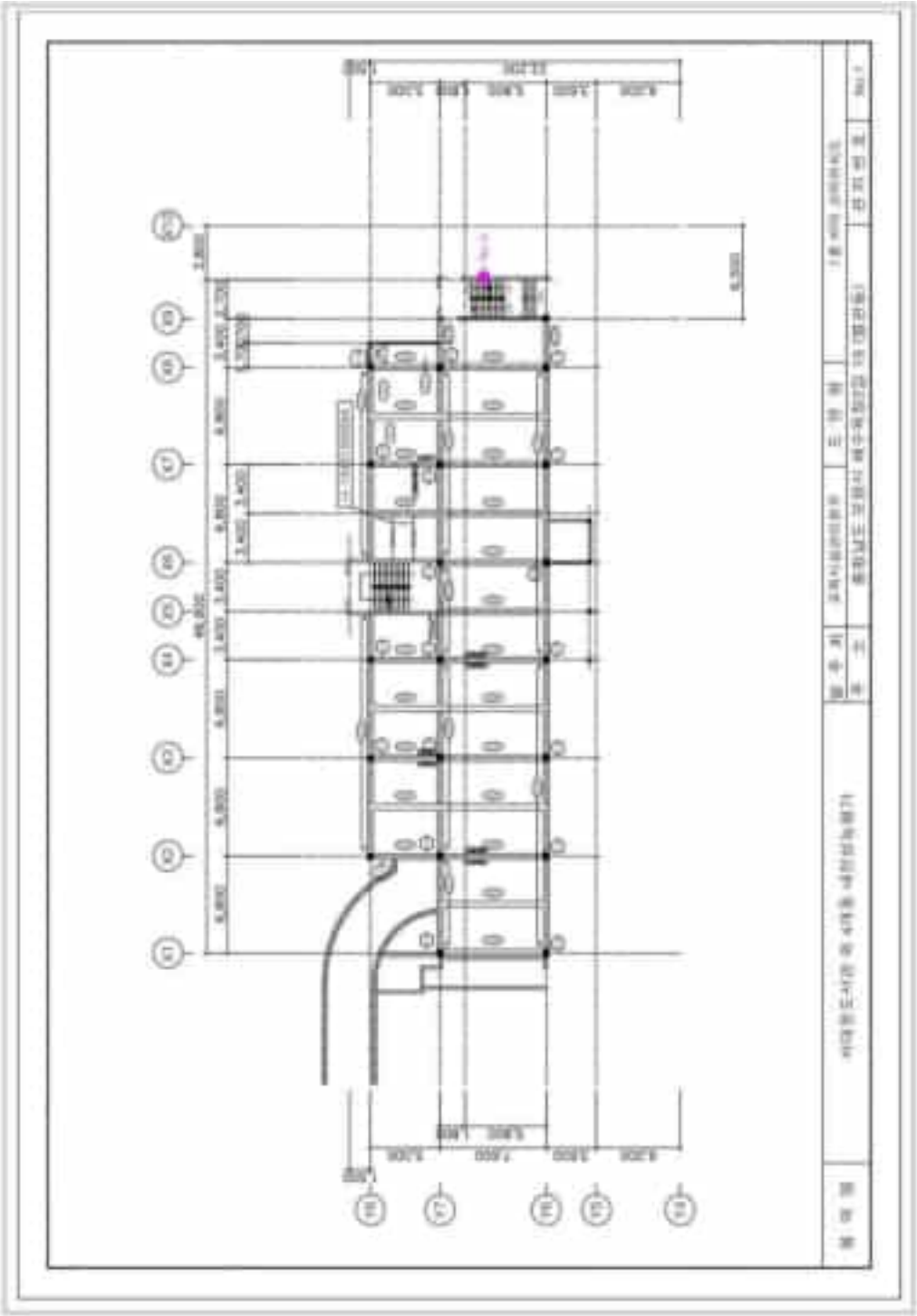
[그림 1.5.1] 기존부 4층 바닥 코어위치도



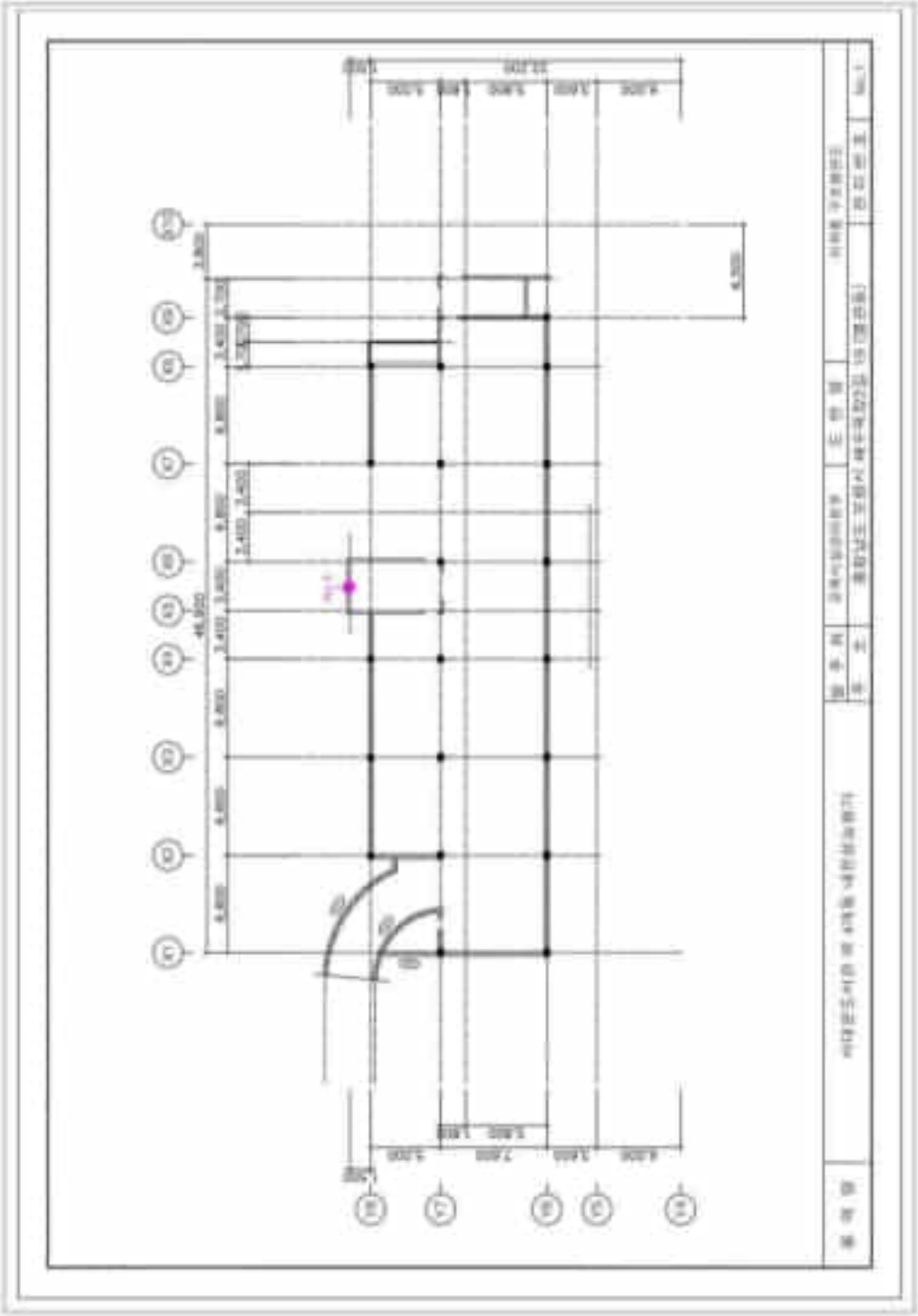
[그림 1.5.2] 기존부 3층 바닥 코어위치도



[그림 1.5.3] 기존부 2층 바닥 코어위치도

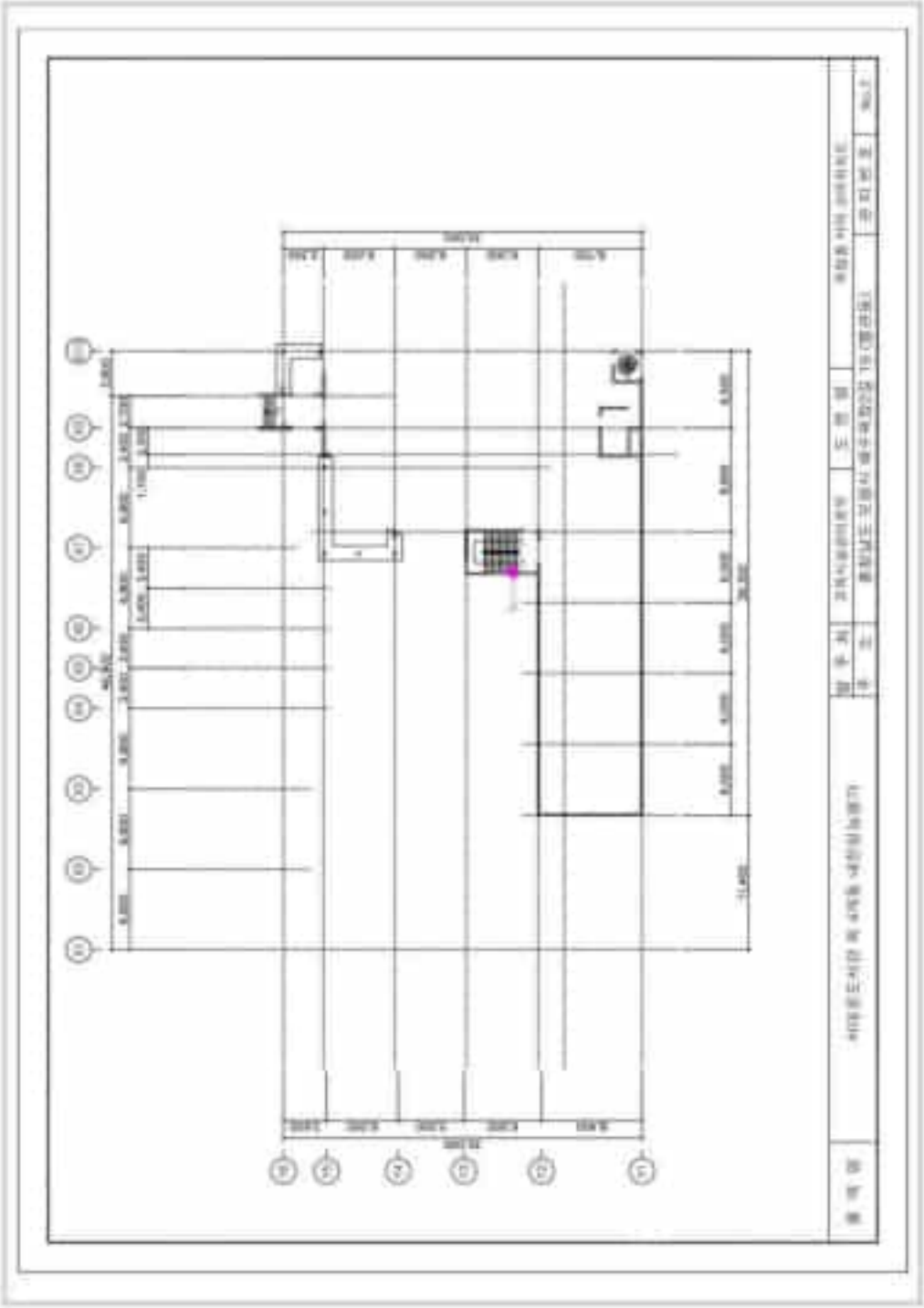


[그림 1.5.4] 기존부 1층 바닥 코어위치도



[그림 1.5.5] 기존부 지하층 바닥 코어위치도

2) 증측부

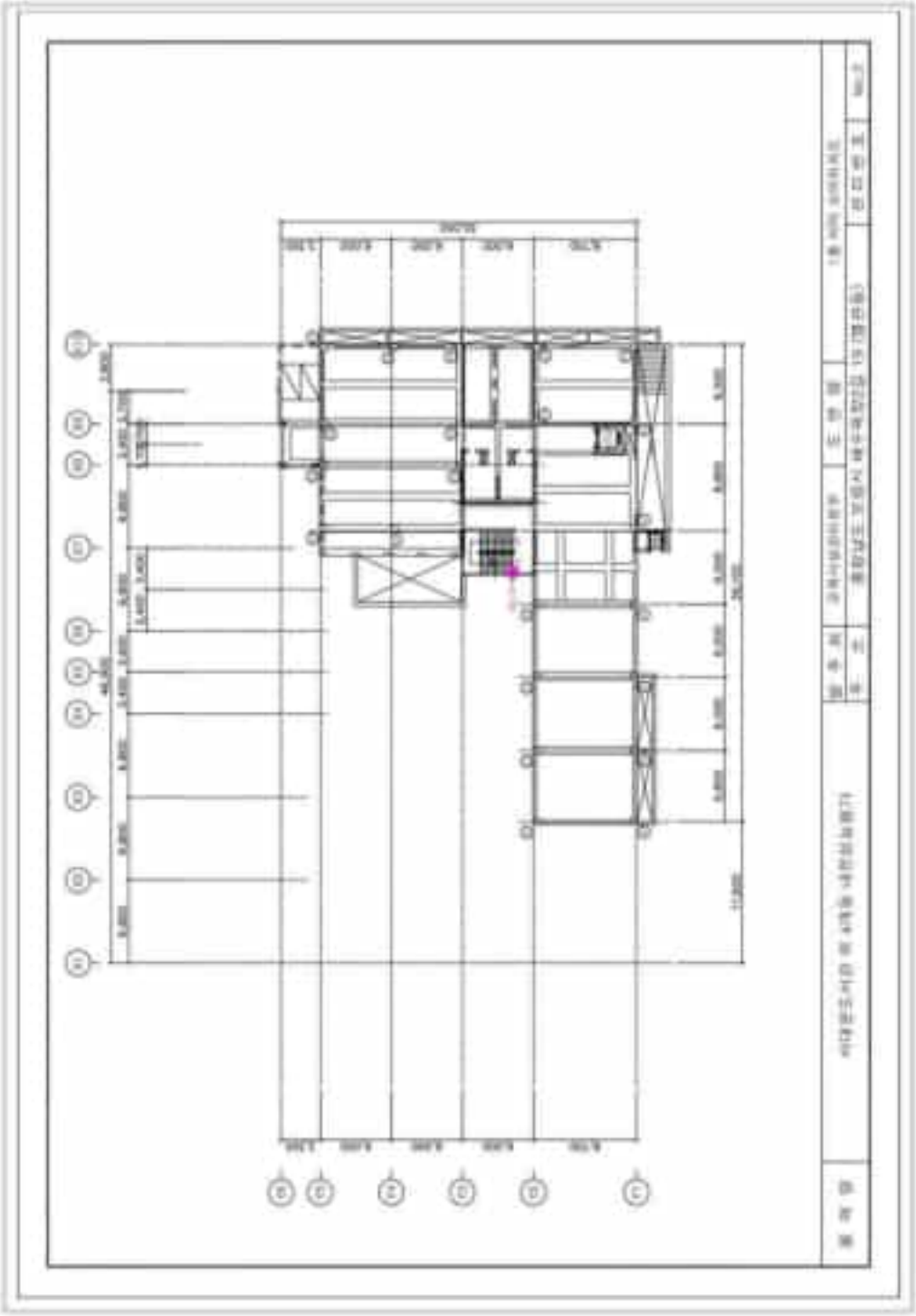


[그림 1.5.6] 증측부 옥탑층 바닥 코어위치도

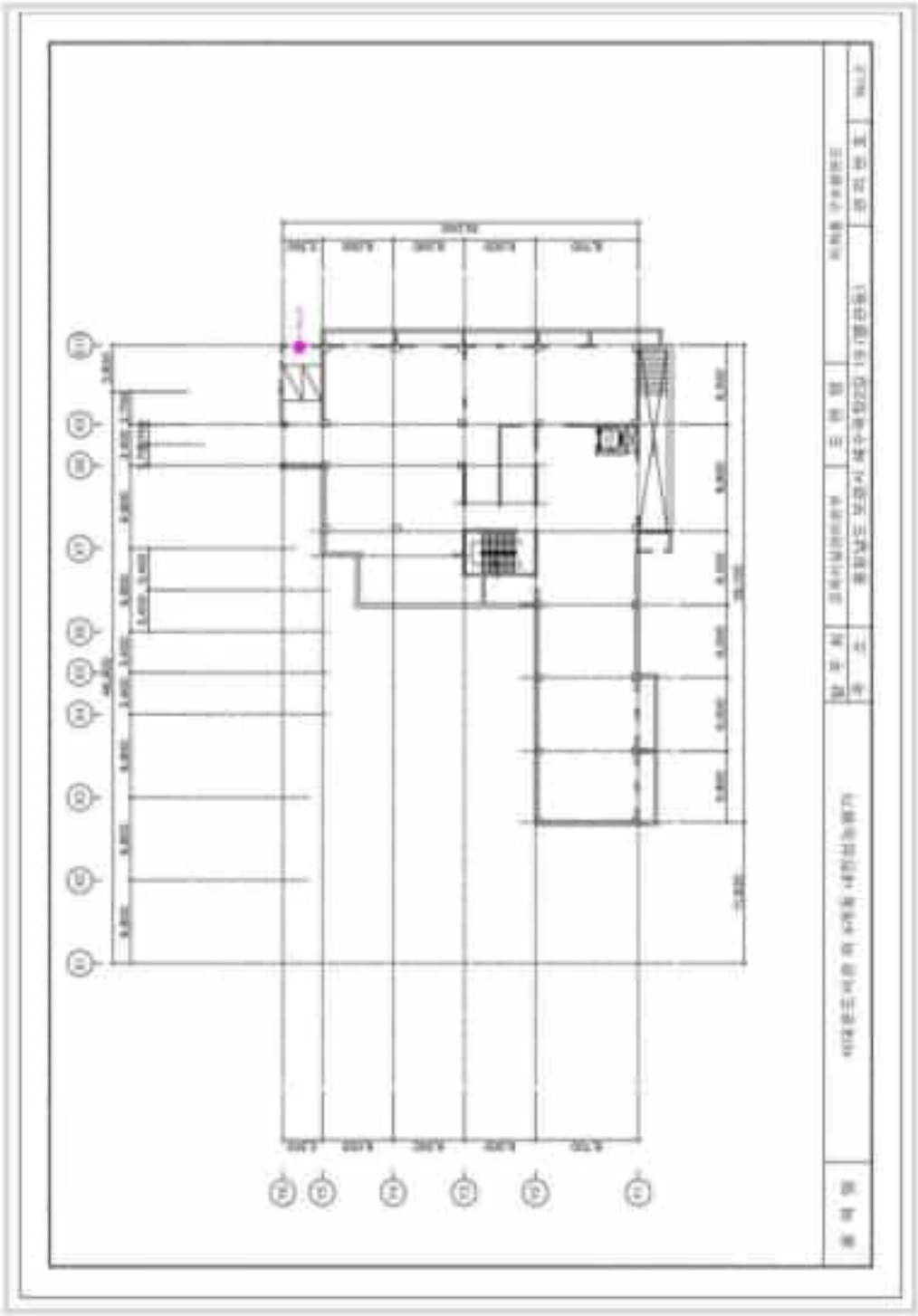
[그림 1.5.7] 증측부 4층 바닥 코어위치도

[그림 1.5.8] 증측부 3층 바닥 코어위치도

[그림 1.5.9] 증측부 2층 바닥 코어위치도



[그림 1.5.10] 증측부 1층 바닥 코어위치도



[그림 1.5.11] 증측부 지하층 바닥 코어위치도

3)시험성적서

SGS 시 험 성 적 서

한국에스지에스(주) 건설시험연구원 | 성적서 번호 : CMT2020-4974

https://www.sgsgroup.kr

1. 의뢰인

- 기 관 명 : 한국시설안전연구원 김 해 진
- 주 소 : 서울특별시 송파구 송파대로 167, 테라타워 A동 1015호
- 의뢰일자 : 2020년 07월 07일

2. 시험성적서의 용도 : 품질시험용, 연구시험

3. 시험대상물의 종류 : 콘크리트, 시료명 : 콘크리트 코어

4. 시험기간 : 2020년 07월 07일 ~ 2020년 07월 17일

5. 시험장소 : ■ 고정시험실 □ 현장시험

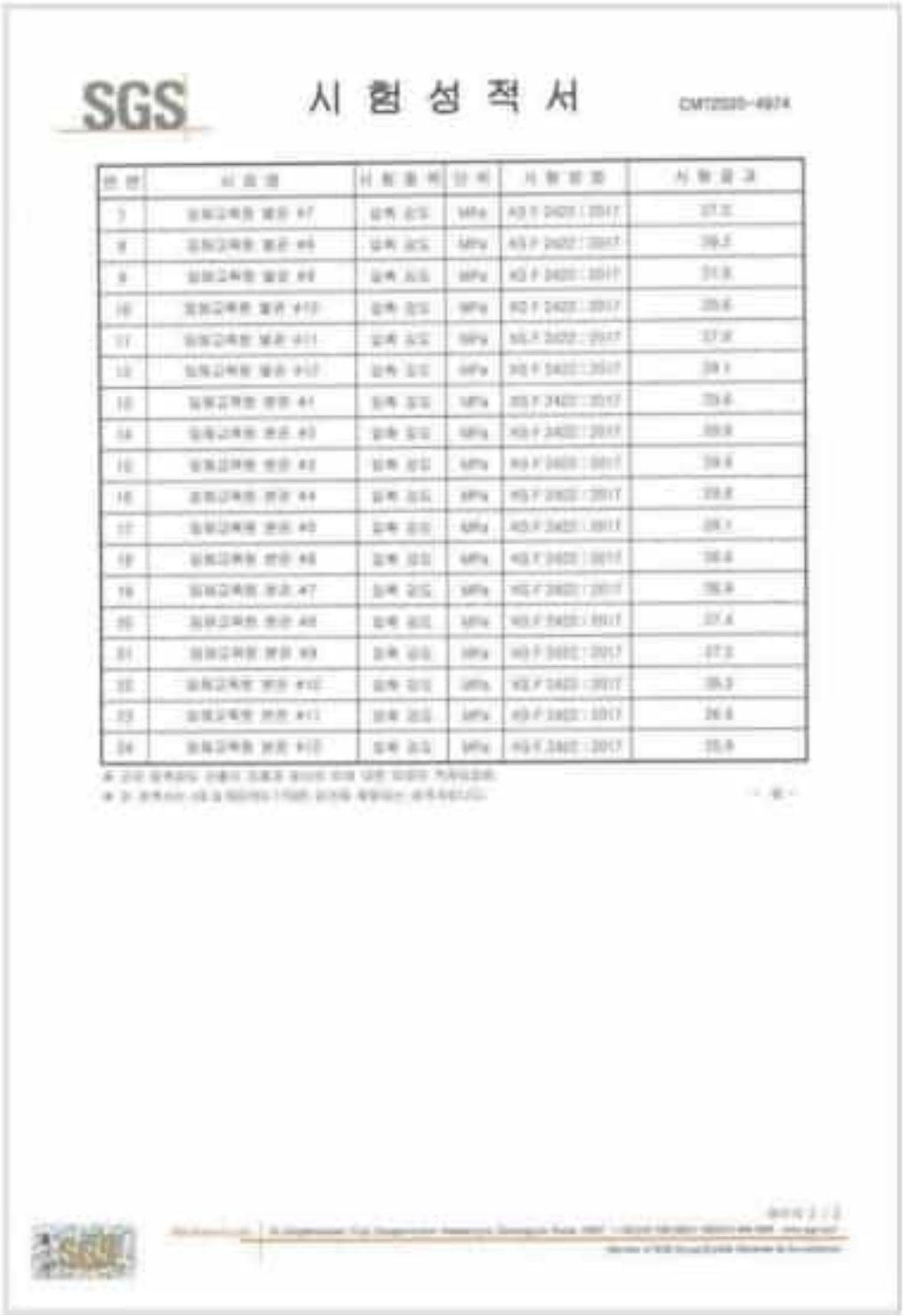
6. 시험결과 : 시험방법서에 의 4개월 경과일현재 결과

번호	시 료 명	시 험 종 류	단 위	시 험 방 법	시 험 결 과
1	콘크리트 코어 #1	압축 강도	MPa	KS F 2422 : 2017	[illegible]
2	콘크리트 코어 #2	압축 강도	MPa	KS F 2422 : 2017	[illegible]
3	콘크리트 코어 #3	압축 강도	MPa	KS F 2422 : 2017	[illegible]
4	콘크리트 코어 #4	압축 강도	MPa	KS F 2422 : 2017	[illegible]
5	콘크리트 코어 #5	압축 강도	MPa	KS F 2422 : 2017	[illegible]
6	콘크리트 코어 #6	압축 강도	MPa	KS F 2422 : 2017	[illegible]

2020 년 08 월 20 일

한국에스지에스(주) 건설시험연구원

[그림 1.5.12] 코어 압축강도 시험성적서



SGS 시 험 성 적 서

번 호	시 료 명	시 험 종 목	단 위	시 험 방 법	시 험 결 과
7	일체고무형 별관 #7	압축 강도	MPa	KS F 2405 : 2017	27.2
8	일체고무형 별관 #8	압축 강도	MPa	KS F 2405 : 2017	28.5
9	일체고무형 별관 #9	압축 강도	MPa	KS F 2405 : 2017	31.8
10	일체고무형 별관 #10	압축 강도	MPa	KS F 2405 : 2017	25.6
11	일체고무형 별관 #11	압축 강도	MPa	KS F 2405 : 2017	27.9
12	일체고무형 별관 #12	압축 강도	MPa	KS F 2405 : 2017	28.1
13	일체고무형 본관 #1	압축 강도	MPa	KS F 2405 : 2017	29.6
14	일체고무형 본관 #2	압축 강도	MPa	KS F 2405 : 2017	30.9
15	일체고무형 본관 #3	압축 강도	MPa	KS F 2405 : 2017	29.9
16	일체고무형 본관 #4	압축 강도	MPa	KS F 2405 : 2017	28.8
17	일체고무형 본관 #5	압축 강도	MPa	KS F 2405 : 2017	28.1
18	일체고무형 본관 #6	압축 강도	MPa	KS F 2405 : 2017	30.4
19	일체고무형 본관 #7	압축 강도	MPa	KS F 2405 : 2017	29.9
20	일체고무형 본관 #8	압축 강도	MPa	KS F 2405 : 2017	27.4
21	일체고무형 본관 #9	압축 강도	MPa	KS F 2405 : 2017	27.2
22	일체고무형 본관 #10	압축 강도	MPa	KS F 2405 : 2017	28.3
23	일체고무형 본관 #11	압축 강도	MPa	KS F 2405 : 2017	26.8
24	일체고무형 본관 #12	압축 강도	MPa	KS F 2405 : 2017	25.9

[그림 1.5.13] 코어 압축강도 시험성적서

코어채취 및 압축강도시험 후 '기존 시설물(건축물) 내진성능 평가요령'에 따라 산정한 콘크리트의 설계기준강도 및 평균강도는 다음과 같다.

[표 1.5.1] 별관동 기존부 콘크리트 강도 산정

구분	압축강도 [MPa]	구분	압축강도 [MPa]
별관동 기존부	30.80	m	29.600
	30.50	s	1.062
	30.10	s/m	0.036
	29.30	m-s	28.538
	28.90	0.75(m-s)	21.403
	28.00	0.75m	22.200
	-	**설계기준강도**	**28.54**
	-	**평균강도**	**29.60**

[표 1.5.2] 별관동 증측부 콘크리트 강도 산정

구분	압축강도 [MPa]	구분	압축강도 [MPa]
별관동 증측부	27.50	m	28.200
	29.30	s	0.651
	27.80	s/m	0.023
	28.60	m-s	27.549
	27.90	0.75(m-s)	20.662
	28.10	0.75m	21.150
	-	**설계기준강도**	**27.55**
	-	**평균강도**	**28.20**

1.5.2 철근

기존부의 경우 구조도면이 존재하지 않으며 철근에 대한 재료강도를 알 수 있는 정보가 부족하여, 관련 매뉴얼에 따른 '건설연도별 재료의 기본값'을 적용하였으며 증측부의 경우 설계도서를 참고하여 설계당시 철근의 재료강도인 SD400(fy=400MPa)를 적용하였다. 학생교육원 대천임해 별관동 기존부의 준공년도는 1996년으로 철근의 재료강도는 SD300(fy=300MPa)을 적용하였다.

1.5.3 조적허리벽 및 조적채움벽

조적에 대한 상태 및 적용 재료강도는 현장조사를 실시한 전차용역보고서를 참조하여 설정하였다. 조적허리벽 및 조적채움벽은 양호 상태로 설계압축강도 fa=6.2MPa을 적용하였다. 탄성계수는 관련 매뉴얼 지침에 따라 산정하였으며 재료 특성의 평균값(1.3배)를 적용하였다.

<표 3.2.12> 조적채움벽 및 사용상태 조사 현황

구 분	조사번호	부재명	균열상태	접합부상태	비고
지상4층	B-1	채움벽	양호	양호	
	B-2	채움벽	양호	양호	
	B-3	채움벽	양호	양호	
	B-4	채움벽	양호	양호	
	B-5	채움벽	양호	양호	
	B-6	채움벽	양호	양호	
지상3층	B-7	채움벽	양호	양호	
	B-8	채움벽	양호	양호	
	B-9	채움벽	양호	양호	
	B-10	채움벽	양호	양호	
	B-11	채움벽	양호	양호	
	B-12	채움벽	양호	양호	
지상2층	B-13	채움벽	양호	양호	
	B-14	채움벽	양호	양호	
	B-15	채움벽	양호	양호	
	B-16	채움벽	양호	양호	
	B-17	채움벽	양호	양호	
	B-18	채움벽	양호	양호	
지상1층	B-19	채움벽	양호	양호	
	B-20	채움벽	양호	양호	
	B-21	채움벽	양호	양호	
	B-22	채움벽	양호	양호	

[그림 1.5.13] 조적채움벽 상태조사

1.6 연직하중 안전성 검토

1.6.1 평가를 위한 강도감소계수

기존 구조물에 대한 안전성 검토시 관련 매뉴얼에 따라 다음과 같이 강도감소계수를 적용하였다.

① KDS 14 20 20(4.1.2(4))에서 정의된 인장지배단면 : 1.0

② KDS 14 20 20(4.1.2(4))에서 정의된 압축지배단면

가. KDS 14 20 20(4.3.2)에 따르는 나선철근으로 보강된 부재 : 0.85

나. 기타 부재 : 0.80

③ 전단력 및 비틀림모멘트 : 0.80

④ 콘크리트에 작용한 지압력 : 0.80

[그림 1.6.1] 평가를 위한 강도감소계수 적용

1.6.2 평가 하중조합

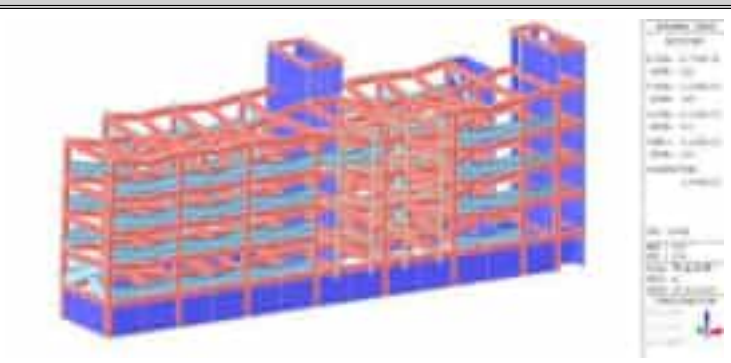
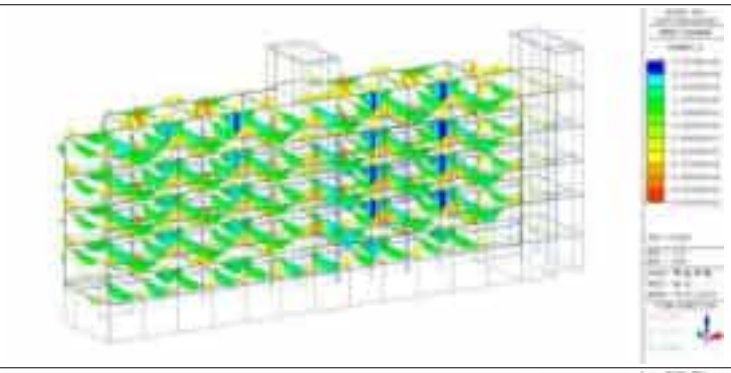
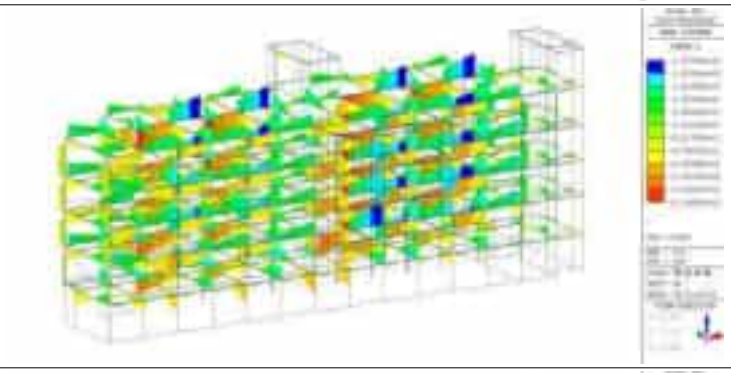
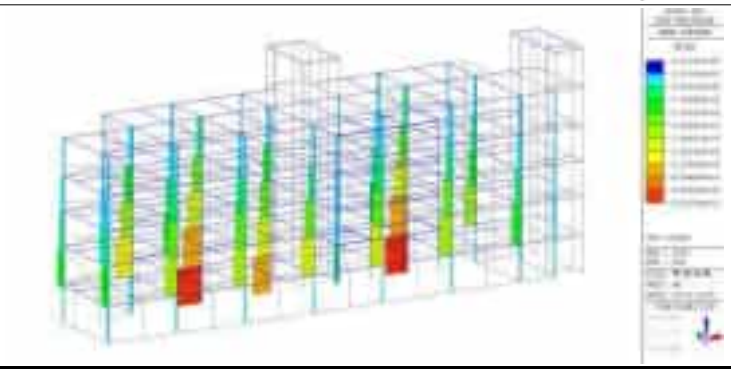
건축구조기준 설계하중(KDS 41 10 15)에 따라 아래 하중조합으로 기존 구조물의 연직하중 안전성 검토를 수행한다.

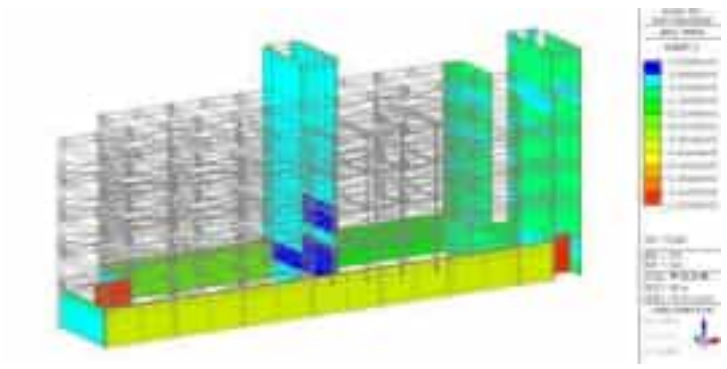
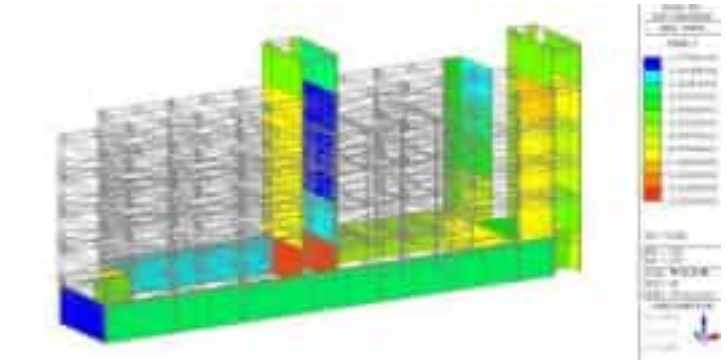
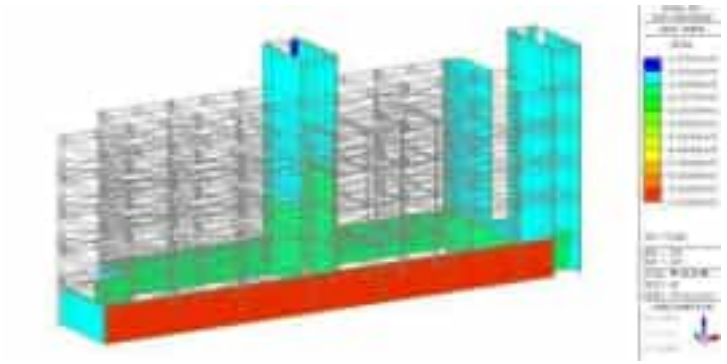
① 1.0DL + 1.0LL

* DL : 고정하중, LL : 적재하중

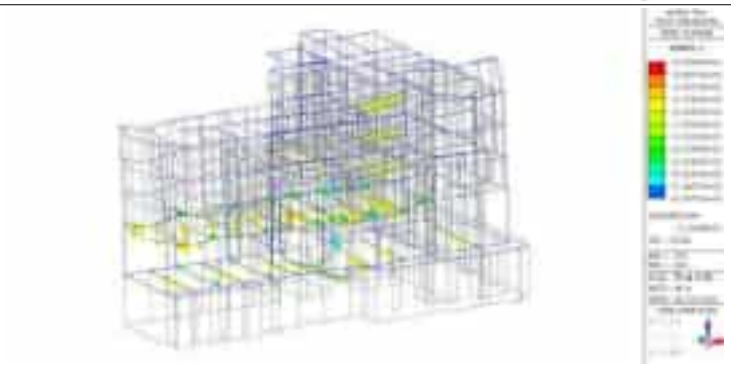
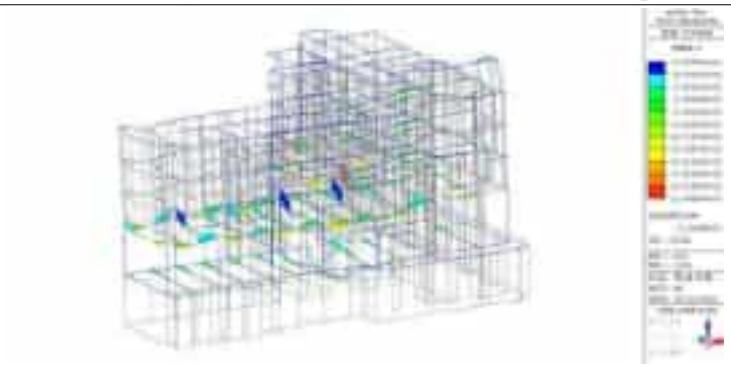
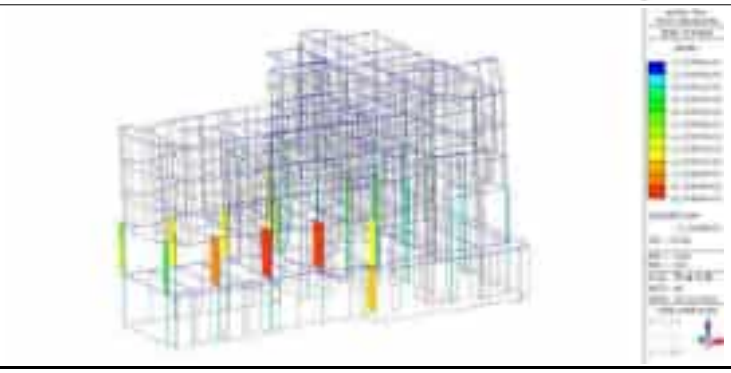
1.6.3 검토결과

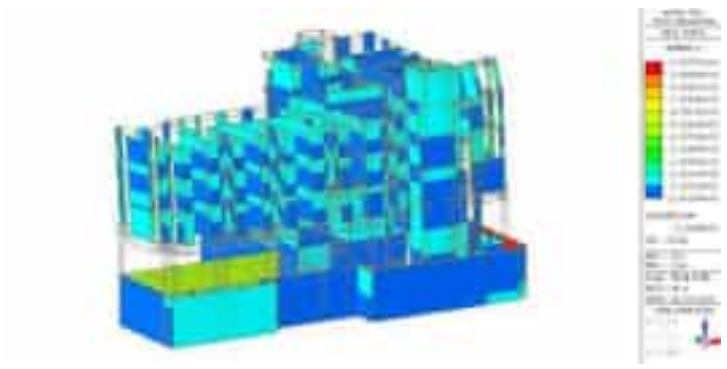
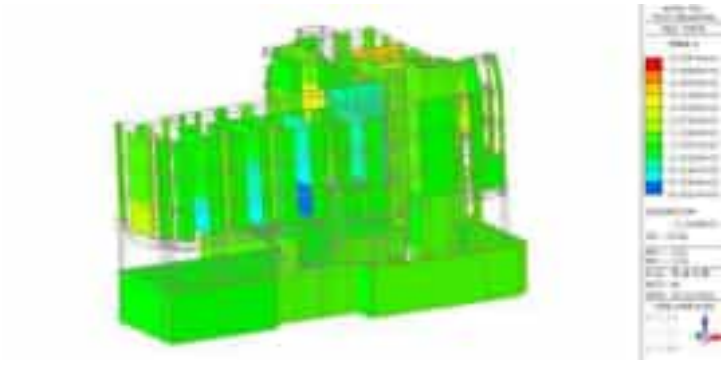
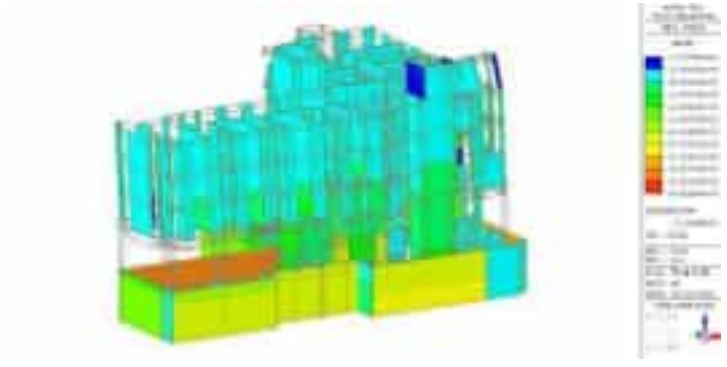
1) 기존부

항 목	내 용
Deformed Shape	
Beam Bending Moment Diagram	
Beam Shear Force Diagram	
Beam Axial Force Diagram	

항 목	내 용
Wall Moment Force	
Wall Shear Force	
Wall Axial Force	

2) 증측부

항 목	내 용
Deformed Shape	
Beam Bending Moment Diagram	
Beam Shear Force Diagram	
Beam Axial Force Diagram	

항 목	내 용
Wall Moment Force	
Wall Shear Force	
Wall Axial Force	

1.6.3.1 보 구조안전성 검토

· 대상 건축물의 RC보를 검토한 결과, 보의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

1) 기존부

[표 1.6.1] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상2층	2G1	내력	221.65	143.87	221.65	139.56	296.39	139.56	246.34	220.07	246.31	OK
		외력	176.97	25.74	157.23	69.31	148.89	98.97	150.27	85.83	150.25	
	400x600	Ratio	0.80	0.18	0.71	0.50	0.50	0.71	0.61	0.39	0.61	
	2G4	내력	378.85	143.53	142.36	150.93	266.66	142.36	307.83	314.49	310.24	OK
		외력	160.72	0.00	106.53	17.14	130.07	38.93	120.05	91.20	105.48	
	500x600	Ratio	0.42	0.00	0.75	0.11	0.49	0.27	0.39	0.29	0.34	
	2G2	내력	221.65	139.56	221.65	139.56	221.65	139.56	271.67	273.87	274.92	OK
		외력	105.07	13.06	87.95	22.04	74.47	29.83	92.37	57.51	85.23	
	400x600	Ratio	0.47	0.09	0.40	0.16	0.34	0.21	0.34	0.21	0.31	
	2B1	내력	296.39	143.87	139.56	143.87	296.39	221.65	239.17	222.87	244.92	OK
		외력	171.19	0.00	118.31	100.46	170.28	101.13	160.24	82.46	149.40	
	400x600	Ratio	0.58	0.00	0.85	0.70	0.57	0.46	0.67	0.37	0.61	
	2B2	내력	296.39	139.34	139.03	143.87	180.37	139.03	239.46	223.50	244.48	OK
		외력	116.49	34.70	18.71	0.00	35.57	26.96	74.23	55.88	44.01	
	400x600	Ratio	0.39	0.25	0.13	0.00	0.20	0.19	0.31	0.25	0.18	
	2G4A	내력	180.55	180.55	180.55	180.55	180.55	180.55	244.83	241.06	247.58	OK
		외력	38.34	52.75	90.13	1.61	1.61	0.00	31.83	45.80	51.99	
	400x600	Ratio	0.21	0.29	0.50	0.01	0.01	0.00	0.13	0.19	0.21	
	2G4-1	내력	378.85	143.53	378.85	150.93	266.66	150.93	305.07	311.60	305.32	OK
		외력	216.21	2.09	226.50	39.67	213.84	36.50	183.04	137.10	180.14	
	500x600	Ratio	0.57	0.01	0.60	0.26	0.80	0.24	0.60	0.44	0.59	
	2B3	내력	145.58	148.30	145.58	333.41	406.73	333.41	243.94	218.15	245.14	OK
		외력	122.54	0.00	105.80	114.31	200.86	136.16	158.56	91.62	144.63	
	400x600	Ratio	0.84	0.00	0.73	0.34	0.49	0.41	0.65	0.42	0.59	
	2G3	내력	565.62	195.09	565.62	195.40	489.30	195.40	299.91	302.12	298.80	OK
		외력	247.50	0.00	193.28	93.53	299.83	85.97	200.94	157.10	197.21	
	500x600	Ratio	0.44	0.00	0.34	0.48	0.61	0.44	0.67	0.52	0.66	

* Ratio = 외력/내력

* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.2] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상3층	3G1	내력	221.65	143.87	221.65	139.56	296.39	139.56	245.92	220.96	244.17	OK
		외력	170.66	12.89	152.73	104.89	146.10	83.00	145.09	88.38	151.39	
	400x600	Ratio	0.77	0.09	0.69	0.75	0.49	0.59	0.59	0.40	0.62	
	3B1	내력	296.39	143.87	139.56	143.87	296.39	221.65	239.87	221.56	245.34	OK
		외력	169.68	5.16	111.11	89.98	168.48	101.15	153.52	79.76	144.75	
	400x600	Ratio	0.57	0.04	0.80	0.63	0.57	0.46	0.64	0.36	0.59	
	3G2	내력	221.65	139.56	221.65	139.56	221.65	139.56	274.08	280.43	274.10	OK
		외력	86.99	2.23	86.16	26.46	72.74	24.80	87.71	58.89	93.19	
	400x600	Ratio	0.39	0.02	0.39	0.19	0.33	0.18	0.32	0.21	0.34	
	3B2	내력	296.39	139.34	139.03	143.87	180.37	139.03	235.27	227.59	248.68	OK
		외력	110.27	28.20	106.12	25.57	34.39	25.25	72.93	54.62	72.12	
	400x600	Ratio	0.37	0.20	0.76	0.18	0.19	0.18	0.31	0.24	0.29	
	3G1A	내력	221.65	143.87	221.65	139.56	296.39	139.56	244.70	218.71	243.52	OK
		외력	135.02	0.00	154.07	83.78	131.58	53.22	141.93	83.11	146.11	
	400x600	Ratio	0.61	0.00	0.70	0.60	0.44	0.38	0.58	0.38	0.60	
	3G4A	내력	180.55	180.55	180.55	180.55	180.55	180.55	241.75	242.83	244.94	OK
		외력	23.43	83.16	82.85	29.43	8.70	0.00	77.36	87.42	44.09	
	400x600	Ratio	0.13	0.46	0.46	0.16	0.05	0.00	0.32	0.36	0.18	
	3G4	내력	378.85	143.53	378.85	150.93	266.66	150.93	304.98	310.36	303.48	OK
		외력	127.12	0.00	125.26	39.06	135.36	33.72	106.74	80.69	112.29	
	500x600	Ratio	0.34	0.00	0.33	0.26	0.51	0.22	0.35	0.26	0.37	
	3B3	내력	145.58	148.30	145.58	333.41	406.73	333.41	245.55	218.79	242.99	OK
		외력	111.89	0.00	107.66	119.25	205.47	145.87	154.69	89.70	150.66	
	400x600	Ratio	0.77	0.00	0.74	0.36	0.51	0.44	0.63	0.41	0.62	
	3G4-1	내력	378.85	143.53	378.85	150.93	266.66	150.93	306.05	316.48	303.47	OK
		외력	186.30	0.00	201.66	22.46	178.99	31.89	146.91	117.10	157.80	
	500x600	Ratio	0.49	0.00	0.53	0.15	0.67	0.21	0.48	0.37	0.52	
	3G3	내력	565.62	195.09	565.62	195.40	489.30	195.40	298.78	303.24	300.98	OK
		외력	279.45	0.00	235.96	49.58	248.67	57.53	206.16	163.75	192.63	
	500x600	Ratio	0.49	0.00	0.42	0.25	0.51	0.29	0.69	0.54	0.64	
	3B1A	내력	225.02	148.30	145.58	333.35	406.73	333.41	244.63	216.54	244.63	OK
		외력	160.41	0.00	109.16	106.99	165.81	95.96	154.12	77.96	139.44	
	400x600	Ratio	0.71	0.00	0.75	0.32	0.41	0.29	0.63	0.36	0.57	
	3G2A	내력	221.65	139.56	221.65	139.56	221.65	139.56	278.41	270.38	277.52	OK
		외력	100.76	9.41	76.01	13.06	74.02	26.48	83.52	54.08	74.93	
	400x600	Ratio	0.45	0.07	0.34	0.09	0.33	0.19	0.30	0.20	0.27	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.3] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상4층	4G1	내력	221.65	143.87	221.65	139.56	296.39	139.56	246.02	222.45	245.09	OK
		외력	164.91	12.66	102.83	64.79	151.82	124.65	154.99	93.43	144.60	
	400x600	Ratio	0.74	0.09	0.46	0.46	0.51	0.89	0.63	0.42	0.59	
	4B1	내력	296.39	145.58	139.56	143.87	333.41	221.65	237.83	219.10	242.74	OK
		외력	157.82	6.19	112.80	106.68	163.83	97.08	145.07	78.88	143.22	
	400x600	Ratio	0.53	0.04	0.81	0.74	0.49	0.44	0.61	0.36	0.59	
	4G2	내력	221.65	139.56	221.65	139.56	221.65	139.56	278.53	276.58	277.96	OK
		외력	79.67	2.19	93.25	28.80	71.50	21.50	83.56	60.85	94.51	
	400x600	Ratio	0.36	0.02	0.42	0.21	0.32	0.15	0.30	0.22	0.34	
	4B2	내력	296.39	139.34	139.03	143.87	180.37	139.03	238.72	223.82	241.12	OK
		외력	102.36	25.09	22.74	0.00	33.66	22.93	69.23	51.48	43.40	
	400x600	Ratio	0.35	0.18	0.16	0.00	0.19	0.16	0.29	0.23	0.18	
	4G1A	내력	221.65	143.87	221.65	139.56	296.39	139.56	242.97	220.51	245.53	OK
		외력	118.09	0.00	148.73	119.69	153.91	65.31	157.93	88.21	149.77	
	400x600	Ratio	0.53	0.00	0.67	0.86	0.52	0.47	0.65	0.40	0.61	
	4G4A	내력	180.55	180.55	180.55	180.55	180.55	180.55	244.23	244.84	246.74	OK
		외력	23.31	104.87	84.23	51.37	0.59	0.00	107.46	117.52	54.28	
	400x600	Ratio	0.13	0.58	0.47	0.28	0.00	0.00	0.44	0.48	0.22	
	4G4	내력	378.85	143.53	142.36	150.93	266.66	142.36	305.27	318.27	316.98	OK
		외력	115.19	0.00	113.81	45.04	150.65	34.36	109.90	82.75	107.77	
	500x600	Ratio	0.30	0.00	0.80	0.30	0.56	0.24	0.36	0.26	0.34	
	4B3	내력	145.58	148.30	145.58	333.41	406.73	333.41	243.97	219.11	245.04	OK
		외력	98.73	0.00	93.98	106.77	180.57	121.94	139.06	78.88	129.87	
	400x600	Ratio	0.68	0.00	0.65	0.32	0.44	0.37	0.57	0.36	0.53	
	4G4-1	내력	378.85	143.53	378.85	150.93	266.66	150.93	306.82	314.88	304.37	OK
		외력	173.74	0.00	178.53	23.90	165.45	33.09	138.07	107.06	143.05	
	500x600	Ratio	0.46	0.00	0.47	0.16	0.62	0.22	0.45	0.34	0.47	
	4G3	내력	565.62	195.09	565.62	195.40	489.30	195.40	300.68	301.04	298.84	OK
		외력	290.91	0.00	247.19	65.51	272.12	53.70	219.50	165.57	197.24	
	500x600	Ratio	0.51	0.00	0.44	0.34	0.56	0.27	0.73	0.55	0.66	
	4B1A	내력	225.02	148.30	145.58	333.35	406.73	333.41	246.48	218.29	246.78	OK
		외력	164.97	0.00	120.98	122.90	173.80	92.25	170.07	82.95	143.13	
	400x600	Ratio	0.73	0.00	0.83	0.37	0.43	0.28	0.69	0.38	0.58	
	4G2A	내력	221.65	139.56	221.65	139.56	221.65	139.56	274.69	281.75	277.88	OK
		외력	101.94	12.09	67.76	13.15	75.06	27.02	82.41	53.53	72.25	
	400x600	Ratio	0.46	0.09	0.31	0.09	0.34	0.19	0.30	0.19	0.26	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.4] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지붕	RG1A	내력	184.22	184.22	184.22	184.22	184.22	184.22	282.45	275.98	283.18	OK
		외력	30.53	0.00	71.96	71.96	101.13	51.25	70.61	49.68	82.12	
	500x600	Ratio	0.17	0.00	0.39	0.39	0.55	0.28	0.25	0.18	0.29	
	RB2	내력	296.39	139.34	139.03	143.87	180.37	139.03	236.27	230.08	245.57	OK
		외력	108.39	10.75	34.11	0.00	44.96	30.03	87.42	64.42	58.94	
	400x600	Ratio	0.37	0.08	0.25	0.00	0.25	0.22	0.37	0.28	0.24	
	RG1	내력	296.39	145.58	296.30	143.87	333.41	224.00	237.47	221.05	237.84	OK
		외력	209.27	0.00	146.78	72.99	137.10	84.59	142.48	92.84	128.43	
	400x600	Ratio	0.71	0.00	0.50	0.51	0.41	0.38	0.60	0.42	0.54	
	RB1	내력	296.39	145.58	139.56	143.87	333.41	221.65	240.99	218.97	242.31	OK
		외력	144.98	0.00	80.53	92.43	174.79	112.76	132.54	85.40	118.73	
	400x600	Ratio	0.49	0.00	0.58	0.64	0.52	0.51	0.55	0.39	0.49	
	RG4	내력	378.85	143.53	378.85	150.93	266.66	150.93	307.00	317.23	305.00	OK
		외력	170.24	0.00	150.44	48.86	149.74	48.24	122.80	95.17	122.00	
	500x600	Ratio	0.45	0.00	0.40	0.32	0.56	0.32	0.40	0.30	0.40	
	RG2	내력	296.39	139.34	139.03	143.87	180.37	139.03	238.29	226.32	243.36	OK
		외력	102.52	29.44	90.40	12.60	40.49	21.41	85.78	61.11	65.71	
	400x600	Ratio	0.35	0.21	0.65	0.09	0.22	0.15	0.36	0.27	0.27	
	RG4A	내력	180.55	180.55	180.55	180.55	180.55	180.55	245.59	243.81	242.94	OK
		외력	50.34	99.11	128.60	0.00	0.00	0.00	58.94	75.58	63.17	
	400x600	Ratio	0.28	0.55	0.71	0.00	0.00	0.00	0.24	0.31	0.26	
	RB3	내력	145.58	148.30	145.58	333.41	406.73	333.41	242.63	214.83	243.52	OK
		외력	84.11	0.00	89.09	128.90	196.25	118.02	123.74	79.49	126.63	
	400x600	Ratio	0.58	0.00	0.61	0.39	0.48	0.35	0.51	0.37	0.52	
	RG3	내력	565.62	195.09	565.62	195.40	489.30	195.40	299.15	301.30	301.31	OK
		외력	265.96	0.00	218.75	55.45	257.82	72.77	203.42	159.69	186.81	
	500x600	Ratio	0.47	0.00	0.39	0.28	0.53	0.37	0.68	0.53	0.62	
	RG4 (중앙)	내력	378.85	143.53	378.85	150.93	266.66	150.93	306.61	309.57	301.65	OK
		외력	158.39	0.00	164.30	30.66	150.67	41.04	137.98	99.06	126.69	
	500x600	Ratio	0.42	0.00	0.43	0.20	0.57	0.27	0.45	0.32	0.42	
	RWG1	내력	135.41	135.41	135.41	135.41	135.41	135.41	175.96	175.95	174.93	OK
		외력	33.78	46.00	65.57	7.27	33.76	1.74	68.63	70.38	78.72	
	300x600	Ratio	0.25	0.34	0.48	0.05	0.25	0.01	0.39	0.40	0.45	
	PHWG1	내력	109.63	109.63	109.63	109.63	109.63	109.63	140.78	144.81	141.13	OK
		외력	39.17	35.14	21.83	10.52	17.64	17.64	40.83	39.10	23.99	
	300x500	Ratio	0.36	0.32	0.20	0.10	0.16	0.16	0.29	0.27	0.17	
전층	WG1	내력	90.27	90.27	90.27	90.27	90.27	90.27	138.19	138.08	139.04	OK
		외력	30.33	38.77	55.67	7.83	28.33	8.90	52.51	60.76	68.13	
	200x600	Ratio	0.34	0.43	0.62	0.09	0.31	0.10	0.38	0.44	0.49	

* Ratio = 외력/내력

* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

2) 증측부

[표 1.6.5] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상2층	2TB1	내력	713.46	713.46	713.46	2075.50	2075.50	2075.50	995.39	982.12	1025.48	OK
		외력	136.79	176.41	420.43	179.88	617.68	610.20	159.26	294.64	348.66	
	700x1000	Ratio	0.19	0.25	0.59	0.09	0.30	0.29	0.16	0.30	0.34	
	2TB2	내력	528.39	528.39	528.39	528.39	528.39	528.39	474.20	501.04	494.74	OK
		외력	12.17	103.64	82.13	26.69	44.99	61.46	23.71	185.38	183.05	
	400x800	Ratio	0.02	0.20	0.16	0.05	0.09	0.12	0.05	0.37	0.37	
	2TB2A	내력	528.39	528.39	528.39	528.39	528.39	528.39	507.52	503.32	480.65	OK
		외력	19.31	70.53	20.49	36.66	38.02	26.40	106.58	125.83	52.87	
	400x800	Ratio	0.04	0.13	0.04	0.07	0.07	0.05	0.21	0.25	0.11	
	2TB3	내력	1676.12	1676.12	1676.12	3524.92	3524.92	3524.92	1547.31	1598.38	1429.40	OK
		외력	202.56	165.54	59.39	57.51	214.64	214.64	139.26	159.84	128.65	
	800x1200	Ratio	0.12	0.10	0.04	0.02	0.06	0.06	0.09	0.10	0.09	
	2TB4	내력	1191.83	1191.83	1191.83	2294.61	2294.61	2294.61	1307.81	1304.91	1303.86	OK
		외력	675.63	22.84	294.29	87.84	391.71	206.19	1046.25	1017.83	312.93	
	800x1200	Ratio	0.57	0.02	0.25	0.04	0.17	0.09	0.80	0.78	0.24	
	2TB5	내력	700.55	700.55	700.55	965.18	965.18	965.18	1023.66	1090.49	997.04	OK
		외력	129.80	3.29	135.75	0.80	65.56	0.80	174.02	32.71	189.44	
	700x1000	Ratio	0.19	0.00	0.19	0.00	0.07	0.00	0.17	0.03	0.19	
	2TWG1	내력	567.18	567.18	567.18	567.18	567.18	567.18	889.76	923.85	965.93	OK
		외력	213.74	253.42	27.66	19.81	21.13	15.39	177.95	184.77	48.30	
	700x1000	Ratio	0.38	0.45	0.05	0.03	0.04	0.03	0.20	0.20	0.05	
	2TG1	내력	1835.31	1835.31	1835.31	1835.31	1835.31	1835.31	1012.99	999.61	997.37	OK
		외력	237.61	183.11	895.87	298.13	993.86	979.21	243.12	589.77	658.26	
	700x1000	Ratio	0.13	0.10	0.49	0.16	0.54	0.53	0.24	0.59	0.66	
	2TG2	내력	1476.63	1476.63	1476.63	1227.34	1227.34	1227.34	1009.26	999.85	995.43	OK
		외력	387.10	164.74	456.44	274.24	467.85	87.11	333.06	399.94	428.04	
	700x1000	Ratio	0.26	0.11	0.31	0.22	0.38	0.07	0.33	0.40	0.43	
	2TG3	내력	1979.77	1979.77	1979.77	3207.34	3207.34	3207.34	1298.76	1304.78	1258.87	OK
		외력	161.98	103.30	170.75	0.00	331.15	145.88	493.53	482.77	163.65	
	800x1200	Ratio	0.08	0.05	0.09	0.00	0.10	0.05	0.38	0.37	0.13	
	2TG4	내력	1190.72	1190.72	1190.72	2140.59	2140.59	2140.59	1300.80	1291.25	1309.28	OK
		외력	29.51	105.56	123.09	340.99	517.50	125.70	715.44	710.19	130.93	
	800x1200	Ratio	0.02	0.09	0.10	0.16	0.24	0.06	0.55	0.55	0.10	
	2B1	내력	179.87	180.02	179.87	179.87	234.85	179.87	274.25	249.79	267.55	OK
		외력	45.22	40.64	10.97	9.38	11.10	5.86	60.33	57.45	21.40	
	400x600	Ratio	0.25	0.23	0.06	0.05	0.05	0.03	0.22	0.23	0.08	

* Ratio = 외력/내력

* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.6] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상3층	3B1	내력	179.87	180.02	179.87	179.87	234.85	179.87	268.86	250.28	276.09	OK
		외력	35.94	32.82	74.76	144.99	144.99	13.41	91.41	100.11	77.31	
	400x600	Ratio	0.20	0.18	0.42	0.81	0.62	0.07	0.34	0.40	0.28	
	3B2	내력	436.31	183.16	180.13	184.43	387.97	289.70	262.74	241.97	271.97	OK
		외력	81.63	0.00	87.13	123.36	193.17	120.61	112.98	65.33	114.23	
	400x600	Ratio	0.19	0.00	0.48	0.67	0.50	0.42	0.43	0.27	0.42	
	3B3	내력	234.85	180.02	234.85	180.02	234.85	180.02	276.47	251.94	274.85	OK
		외력	97.10	0.00	95.60	14.15	56.39	14.93	85.70	55.43	85.20	
	400x600	Ratio	0.41	0.00	0.41	0.08	0.24	0.08	0.31	0.22	0.31	
	3B5	내력	117.75	117.75	117.75	117.75	117.75	117.75	100.81	103.86	102.51	OK
		외력	0.00	1.49	12.18	11.30	10.25	3.86	11.09	17.66	20.50	
	150x400	Ratio	0.00	0.01	0.10	0.10	0.09	0.03	0.11	0.17	0.20	
	3B6	내력	121.99	121.99	121.99	121.99	121.99	121.99	116.17	115.84	115.78	OK
		외력	17.01	16.88	40.35	30.61	18.60	1.42	34.85	40.54	44.00	
	200x400	Ratio	0.14	0.14	0.33	0.25	0.15	0.01	0.30	0.35	0.38	
	3TB1	내력	548.21	548.21	548.21	1018.85	1018.85	1018.85	488.65	505.95	503.81	OK
		외력	9.16	37.97	7.43	12.44	35.60	0.78	39.09	75.89	20.15	
	500x700	Ratio	0.02	0.07	0.01	0.01	0.03	0.00	0.08	0.15	0.04	
	3TB2	내력	556.49	556.49	556.49	1270.44	1270.44	1270.44	538.49	548.08	518.03	OK
		외력	85.07	173.72	13.13	2.83	184.80	11.55	96.93	356.25	25.90	
	600x700	Ratio	0.15	0.31	0.02	0.00	0.15	0.01	0.18	0.65	0.05	
	3WG1	내력	176.15	176.15	176.15	176.15	176.15	176.15	210.34	209.72	207.08	OK
		외력	32.86	53.18	20.71	54.72	29.40	12.74	82.03	132.13	31.06	
	300x600	Ratio	0.19	0.30	0.12	0.31	0.17	0.07	0.39	0.63	0.15	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.7] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지상4층	4B1	내력	179.87	180.02	179.87	179.87	234.85	179.87	270.79	245.00	271.46	OK
		외력	35.71	31.36	77.50	31.25	37.46	13.41	40.62	63.70	84.15	
	400x600	Ratio	0.20	0.17	0.43	0.17	0.16	0.07	0.15	0.26	0.31	
	4B2	내력	436.31	183.16	180.13	184.43	387.97	289.70	262.88	249.06	271.83	OK
		외력	128.51	45.39	86.81	129.62	193.22	120.80	113.04	107.10	114.17	
	400x600	Ratio	0.29	0.25	0.48	0.70	0.50	0.42	0.43	0.43	0.42	
	4B3	내력	234.85	180.02	234.85	180.02	234.85	180.02	276.50	251.98	274.82	OK
		외력	96.88	0.00	95.32	14.38	56.64	15.16	85.71	55.44	85.19	
	400x600	Ratio	0.41	0.00	0.41	0.08	0.24	0.08	0.31	0.22	0.31	
	4B5	내력	117.75	117.75	117.75	117.75	117.75	117.75	105.55	102.65	106.83	OK
		외력	0.00	1.52	12.09	10.93	9.99	3.75	11.61	17.45	20.30	
	150x400	Ratio	0.00	0.01	0.10	0.09	0.08	0.03	0.11	0.17	0.19	
	4B6	내력	121.99	121.99	121.99	121.99	121.99	121.99	116.52	116.78	116.24	OK
		외력	17.16	2.06	11.40	1.53	7.47	1.48	34.95	18.68	20.92	
	200x400	Ratio	0.14	0.02	0.09	0.01	0.06	0.01	0.30	0.16	0.18	
	4B7	내력	121.99	121.99	121.99	121.99	121.99	121.99	115.27	119.14	113.73	OK
		외력	19.69	7.75	19.30	1.90	14.72	11.62	27.66	20.25	19.33	
	200x400	Ratio	0.16	0.06	0.16	0.02	0.12	0.10	0.24	0.17	0.17	
	4WG1	내력	176.15	176.15	176.15	176.15	176.15	176.15	213.56	213.39	208.91	OK
		외력	33.61	49.48	72.45	66.08	38.24	12.74	53.39	72.55	77.30	
	300x600	Ratio	0.19	0.28	0.41	0.38	0.22	0.07	0.25	0.34	0.37	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.8] RC보 검토 결과표

구분	부재	항목	부모멘트 검토 (kN.m))			정모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
			i단	center	j단	i단	center	j단	i단	center	j단	
지붕	RB1	내력	176.15	176.15	176.15	176.15	176.15	176.15	211.79	215.06	209.87	OK
		외력	36.28	33.33	59.03	19.33	21.30	7.46	38.12	45.16	65.06	
	300x600	Ratio	0.21	0.19	0.34	0.11	0.12	0.04	0.18	0.21	0.31	
	RB2	내력	180.02	184.43	180.02	234.85	436.31	234.85	274.91	247.85	271.09	OK
		외력	120.48	57.41	125.68	185.30	274.94	183.71	142.96	136.32	143.68	
	400x600	Ratio	0.67	0.31	0.70	0.79	0.63	0.78	0.52	0.55	0.53	
	RB3	내력	234.85	180.02	234.85	180.02	234.85	180.02	273.75	245.95	272.01	OK
		외력	103.16	0.00	93.28	14.52	60.53	19.46	90.34	59.03	87.04	
	400x600	Ratio	0.44	0.00	0.40	0.08	0.26	0.11	0.33	0.24	0.32	
	RB5	내력	117.75	117.75	117.75	117.75	117.75	117.75	106.54	105.70	106.70	OK
		외력	3.36	0.19	13.38	10.03	10.03	5.68	24.50	21.14	25.61	
	150x400	Ratio	0.03	0.00	0.11	0.09	0.09	0.05	0.23	0.20	0.24	
	RB6	내력	121.99	121.99	121.99	121.99	121.99	121.99	118.50	116.32	118.68	OK
		외력	10.79	1.53	8.39	0.66	5.12	1.58	24.89	15.12	20.18	
	200x400	Ratio	0.09	0.01	0.07	0.01	0.04	0.01	0.21	0.13	0.17	
	RB7	내력	121.99	121.99	121.99	121.99	121.99	121.99	118.93	117.20	115.21	OK
		외력	10.02	11.17	15.27	3.21	25.37	9.33	20.22	33.99	40.32	
	200x400	Ratio	0.08	0.09	0.13	0.03	0.21	0.08	0.17	0.29	0.35	
	RWG1	내력	176.15	176.15	176.15	176.15	176.15	176.15	206.61	213.04	211.31	OK
		외력	32.63	54.89	74.04	64.53	39.25	12.86	49.59	76.70	82.41	
	300x600	Ratio	0.19	0.31	0.42	0.37	0.22	0.07	0.24	0.36	0.39	
	PHRWG1	내력	741.69	298.43	189.83	245.05	640.58	495.59	420.86	323.39	438.25	OK
		외력	77.18	69.37	27.98	37.19	70.36	27.15	134.68	126.12	87.65	
	500x600	Ratio	0.10	0.23	0.15	0.15	0.11	0.05	0.32	0.39	0.20	
전층	WG1	내력	117.43	117.43	117.43	117.43	117.43	117.43	155.30	156.95	155.57	OK
		외력	36.79	50.29	60.43	22.83	48.83	49.28	74.55	103.59	104.23	
	200x600	Ratio	0.31	0.43	0.51	0.19	0.42	0.42	0.48	0.66	0.67	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

1.6.3.2 기둥 구조안전성 검토

· 대상 건축물의 RC기둥를 검토한 결과, 보의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

1) 기존부

[표 1.6.9] RC기둥 검토 결과표

부재	축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
	내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1C5	3650.74	2362.03	0.65	46.49	15.11	0.33	241.95	75.73	0.31	OK
400x500				142.80	46.41	0.33	242.73	75.73	0.31	
2C5	2146.66	1144.17	0.53	5.73	3.05	0.53	225.69	96.60	0.43	OK
400x500				257.77	137.13	0.53	226.22	96.60	0.43	
3C5	1415.76	666.82	0.47	308.48	150.85	0.49	228.06	110.84	0.49	OK
400x500				91.39	44.69	0.49	228.53	110.84	0.49	
4C5	481.75	349.75	0.73	4.49	3.25	0.72	192.33	112.32	0.58	OK
400x500				215.52	156.04	0.72	192.66	112.32	0.58	
1C6	3033.85	1055.78	0.35	11.84	3.67	0.31	174.96	33.77	0.19	OK
400x400				123.56	38.30	0.31	175.87	33.77	0.19	
2C6	2656.47	783.66	0.30	19.51	5.77	0.30	169.40	47.60	0.28	OK
400x400				160.41	47.48	0.30	170.01	47.60	0.28	
3C6	876.95	270.10	0.31	233.59	71.48	0.31	164.55	51.34	0.31	OK
400x400				18.08	5.53	0.31	164.55	51.34	0.31	
4C6	434.16	161.51	0.37	201.90	74.90	0.37	160.02	50.73	0.32	OK
400x400				14.99	5.56	0.37	160.02	50.73	0.32	
1C6A	2766.51	514.57	0.19	133.74	24.88	0.19	164.03	18.86	0.12	OK
400x400				71.68	13.33	0.19	164.03	18.86	0.12	
2C6A	1690.20	393.82	0.23	192.49	45.04	0.23	170.04	31.29	0.18	OK
400x400				76.83	17.98	0.23	170.04	31.29	0.18	
3C6A	483.00	121.72	0.25	148.27	37.81	0.26	164.06	30.02	0.18	OK
400x400				116.80	29.78	0.26	164.06	30.02	0.18	
4C6A	207.67	71.23	0.34	139.63	47.47	0.34	157.40	34.79	0.22	OK
400x400				101.50	34.51	0.34	157.40	34.79	0.22	

* Ratio = 외력/내력

* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

2) 증측부

[표 1.6.10] RC기둥 검토 결과표

부재	축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
	내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1C1	5737.79	2254.95	0.39	211.15	15.08	0.05	424.01	27.56	0.07	OK
500x600				63.02	2.84	0.05	430.63	27.56	0.06	
1C2	5732.58	521.67	0.09	83.97	1.26	0.02	391.60	2.35	0.01	OK
500x600				283.90	4.26	0.02	391.60	2.35	0.01	
1C3	5152.42	494.63	0.10	411.15	39.47	0.10	408.09	5.31	0.01	OK
500x600				129.51	12.43	0.10	408.09	5.31	0.01	
1C4	1286.12	42.44	0.03	30.87	1.02	0.03	76.14	0.25	0.00	OK
200x300				27.85	0.92	0.03	76.27	0.25	0.00	
2C4	1393.35	96.14	0.07	23.95	1.68	0.07	75.73	0.61	0.01	OK
200x300				28.84	2.02	0.07	75.73	0.61	0.01	
3C4	1386.02	62.37	0.05	22.79	1.03	0.05	79.67	0.80	0.01	OK
200x300				29.11	1.31	0.05	79.67	0.80	0.01	
4C4	820.17	29.53	0.04	19.68	0.71	0.04	73.89	1.03	0.01	OK
200x300				39.82	1.43	0.04	73.89	1.03	0.01	

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

1.6.3.3 벽체 구조안전성 검토

· 대상 건축물의 벽체를 검토한 결과, 벽체의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

1) 기존부

[표 1.6.11] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
CW1	H=3500	22151.1	2150.8	0.10	16816.12	1732.06	0.10	2008.8	70.3	0.04	OK
	Lw=6500				0.00	0.00	0.00				
CW1	H=3100	22151.1	1657.7	0.08	17016.00	1361.28	0.08	2099.0	77.7	0.04	OK
	Lw=6500				0.00	0.00	0.00				
CW1	H=3100	21291.2	1212.4	0.06	12261.98	674.41	0.06	1297.0	62.3	0.05	OK
	Lw=6500				0.00	0.00	0.00				
CW1	H=3400	21291.2	576.1	0.03	20487.68	696.58	0.03	2050.7	114.8	0.06	OK
	Lw=6500				0.00	0.00	0.00				
CW1	H=3400	21291.2	189.4	0.01	9979.04	79.83	0.01	1312.3	6.6	0.01	OK
	Lw=6500				0.00	0.00	0.00				
CW10	H=3500	2597.2	71.8	0.03	82.42	1.98	0.02	259.9	1.0	0.00	OK
	Lw=750				0.00	0.00	0.00				
CW10	H=3100	2597.2	55.3	0.02	167.65	3.35	0.02	237.0	2.1	0.01	OK
	Lw=750				0.00	0.00	0.00				
CW10	H=3100	2479.9	43.4	0.02	255.42	5.36	0.02	142.0	3.4	0.02	OK
	Lw=750				0.00	0.00	0.00				
CW10	H=3400	2479.9	21.0	0.02	326.27	6.20	0.02	135.8	3.4	0.03	OK
	Lw=750				0.00	0.00	0.00				
CW10	H=3400	2479.9	19.5	0.01	284.02	3.12	0.01	140.7	1.7	0.01	OK
	Lw=750				0.00	0.00	0.00				
CW2	H=3500	22151.1	2465.0	0.13	19249.14	2463.89	0.13	2063.9	113.5	0.06	OK
	Lw=6500				0.00	0.00	0.00				
CW2	H=3100	22151.1	1972.0	0.10	18873.20	1887.32	0.10	2332.6	168.0	0.07	OK
	Lw=6500				0.00	0.00	0.00				
CW2	H=3100	21291.2	1399.7	0.07	18090.27	1338.68	0.07	1726.1	169.2	0.10	OK
	Lw=6500				0.00	0.00	0.00				
CW2	H=3400	21291.2	829.9	0.04	15732.83	645.05	0.04	2069.4	178.0	0.09	OK
	Lw=6500				0.00	0.00	0.00				
CW2	H=3400	21291.2	211.7	0.02	22100.60	331.51	0.02	1976.6	67.2	0.03	OK
	Lw=6500				0.00	0.00	0.00				
CW3	H=3500	2597.2	51.6	0.03	307.67	8.31	0.03	230.4	4.4	0.02	OK
	Lw=750				0.00	0.00	0.00				

* Ratio = 외력/내력

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[표 1.6.12] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
CW3	H=3100	2597.2	44.0	0.03	329.81	8.90	0.03	239.4	5.5	0.02	OK
	Lw=750				0.00	0.00	0.00				
CW3	H=3100	2479.9	45.3	0.03	318.77	10.52	0.03	143.5	6.7	0.05	OK
	Lw=750				0.00	0.00	0.00				
CW3	H=3400	2479.9	47.4	0.06	303.73	16.71	0.06	136.8	8.8	0.06	OK
	Lw=750				0.00	0.00	0.00				
CW3	H=3400	2479.9	28.6	0.01	125.90	1.38	0.01	133.1	1.2	0.01	OK
	Lw=750				0.00	0.00	0.00				
CW4	H=3500	2597.2	132.2	0.05	205.23	10.47	0.05	236.0	5.2	0.02	OK
	Lw=750				0.00	0.00	0.00				
CW4	H=3100	2597.2	110.6	0.04	81.01	2.92	0.04	249.9	2.0	0.01	OK
	Lw=750				0.00	0.00	0.00				
CW4	H=3100	2479.9	71.7	0.03	14.88	0.34	0.02	179.7	0.2	0.00	OK
	Lw=750				0.00	0.00	0.00				
CW4	H=3400	2479.9	4.7	0.04	122.54	5.27	0.04	128.9	2.3	0.02	OK
	Lw=750				0.00	0.00	0.00				
CW4	H=3400	2479.9	-4.9	0.15	78.31	11.59	0.15	138.2	6.9	0.05	OK
	Lw=750				0.00	0.00	0.00				
CW5	H=3500	12298.9	866.5	0.07	2464.80	147.89	0.06	788.9	9.5	0.01	OK
	Lw=5000				0.00	0.00	0.00				
CW5	H=3100	12298.9	749.3	0.06	330.54	16.20	0.05	1391.3	57.0	0.04	OK
	Lw=5000				0.00	0.00	0.00				
CW5	H=3100	12298.9	520.3	0.04	2434.54	87.64	0.04	1337.1	96.3	0.07	OK
	Lw=5000				0.00	0.00	0.00				
CW5	H=3400	12298.9	188.9	0.03	10944.64	273.62	0.03	1291.8	129.2	0.10	OK
	Lw=5000				0.00	0.00	0.00				
CW6	H=3500	4185.7	278.9	0.07	135.27	7.44	0.06	271.5	3.5	0.01	OK
	Lw=1700				0.00	0.00	0.00				
CW6	H=3100	4185.7	192.2	0.05	945.96	49.19	0.05	424.5	26.7	0.06	OK
	Lw=1700				0.00	0.00	0.00				
CW6	H=3100	4185.7	126.3	0.05	1148.24	51.67	0.05	439.9	30.8	0.07	OK
	Lw=1700				0.00	0.00	0.00				
CW6	H=3400	4185.7	42.1	0.12	556.97	66.84	0.12	392.9	36.9	0.09	OK
	Lw=1700				0.00	0.00	0.00				
CW7	H=3500	19753.9	1415.8	0.07	6302.86	397.08	0.06	2776.4	69.4	0.03	OK
	Lw=5800				0.00	0.00	0.00				
CW7	H=3100	19753.9	1112.5	0.06	7475.67	381.26	0.05	2689.3	99.5	0.04	OK
	Lw=5800				0.00	0.00	0.00				

* Ratio = 외력/내력
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[표 1.6.13] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
CW7	H=3100	18991.7	788.4	0.04	8212.54	320.29	0.04	1863.5	123.0	0.07	OK
	Lw=5800				0.00	0.00	0.00				
CW7	H=3400	18991.7	495.5	0.03	8048.67	193.17	0.02	1812.1	152.2	0.08	OK
	Lw=5800				0.00	0.00	0.00				
CW7	H=3400	18991.7	178.2	0.01	10952.39	98.57	0.01	647.0	0.6	0.00	OK
	Lw=5800				0.00	0.00	0.00				
CW8	H=3500	19753.9	1077.8	0.06	1500.48	67.52	0.05	2168.9	10.8	0.01	OK
	Lw=5800				0.00	0.00	0.00				
CW8	H=3100	19753.9	846.5	0.04	4861.51	179.88	0.04	2422.9	29.1	0.01	OK
	Lw=5800				0.00	0.00	0.00				
CW8	H=3100	18991.7	631.7	0.03	6052.31	175.52	0.03	1821.4	47.4	0.03	OK
	Lw=5800				0.00	0.00	0.00				
CW8	H=3400	18991.7	417.6	0.02	6056.89	115.08	0.02	1811.0	59.8	0.03	OK
	Lw=5800				0.00	0.00	0.00				
CW8	H=3400	18991.7	186.0	0.01	84.60	0.68	0.01	1859.2	7.4	0.00	OK
	Lw=5800				0.00	0.00	0.00				
CW9	H=3500	2597.2	56.8	0.02	30.01	0.54	0.02	220.8	0.4	0.00	OK
	Lw=750				0.00	0.00	0.00				
CW9	H=3100	2597.2	35.8	0.02	230.52	3.46	0.02	245.0	2.2	0.01	OK
	Lw=750				0.00	0.00	0.00				
CW9	H=3100	2479.9	35.9	0.02	283.15	5.66	0.02	140.7	3.7	0.03	OK
	Lw=750				0.00	0.00	0.00				
CW9	H=3400	2479.9	42.2	0.02	250.07	5.00	0.02	137.8	2.9	0.02	OK
	Lw=750				0.00	0.00	0.00				
CW9	H=3400	2479.9	19.4	0.01	307.52	4.31	0.01	129.6	2.1	0.02	OK
	Lw=750				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

2) 증측부

[표 1.6.14] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
W1	H=3300	4199.3	-76.2	0.99	395.65	391.30	0.99	413.7	200.7	0.49	OK
	Lw=1715				0.00	0.00	0.00				
W1	H=3300	1463.9	-52.9	0.57	36.77	20.85	0.57	112.9	14.8	0.13	OK
	Lw=590				0.00	0.00	0.00				
W1	H=3300	3050.8	40.9	0.02	598.98	10.78	0.02	278.0	3.6	0.01	OK
	Lw=1250				0.00	0.00	0.00				
W1	H=3300	5876.1	65.7	0.33	1020.29	333.64	0.33	700.5	166.7	0.24	OK
	Lw=2415				0.00	0.00	0.00				
W1	H=3300	15747.2	873.0	0.07	13747.23	893.57	0.07	1996.5	387.3	0.19	OK
	Lw=6500				0.00	0.00	0.00				
W1	H=3300	5493.3	26.7	0.07	1080.17	71.29	0.07	655.7	44.6	0.07	OK
	Lw=2260				0.00	0.00	0.00				
W1	H=3300	4300.5	131.8	0.06	1293.77	69.86	0.05	487.0	37.0	0.08	OK
	Lw=1760				0.00	0.00	0.00				
W1	H=3300	2195.2	91.4	0.04	178.93	7.34	0.04	189.1	3.6	0.02	OK
	Lw=900				0.00	0.00	0.00				
W1	H=3300	4784.5	176.6	0.04	1306.61	57.49	0.04	588.8	30.0	0.05	OK
	Lw=1960				0.00	0.00	0.00				
W1	H=3300	13102.4	208.2	0.03	11582.60	289.57	0.03	1580.7	123.3	0.08	OK
	Lw=5400				0.00	0.00	0.00				
W1	H=3300	15747.2	1018.4	0.07	13316.01	972.07	0.07	2012.9	412.6	0.21	OK
	Lw=6500				0.00	0.00	0.00				
W1	H=3300	4300.5	146.3	0.05	1222.66	63.58	0.05	483.8	32.9	0.07	OK
	Lw=1760				0.00	0.00	0.00				
W1	H=3300	2195.2	85.2	0.04	225.38	9.24	0.04	187.5	4.9	0.03	OK
	Lw=900				0.00	0.00	0.00				
W1	H=3300	4784.5	113.5	0.05	1646.53	79.03	0.05	574.4	43.1	0.08	OK
	Lw=1960				0.00	0.00	0.00				
W1	H=3300	10986.5	134.6	0.11	4989.01	548.79	0.11	1329.5	222.0	0.17	OK
	Lw=4520				0.00	0.00	0.00				
W1	H=3300	15747.2	1117.8	0.09	14944.72	1330.08	0.09	2031.9	625.8	0.31	OK
	Lw=6500				0.00	0.00	0.00				

* Ratio = 외력/내력

* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.15] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
W1	H=3300	6551.2	111.7	0.02	1054.51	15.82	0.02	778.6	17.1	0.02	OK
	Lw=2700				0.00	0.00	0.00				
W1	H=3300	3906.4	61.1	0.15	629.40	95.04	0.15	404.5	50.6	0.13	OK
	Lw=1600				0.00	0.00	0.00				
W1	H=3300	2195.2	35.0	0.02	115.64	1.62	0.01	196.8	1.2	0.01	OK
	Lw=900				0.00	0.00	0.00				
W1	H=3300	5178.5	98.9	0.02	1300.66	26.01	0.02	608.6	14.0	0.02	OK
	Lw=2120				0.00	0.00	0.00				
W1	H=5600	14554.3	995.9	0.07	4804.85	293.10	0.06	1428.3	82.8	0.06	OK
	Lw=6000				0.00	0.00	0.00				
W1	H=5600	5076.7	418.3	0.08	137.36	9.20	0.07	404.7	6.5	0.02	OK
	Lw=2090				0.00	0.00	0.00				
W1	H=3300	8262.4	415.9	0.05	3338.35	180.27	0.05	1040.2	85.3	0.08	OK
	Lw=3400				0.00	0.00	0.00				
W1	H=3300	5662.5	111.9	0.02	1087.34	20.66	0.02	667.3	11.3	0.02	OK
	Lw=2320				0.00	0.00	0.00				
W1	H=3300	1508.9	-3.4	0.13	55.74	7.30	0.13	117.5	4.2	0.04	OK
	Lw=610				0.00	0.00	0.00				
W1	H=3300	4131.2	35.7	0.04	995.05	35.82	0.04	463.3	20.8	0.05	OK
	Lw=1700				0.00	0.00	0.00				
W1	H=3300	4131.2	137.7	0.04	859.91	31.82	0.04	475.5	17.6	0.04	OK
	Lw=1700				0.00	0.00	0.00				
W1	H=3300	1970.4	102.2	0.05	117.98	5.66	0.05	170.1	3.1	0.02	OK
	Lw=800				0.00	0.00	0.00				
W1	H=3300	5178.5	350.2	0.07	794.15	49.24	0.06	584.6	19.9	0.03	OK
	Lw=2120				0.00	0.00	0.00				
W1	H=3300	4784.5	290.7	0.06	744.51	42.44	0.06	431.1	6.0	0.01	OK
	Lw=1960				0.00	0.00	0.00				
W1	H=5600	1970.4	0.8	0.09	105.98	9.11	0.09	146.7	3.7	0.03	OK
	Lw=800				0.00	0.00	0.00				
W1	H=5600	4525.3	94.9	0.05	1531.51	73.51	0.05	395.1	21.3	0.05	OK
	Lw=1860				0.00	0.00	0.00				
W1	H=5600	15747.2	1659.9	0.11	3056.44	272.02	0.09	1840.1	112.2	0.06	OK
	Lw=6500				0.00	0.00	0.00				
W1	H=3300	4784.5	36.0	0.05	1121.64	52.72	0.05	570.5	35.4	0.06	OK
	Lw=1960				0.00	0.00	0.00				
W1	H=3300	1970.4	50.7	0.04	241.73	8.46	0.04	167.4	5.0	0.03	OK
	Lw=800				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.16] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
W1	H=3300	4525.3	185.6	0.07	1393.18	96.13	0.07	545.9	50.8	0.09	OK
	Lw=1860				0.00	0.00	0.00				
W1	H=3300	5493.3	511.6	0.11	1697.40	185.02	0.11	476.7	9.5	0.02	OK
	Lw=2260				0.00	0.00	0.00				
W1	H=5600	6551.2	660.5	0.10	517.61	44.00	0.09	669.9	28.8	0.04	OK
	Lw=2700				0.00	0.00	0.00				
W1	H=3300	13102.4	345.7	0.04	11465.20	504.47	0.04	1606.1	114.0	0.07	OK
	Lw=5400				0.00	0.00	0.00				
W1	H=3300	5493.3	-133.9	0.31	276.92	86.12	0.31	620.9	43.5	0.07	OK
	Lw=2260				0.00	0.00	0.00				
W1	H=3300	6551.2	168.8	0.10	2657.02	252.42	0.10	798.1	131.7	0.17	OK
	Lw=2700				0.00	0.00	0.00				
W1	H=5600	1329.0	197.9	0.15	1.61	0.19	0.12	111.5	0.1	0.00	OK
	Lw=530				0.00	0.00	0.00				
W1	H=3300	6787.9	318.6	0.05	1795.99	82.62	0.05	840.0	39.5	0.05	OK
	Lw=2790				0.00	0.00	0.00				
W1	H=5600	2510.6	-20.3	0.08	45.03	3.65	0.08	162.8	0.7	0.00	OK
	Lw=1025				0.00	0.00	0.00				
W1	H=5600	2510.6	-20.3	0.11	76.00	8.28	0.11	184.9	1.5	0.01	OK
	Lw=1025				0.00	0.00	0.00				
W1	H=5600	1329.0	121.7	0.09	2.41	0.18	0.07	104.9	0.1	0.00	OK
	Lw=530				0.00	0.00	0.00				
1~2W2	H=5600	22170.6	1737.0	0.08	2230.02	142.72	0.06	3277.4	81.9	0.03	OK
	Lw=6500				0.00	0.00	0.00				
1~2W2	H=5600	14360.4	865.6	0.06	3585.85	193.64	0.05	1696.1	45.8	0.03	OK
	Lw=4200				0.00	0.00	0.00				
1~2W2	H=3300	22170.6	542.8	0.05	25672.95	1129.61	0.04	3410.5	405.8	0.12	OK
	Lw=6500				0.00	0.00	0.00				
1~2W2	H=5600	12317.6	816.3	0.07	2319.03	134.50	0.06	1977.8	65.3	0.03	OK
	Lw=3600				0.00	0.00	0.00				
1~2W2	H=3300	5287.9	97.1	0.04	1434.12	47.33	0.03	596.2	11.3	0.02	OK
	Lw=1540				0.00	0.00	0.00				
1~2W2	H=5600	16973.7	2070.1	0.12	3945.74	418.25	0.11	2032.0	42.7	0.02	OK
	Lw=4970				0.00	0.00	0.00				
1~2W2	H=3300	22982.1	1325.6	0.07	20783.88	1392.52	0.07	3647.7	496.1	0.14	OK
	Lw=6730				0.00	0.00	0.00				
1~2W2	H=5600	8157.2	1243.9	0.15	424.60	53.92	0.13	1228.4	23.3	0.02	OK
	Lw=2375				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.17] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1~2W2	H=5600	14360.4	1753.8	0.12	1793.34	184.71	0.10	1761.0	49.3	0.03	OK
	Lw=4200				0.00	0.00	0.00				
1~2W2	H=3300	30266.6	1878.0	0.06	28592.86	1801.35	0.06	4817.5	337.2	0.07	OK
	Lw=8875				0.00	0.00	0.00				
1~2W2	H=5600	2824.3	438.1	0.16	1.01	0.13	0.12	326.4	0.3	0.00	OK
	Lw=820				0.00	0.00	0.00				
1~2W2	H=5600	2343.6	30.8	0.10	221.44	23.03	0.10	258.9	7.2	0.03	OK
	Lw=680				0.00	0.00	0.00				
1~2W2	H=5600	2343.6	49.1	0.12	242.97	29.16	0.12	250.9	8.0	0.03	OK
	Lw=680				0.00	0.00	0.00				
1~2W2	H=5600	2343.6	137.0	0.06	14.92	0.72	0.05	267.9	1.6	0.01	OK
	Lw=680				0.00	0.00	0.00				
1~2W2	H=5600	2253.7	54.2	0.04	247.21	10.63	0.04	241.9	2.9	0.01	OK
	Lw=650				0.00	0.00	0.00				
1~2W2	H=5600	1832.9	-3.2	0.02	64.67	1.49	0.02	230.2	0.5	0.00	OK
	Lw=530				0.00	0.00	0.00				
1~2W2	H=5600	4747.2	81.7	0.03	1042.84	27.11	0.03	526.2	6.8	0.01	OK
	Lw=1380				0.00	0.00	0.00				
1~2W2	H=5600	2313.7	97.3	0.04	41.80	1.46	0.04	273.6	0.8	0.00	OK
	Lw=670				0.00	0.00	0.00				
1~2W2	H=5600	2313.7	125.5	0.05	43.97	2.02	0.05	272.2	0.8	0.00	OK
	Lw=670				0.00	0.00	0.00				
1~2W2	H=5600	6159.4	580.3	0.09	281.29	22.22	0.08	725.4	25.4	0.04	OK
	Lw=1790				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	163.4	0.05	593.01	27.28	0.05	480.0	10.6	0.02	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	1533.2	67.5	0.04	38.67	1.51	0.04	159.9	0.8	0.01	OK
	Lw=430				0.00	0.00	0.00				
1~2W2	H=3300	22170.6	365.5	0.04	26512.51	927.94	0.04	3235.8	135.9	0.04	OK
	Lw=6500				0.00	0.00	0.00				
1~2W2	H=3300	1862.9	-34.8	0.12	27.00	3.13	0.12	212.5	2.1	0.01	OK
	Lw=540				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	136.5	0.14	799.07	107.88	0.14	489.8	51.4	0.11	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	2163.8	44.8	0.09	224.20	21.07	0.09	244.3	12.7	0.05	OK
	Lw=620				0.00	0.00	0.00				
1~2W2	H=3300	9193.5	545.1	0.08	3654.95	277.78	0.08	1212.5	71.5	0.06	OK
	Lw=2680				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.18] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1~2W2	H=5600	24454.2	1481.8	0.06	7525.17	391.31	0.05	2759.1	24.8	0.01	OK
	Lw=7160				0.00	0.00	0.00				
1~2W2	H=3300	5377.8	427.9	0.08	785.42	61.26	0.08	732.9	26.4	0.04	OK
	Lw=1570				0.00	0.00	0.00				
1~2W2	H=3300	3035.3	154.4	0.05	209.48	10.06	0.05	356.9	5.7	0.02	OK
	Lw=870				0.00	0.00	0.00				
1~2W2	H=3300	2554.6	207.1	0.11	290.71	32.85	0.11	303.5	20.0	0.07	OK
	Lw=730				0.00	0.00	0.00				
1~2W2	H=3300	2554.6	202.5	0.11	281.85	29.88	0.11	303.1	17.6	0.06	OK
	Lw=730				0.00	0.00	0.00				
1~2W2	H=5600	12617.3	345.2	0.03	3749.50	97.49	0.03	1548.3	7.7	0.01	OK
	Lw=3700				0.00	0.00	0.00				
1~2W2	H=5600	2373.6	38.5	0.02	48.54	0.68	0.01	242.9	0.2	0.00	OK
	Lw=690				0.00	0.00	0.00				
1~2W2	H=5600	1892.9	37.0	0.02	32.12	0.51	0.02	216.0	0.2	0.00	OK
	Lw=550				0.00	0.00	0.00				
1~2W2	H=3300	22170.6	1353.9	0.13	26762.64	3452.38	0.13	3535.5	993.5	0.28	OK
	Lw=6500				0.00	0.00	0.00				
1~2W2	H=5600	14360.4	1273.8	0.09	208.79	14.82	0.07	1994.6	31.9	0.02	OK
	Lw=4200				0.00	0.00	0.00				
1~2W2	H=5600	1020.3	21.9	0.02	26.93	0.54	0.02	114.6	0.0	0.00	OK
	Lw=320				0.00	0.00	0.00				
1~2W2	H=5600	4537.4	134.6	0.09	1109.33	98.73	0.09	499.3	16.5	0.03	OK
	Lw=1310				0.00	0.00	0.00				
1~2W2	H=3300	1743.0	71.8	0.06	140.01	8.54	0.06	190.0	4.8	0.03	OK
	Lw=500				0.00	0.00	0.00				
1~2W2	H=5600	31512.8	3091.3	0.10	6528.88	535.37	0.08	5390.9	64.7	0.01	OK
	Lw=9250				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	294.1	0.07	219.56	14.05	0.06	534.6	8.0	0.02	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	4326.4	541.2	0.13	194.41	20.80	0.11	511.2	6.1	0.01	OK
	Lw=1260				0.00	0.00	0.00				
1~2W2	H=3300	4747.2	302.0	0.06	455.44	26.42	0.06	592.8	9.5	0.02	OK
	Lw=1380				0.00	0.00	0.00				
1~2W2	H=5600	3425.0	259.7	0.08	40.53	2.51	0.06	361.4	2.2	0.01	OK
	Lw=1000				0.00	0.00	0.00				
1~2W2	H=3300	1803.0	160.4	0.09	25.18	1.89	0.08	183.5	0.9	0.01	OK
	Lw=520				0.00	0.00	0.00				

* Ratio = 외력/내력
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[표 1.6.19] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1~2W2	H=5600	4747.2	220.0	0.05	69.80	2.65	0.04	553.8	0.6	0.00	OK
	Lw=1380				0.00	0.00	0.00				
1~2W2	H=5600	5783.6	377.3	0.07	33.19	1.76	0.05	652.0	5.9	0.01	OK
	Lw=1685				0.00	0.00	0.00				
1~2W2	H=5600	4747.2	468.2	0.10	2.21	0.17	0.08	533.5	5.9	0.01	OK
	Lw=1380				0.00	0.00	0.00				
1~2W2	H=3300	4747.2	205.2	0.04	561.75	23.03	0.04	597.7	9.0	0.02	OK
	Lw=1380				0.00	0.00	0.00				
1~2W2	H=3300	3305.1	259.9	0.08	232.80	16.99	0.07	394.1	7.1	0.02	OK
	Lw=960				0.00	0.00	0.00				
1~2W2	H=3300	1983.9	44.4	0.03	173.67	5.56	0.03	199.6	2.0	0.01	OK
	Lw=560				0.00	0.00	0.00				
1~2W2	H=3300	5197.9	86.5	0.14	1049.85	149.08	0.14	657.1	66.4	0.10	OK
	Lw=1510				0.00	0.00	0.00				
1~2W2	H=3300	3575.9	99.3	0.08	685.36	57.57	0.08	424.0	27.6	0.07	OK
	Lw=1030				0.00	0.00	0.00				
1~2W2	H=3300	12768.3	400.9	0.04	6059.69	212.09	0.04	1510.3	28.7	0.02	OK
	Lw=3730				0.00	0.00	0.00				
1~2W2	H=5600	2403.6	237.0	0.10	0.76	0.06	0.08	181.3	0.2	0.00	OK
	Lw=700				0.00	0.00	0.00				
1~2W2	H=3300	18580.7	533.0	0.06	18684.91	1065.04	0.06	2882.3	259.4	0.09	OK
	Lw=5445				0.00	0.00	0.00				
1~2W2	H=5600	11956.8	1030.7	0.09	1659.70	122.82	0.07	1330.3	16.0	0.01	OK
	Lw=3500				0.00	0.00	0.00				
1~2W2	H=3300	13488.8	885.2	0.07	3123.49	184.29	0.06	2165.3	88.8	0.04	OK
	Lw=3950				0.00	0.00	0.00				
1~2W2	H=5600	12798.3	797.7	0.06	1220.76	63.48	0.05	2028.6	24.3	0.01	OK
	Lw=3740				0.00	0.00	0.00				
1~2W2	H=5600	7871.3	609.2	0.08	324.65	20.78	0.06	1074.9	7.5	0.01	OK
	Lw=2300				0.00	0.00	0.00				
1~2W2	H=5600	8232.1	773.2	0.09	17.33	1.30	0.08	1050.2	6.3	0.01	OK
	Lw=2400				0.00	0.00	0.00				
1~2W2	H=5600	1832.9	200.5	0.11	3.16	0.28	0.09	202.0	0.1	0.00	OK
	Lw=530				0.00	0.00	0.00				
1~2W2	H=5600	2313.7	252.7	0.11	6.35	0.56	0.09	202.0	0.2	0.00	OK
	Lw=670				0.00	0.00	0.00				
1~2W2	H=3300	2764.4	138.1	0.15	413.38	62.42	0.15	323.7	32.7	0.10	OK
	Lw=800				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.20] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1~2W2	H=3300	5918.4	881.8	0.15	698.39	94.98	0.14	863.0	37.1	0.04	OK
	Lw=1730				0.00	0.00	0.00				
1~2W2	H=3300	5227.9	59.6	0.32	845.07	269.58	0.32	658.9	121.9	0.19	OK
	Lw=1520				0.00	0.00	0.00				
1~2W2	H=3300	5183.0	523.8	0.33	1411.73	467.28	0.33	697.4	199.4	0.29	OK
	Lw=1505				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	313.5	0.09	655.33	61.60	0.09	532.3	35.1	0.07	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	5048.1	569.7	0.11	453.02	46.21	0.10	747.8	31.4	0.04	OK
	Lw=1460				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	198.2	0.05	405.13	19.45	0.05	470.4	7.1	0.02	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	3005.3	315.2	0.11	82.46	7.34	0.09	378.8	4.2	0.01	OK
	Lw=860				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	206.4	0.06	638.37	38.30	0.06	482.4	15.9	0.03	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	4537.4	414.1	0.09	434.93	36.97	0.09	645.3	21.3	0.03	OK
	Lw=1310				0.00	0.00	0.00				
1~2W2	H=3300	3845.7	299.1	0.08	76.15	4.87	0.06	403.1	2.4	0.01	OK
	Lw=1120				0.00	0.00	0.00				
1~2W2	H=3300	2163.8	135.5	0.17	249.42	47.14	0.19	246.4	25.6	0.10	OK
	Lw=620				0.00	0.00	0.00				
1~2W2	H=3300	1533.2	144.2	0.10	68.86	6.61	0.10	167.8	3.4	0.02	OK
	Lw=430				0.00	0.00	0.00				
1~2W2	H=3300	14240.5	385.4	0.06	10884.70	587.77	0.05	2194.5	195.3	0.09	OK
	Lw=4160				0.00	0.00	0.00				
1~2W2	H=3300	1533.2	180.9	0.18	105.11	18.81	0.18	167.5	10.9	0.07	OK
	Lw=430				0.00	0.00	0.00				
1~2W2	H=3300	2043.9	178.2	0.19	208.69	39.03	0.19	229.8	21.4	0.09	OK
	Lw=580				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	474.1	0.12	221.13	22.78	0.10	439.6	4.4	0.01	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	2043.9	256.2	0.13	106.84	13.03	0.12	236.6	7.6	0.03	OK
	Lw=580				0.00	0.00	0.00				
1~2W2	H=3300	1832.9	118.5	0.07	122.32	8.68	0.07	208.0	4.6	0.02	OK
	Lw=530				0.00	0.00	0.00				
1~2W2	H=3300	1743.0	44.4	0.03	75.04	1.80	0.02	166.0	0.5	0.00	OK
	Lw=500				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.21] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
1~2W2	H=3300	4026.7	284.2	0.07	254.76	15.80	0.06	472.2	5.7	0.01	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	72.0	0.02	46.92	0.70	0.02	388.3	1.2	0.00	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=3300	4026.7	144.1	0.15	790.87	116.26	0.15	475.5	48.0	0.10	OK
	Lw=1160				0.00	0.00	0.00				
1~2W2	H=5600	2313.7	-15.5	0.05	49.44	2.22	0.05	270.7	0.5	0.00	OK
	Lw=670				0.00	0.00	0.00				
1~2W2	H=3300	7510.5	300.0	0.07	2778.45	180.60	0.07	1164.2	95.5	0.08	OK
	Lw=2200				0.00	0.00	0.00				
3~RW2	H=3300	2030.3	52.9	0.28	126.61	35.32	0.28	132.3	20.4	0.15	OK
	Lw=620				0.00	0.00	0.00				
3~RW2	H=3300	3632.2	127.4	0.04	358.02	12.17	0.03	281.4	7.9	0.03	OK
	Lw=1120				0.00	0.00	0.00				
3~RW2	H=3300	4270.5	237.7	0.06	609.46	34.74	0.06	373.0	19.8	0.05	OK
	Lw=1310				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	123.9	0.03	471.33	16.03	0.03	284.1	9.7	0.03	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	2818.5	176.0	0.06	122.20	6.72	0.06	211.5	4.0	0.02	OK
	Lw=860				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	125.9	0.03	174.21	5.05	0.03	262.5	6.0	0.02	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	4754.5	325.9	0.07	812.79	59.33	0.07	428.2	30.0	0.07	OK
	Lw=1460				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	197.6	0.08	713.71	59.95	0.08	278.1	26.1	0.09	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	5598.2	272.5	0.05	707.47	31.84	0.05	527.6	22.2	0.04	OK
	Lw=1730				0.00	0.00	0.00				
3~RW2	H=3300	2604.3	46.7	0.32	174.09	55.36	0.32	178.4	31.0	0.17	OK
	Lw=800				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	707.4	0.04	19283.21	809.90	0.04	2273.3	238.7	0.11	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	1426.4	77.1	0.05	46.87	2.39	0.05	86.4	2.4	0.03	OK
	Lw=430				0.00	0.00	0.00				
3~RW2	H=3300	13466.5	297.2	0.02	2611.04	49.61	0.02	1412.7	36.7	0.03	OK
	Lw=4160				0.00	0.00	0.00				
3~RW2	H=3300	1426.4	34.3	0.28	63.39	17.69	0.28	86.5	10.4	0.12	OK
	Lw=430				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.22] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
3~RW2	H=3300	1910.4	58.8	0.22	133.83	29.31	0.22	123.3	16.9	0.14	OK
	Lw=580				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	181.9	0.05	138.55	5.68	0.04	294.2	5.0	0.02	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	1910.4	171.5	0.09	119.44	11.11	0.09	123.8	7.7	0.06	OK
	Lw=580				0.00	0.00	0.00				
3~RW2	H=3300	1726.2	87.3	0.05	74.73	3.59	0.05	110.5	2.0	0.02	OK
	Lw=530				0.00	0.00	0.00				
3~RW2	H=3300	1636.3	43.9	0.03	3.15	0.07	0.02	83.2	0.2	0.00	OK
	Lw=500				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	196.8	0.05	81.27	3.49	0.04	291.0	1.7	0.01	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	66.6	0.02	312.44	5.00	0.02	276.6	4.7	0.02	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	47.4	0.16	408.87	65.83	0.16	277.6	33.3	0.12	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	581.7	0.03	12675.67	342.24	0.03	2257.8	65.5	0.03	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	464.6	0.04	22097.61	795.51	0.04	2233.3	323.8	0.15	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	2270.1	27.3	0.02	255.27	5.11	0.02	152.9	2.9	0.02	OK
	Lw=700				0.00	0.00	0.00				
3~RW2	H=3300	28665.3	1242.7	0.04	23627.40	992.35	0.04	3156.4	186.2	0.06	OK
	Lw=8875				0.00	0.00	0.00				
3~RW2	H=3300	7703.4	105.5	0.01	200.31	2.20	0.01	583.2	9.3	0.02	OK
	Lw=2375				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	303.8	0.02	15338.60	230.08	0.02	2136.7	40.6	0.02	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	1756.2	-4.5	0.05	35.27	1.80	0.05	107.7	1.2	0.01	OK
	Lw=540				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	33.8	0.12	400.58	48.47	0.12	288.8	27.4	0.10	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	2030.3	33.9	0.20	122.67	24.04	0.20	131.5	13.9	0.11	OK
	Lw=620				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	897.8	0.08	24062.65	1997.20	0.08	2297.6	705.4	0.31	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	13586.4	605.7	0.05	3873.29	158.81	0.04	1494.1	73.2	0.05	OK
	Lw=4200				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.23] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
3~RW2	H=3300	21754.4	896.3	0.05	20265.98	993.03	0.05	2381.7	419.2	0.18	OK
	Lw=6730				0.00	0.00	0.00				
3~RW2	H=3300	16066.3	149.7	0.01	1806.05	14.45	0.01	1728.1	15.6	0.01	OK
	Lw=4970				0.00	0.00	0.00				
3~RW2	H=3300	4994.3	163.7	0.03	44.17	1.15	0.03	384.4	3.1	0.01	OK
	Lw=1540				0.00	0.00	0.00				
3~RW2	H=3300	2818.5	34.1	0.04	400.07	15.20	0.04	183.6	6.4	0.04	OK
	Lw=860				0.00	0.00	0.00				
3~RW2	H=3300	3786.5	107.2	0.03	305.95	7.95	0.03	282.6	4.2	0.02	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	1426.4	36.3	0.03	25.96	0.57	0.02	99.5	0.3	0.00	OK
	Lw=430				0.00	0.00	0.00				
3~RW2	H=3300	2394.4	33.2	0.24	155.81	36.77	0.24	158.7	20.8	0.13	OK
	Lw=730				0.00	0.00	0.00				
3~RW2	H=3300	2394.4	23.5	0.27	138.90	38.06	0.27	158.5	22.0	0.14	OK
	Lw=730				0.00	0.00	0.00				
3~RW2	H=3300	8686.4	358.0	0.04	1538.54	56.93	0.04	699.9	28.7	0.04	OK
	Lw=2680				0.00	0.00	0.00				
3~RW2	H=3300	5084.2	295.2	0.06	669.71	36.83	0.06	396.2	26.5	0.07	OK
	Lw=1570				0.00	0.00	0.00				
3~RW2	H=3300	2848.5	35.3	0.05	374.48	17.60	0.05	198.1	9.9	0.05	OK
	Lw=870				0.00	0.00	0.00				
3~RW2	H=3300	7718.4	204.4	0.04	2956.80	130.10	0.04	598.0	34.7	0.06	OK
	Lw=2380				0.00	0.00	0.00				
3~RW2	H=3300	1726.2	134.0	0.08	3.58	0.23	0.06	91.6	0.1	0.00	OK
	Lw=530				0.00	0.00	0.00				
3~RW2	H=3300	2180.2	150.2	0.07	8.11	0.45	0.06	184.1	0.2	0.00	OK
	Lw=670				0.00	0.00	0.00				
3~RW2	H=3300	14734.2	491.3	0.04	7919.60	277.19	0.04	1563.3	148.5	0.10	OK
	Lw=4560				0.00	0.00	0.00				
3~RW2	H=3300	4480.3	137.6	0.03	249.35	6.48	0.03	356.9	5.0	0.01	OK
	Lw=1380				0.00	0.00	0.00				
3~RW2	H=3300	1696.2	94.2	0.06	26.97	1.27	0.05	109.4	0.7	0.01	OK
	Lw=520				0.00	0.00	0.00				
3~RW2	H=3300	4480.3	181.2	0.04	155.05	5.27	0.03	377.3	3.0	0.01	OK
	Lw=1380				0.00	0.00	0.00				
3~RW2	H=3300	4086.2	301.6	0.07	8.33	0.49	0.06	289.5	7.5	0.03	OK
	Lw=1260				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

[표 1.6.24] 벽체 검토 결과표

부재		축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
		내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
3~RW2	H=3300	3786.5	207.7	0.06	219.66	10.54	0.05	295.0	11.2	0.04	OK
	Lw=1160				0.00	0.00	0.00				
3~RW2	H=3300	1636.3	17.0	0.10	86.05	8.17	0.10	101.3	4.8	0.05	OK
	Lw=500				0.00	0.00	0.00				
wM0954	H=3300	3208.2	231.1	0.10	494.33	48.94	0.10	213.0	14.9	0.07	OK
	Lw=990				0.00	0.00	0.00				
3~RW2	H=3300	1726.2	15.9	0.19	72.50	13.99	0.19	109.3	8.0	0.07	OK
	Lw=530				0.00	0.00	0.00				
3~RW2	H=3300	1726.2	-10.3	0.07	18.67	1.23	0.07	101.7	0.7	0.01	OK
	Lw=530				0.00	0.00	0.00				
3~RW2	H=3300	933.6	129.4	0.14	17.85	2.25	0.13	57.4	1.0	0.02	OK
	Lw=300				0.00	0.00	0.00				
3~RW2	H=3300	1173.4	-17.6	0.38	1.94	0.73	0.38	75.9	1.8	0.02	OK
	Lw=380				0.00	0.00	0.00				
3~RW2	H=3300	7778.4	182.8	0.02	24.25	0.46	0.02	562.7	1.7	0.00	OK
	Lw=2400				0.00	0.00	0.00				
3~RW2	H=3300	4540.2	-135.9	0.30	75.09	22.15	0.30	261.2	1.8	0.01	OK
	Lw=1400				0.00	0.00	0.00				
3~RW2	H=3300	4904.4	218.7	0.05	129.41	4.79	0.04	365.6	5.5	0.02	OK
	Lw=1510				0.00	0.00	0.00				
3~RW2	H=3300	1173.4	2.1	0.17	12.62	2.16	0.17	73.3	1.5	0.02	OK
	Lw=380				0.00	0.00	0.00				
3~RW2	H=3300	7838.3	-183.7	0.26	319.30	83.98	0.26	777.1	49.7	0.06	OK
	Lw=2420				0.00	0.00	0.00				
3~RW2	H=3300	2210.2	26.8	0.36	109.23	39.10	0.36	145.8	22.2	0.15	OK
	Lw=680				0.00	0.00	0.00				
3~RW2	H=3300	20996.2	1337.2	0.10	21803.44	2093.13	0.10	2199.2	294.7	0.13	OK
	Lw=6500				0.00	0.00	0.00				
3~RW2	H=3300	7444.2	247.1	0.03	1189.33	35.68	0.03	816.0	18.0	0.02	OK
	Lw=2300				0.00	0.00	0.00				
3~RW2	H=3300	7778.4	461.2	0.06	2041.21	124.51	0.06	863.9	62.2	0.07	OK
	Lw=2400				0.00	0.00	0.00				
3~RW2	H=3300	11316.2	-0.8	0.07	2191.33	159.97	0.07	1156.7	49.7	0.04	OK
	Lw=3500				0.00	0.00	0.00				
3~RW2	H=3300	12768.2	181.4	0.03	8648.58	207.57	0.02	1327.5	65.0	0.05	OK
	Lw=3950				0.00	0.00	0.00				
3~RW2	H=3300	12918.1	271.7	0.05	9317.44	419.29	0.05	947.4	56.8	0.06	OK
	Lw=4000				0.00	0.00	0.00				

* Ratio = 외력/내력
* 'KDS 14 20 90 : 2021 기존 콘크리트 구조물의 안전성 평가기준'에 따라 강도감소계수는 인장지배단면 1.0, 압축지배단면 0.8, 전단력 및 비틀림모멘트 0.8, 콘크리트에 작용한 지압력 0.8을 적용함.

1.6.3.4 철골부재 구조안전성 검토

· 대상 건축물의 RC기둥를 검토한 결과, 보의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

1)기존부

[표 1.6.25] 철골부재 검토 결과표

부재	축력 검토 (kN)			모멘트 검토 (kN.m)			전단력 검토 (kN)			판정
	내력	부재력	Ratio	내력	부재력	Ratio	내력	부재력	Ratio	
H 194x150x6/9	825.06	0.00	0.00	57.48	-17.90	0.31	0.31	0.13	OK	OK
SS400				22.00	0.00	0.00	242.73	75.73	0.31	
3SG1 H 194x150x6/9	825.06	0.00	0.00	56.45	-13.88	0.25	0.25	0.09	OK	OK
SS400				22.00	0.00	0.00	226.22	96.60	0.43	
4SG1 H 194x150x6/9	825.06	0.00	0.00	56.45	-12.98	0.23	0.23	0.10	OK	OK
SS400				22.00	0.00	0.00	228.53	110.84	0.49	
RSG1 H 194x150x6/9	825.06	0.00	0.00	56.45	-16.33	0.29	0.29	0.11	OK	OK
SS400				22.00	0.00	0.00	192.66	112.32	0.58	
2SG1 H 300x150x6.5/9	989.40	0.00	0.00	90.68	-35.24	0.39	0.39	0.13	OK	OK
SS400				22.21	0.00	0.00	175.87	33.77	0.19	
1SC1 H 200x200x8/12	1174.09	-128.56	0.11	106.90	7.77	0.07	0.13	0.01	OK	OK
SS400				51.61	-0.18	0.00	170.01	47.60	0.28	
2SC1 H 200x200x8/12	1239.59	-65.33	0.05	108.85	-12.73	0.12	0.16	0.03	OK	OK
SS400				51.61	-0.94	0.02	164.55	51.34	0.31	
3SC1 H 200x200x8/12	1221.62	-32.06	0.03	108.85	7.49	0.07	0.15	0.02	OK	OK
SS400				51.61	3.54	0.07	160.02	50.73	0.32	
4SC1 H 200x200x8/12	1184.08	-30.08	0.03	107.39	11.23	0.10	0.22	0.02	OK	OK
SS400				51.61	-5.49	0.11	164.03	18.86	0.12	

* Ratio = 외력/내력

1.7 소결

본 장에서는 대상 건축물에 대해 주요 구조부재에 대한 구조안전성을 검토한 결과는 다음과 같다.

① 보 구조안전성 검토결과
대상 건축물의 보를 검토한 결과, 보의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

② 기둥 구조안전성 검토결과
대상 건축물의 기둥를 검토한 결과, 보의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

③ 벽체 구조안전성 검토결과
대상 건축물의 벽체를 검토한 결과, 벽체의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

④ 철골부재 구조안전성 검토결과
대상 건축물의 철골부재를 검토한 결과, 벽체의 내력은 모두 허용범위 이내로 검토되어 구조안전성에 문제가 없는 것으로 판단된다.

단, 상기 결과는 2023년 6월 용역을 수행한 구조물에 대한 검토결과이며, 추후 리모델링 혹은 증축이 이루어질 경우 현 구조물의 상태(구조부재, 하중 등)가 바뀌게 되므로 상기 결과는 유효하지 않다. 따라서 리모델링 혹은 증축이 이루어질 경우 정밀안전진단 및 구조안전성 검토를 재수행하여야 한다.

제2장 기존 구조물 내진성능평가

2.1 일반사항
2.2 내진성능 예비평가
2.3 지진하중 산정
2.4 비정형성 평가
2.5 주기 비정형성 검토
2.6 고차모드 영향검토
2.7 내진성능평가 절차의 선택
2.8 비선형정적해석 결과
2.9 선형동적해석 결과
2.10 소결

2. 기존 구조물 내진성능평가

2.1 일반사항

본 장에서는 대상 구조물의 내진성능을 평가한다. 기존 구조물 내진성능 평가 결과, 내진성능이 부족한 경우 적절한 보강 방안(일반공법)을 제시함으로써 대상 건축물의 내진성능을 확보하고자 한다.

2.1.1 내진성능평가 방법

'기존 시설물(건축물) 내진성능 평가요령 (국토안전관리원, 2021)'에 따라 내진성능 예비평가 및 상세평가를 실시한다.

2.1.2 해석프로그램

- 구조 해석 : 3차원 전산 구조해석
- 사용 Program : MIDAS/GEN 2023 Ver. 935 R3

2.1.3 적용 기준

- 적용기준 : 건축구조기준 (KDS 41)
  건축물 내진설계기준 (KDS 41 17 00)
- 적용규칙 : 건축법 시행령 '건축물의 구조기준 등에 관한 규칙'
- 적용지침 : 기존 시설물(건축물) 내진성능 평가요령 (국토안전관리원, 2021)
  기존 시설물(건축물) 내진성능 향상요령 (국토안전관리원, 2022)

2.1.4 유효강성

적용 지침에 따라 철근콘크리트 부재의 유효강성은 아래 표와 같이 적용한다.

[표 2.1.1] 철근콘크리트 구조 부재별 유효강성

부재	휨강성	전단강성	축강성
보[1)]	$0.35E_cI_g$	$0.4E_cA_w$	E_cA_g
기둥	$0.7E_cI_g$	$0.4E_cA_w$	E_cA_g
비균열 벽체	$0.7E_cI_g$	$0.4E_cA_w$	E_cA_g
균열 벽체	$0.35E_cI_g$	$0.2E_cA_w$	E_cA_g

1) T형보의 경우, Ig는 웨브부분의 Ig값의 2배의 해당하는 값, 또는 「건축구조기준」에 규정된 유효폭의 규정에 따라 산정할 수 있음.

2.1.5 유효지반가속도(S)

대상 구조물은 '충청남도 보령시 해수욕장2길 19'에 위치하고 있어 '2400년 재현주기 지진력 국가지진위험지도(소방방재청)'를 참조하여 유효지반 가속도를 0.167g으로 산정할 수 있다. 단, 건축물 내진설계기준(KDS 41 17 00)에 따라 지진구역계수($Z=0.11$)와 위험도계수($I=2.0$)의 곱하여 구한 S값(0.22g)의 80%보다 작지 않아야 하기에, **<u>본 용역에서는 유효지반 가속도를 0.176g 으로 적용</u>**하였다.

2.1.6 지반등급

지반조사보고서를 참조하여 대상 구조물의 **<u>지반등급은 S4로 적용</u>**하였다.

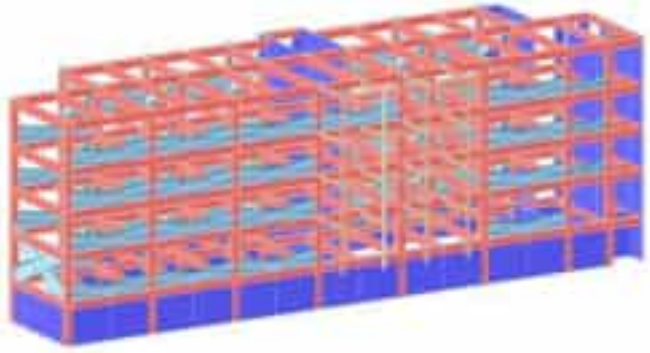
[그림 2.1.1] 대상 구조물 지반등급 산정 (지반조사보고서)

2.1.7 구조물 개요

2.1.7.1 기존부

시설물명	학생교육원 대천임해 별관동	층수(지하/지상)	지하 1층/지상 4층
위 치	충청남도 보령시	유효지반가속도(S)	0.176g
연면적	5,922.61 ㎡ (전체)	구조	철근콘크리트조 (일부 철골구조)
내진등급	내진 Ⅰ 등급 [1]	성능목표 (재현주기-목표성능수준)	
		1400년	인명안전 (LS)
		2400년	붕괴방지 (CP)
지반종류	S4	지반조사보고서 참조	
중요도계수(I_e)	1.2	반응수정계수(R)	1.0 (성능기반평가법)
적용된 평가절차	기존 시설물(건축물) 내진성능 평가요령 (국토안전관리원, 2021.05) 내진성능 상세평가		

	구조재료	설계도서 강도	건설연도별 재료기본값		현장조사 강도 (기대강도/설계기준강도)	내진성능평가 적용강도 (설계기준강도/기대강도)	근거
			공칭강도	기대강도			
재료강도 산정 (단위 : MPa)	콘크리트강도 (f_{ck})	-	18.00	21.00	28.54 / 29.60	28.54 / 29.60	건설연도별 재료의 기본값
	철근강도 (f_y)	-	300	360	-	300 / 360	건설연도별 재료의 기본값
	철골강도 (F_y)	-	-	-	-	235 / 258	추정강도



내진성능평가 해석모델

1) 해당 시설물은 위험물 저장 및 처리시설, 국가 또는 지방자치단체의 청사 · 외국공관 · 소방서 · 발전소 · 방송국 · 전신전화국, 긴급대피수용시설로 지정한 건축물이 아님으로 내진등급Ⅰ등급을 적용함.

2.1.7.2 증축부

시설물명	학생교육원 대천임해 별관동	층수(지하/지상)	지하 1층/지상 4층
위 치	충청남도 보령시	유효지반가속도(S)	0.176g
연면적	5,922.61 ㎡ (전체)	구조	철근콘크리트조
내진등급	내진 Ⅰ 등급 [1]	성능목표 (재현주기-목표성능수준)	
		1400년	인명안전 (LS)
		2400년	붕괴방지 (CP)
지반종류	S4	지반조사보고서 참조	
중요도계수(I_e)	1.2	반응수정계수(R)	1.0 (성능기반평가법)
적용된 평가절차	기존 시설물(건축물) 내진성능 평가요령 (국토안전관리원, 2021.05) 내진성능 예비평가, 내진성능 상세평가		

재료강도 산정 (단위 : MPa)	구조재료	설계도서 강도	건설연도별 재료기본값		현장조사 강도 (기대강도/설계기준강도)	내진성능평가 적용강도 (설계기준강도/기대강도)	근거
			공칭강도	기대강도			
	콘크리트강도 (f_{ck})	-	21.0	25.0	27.55 / 28.20	27.55 / 28.20	건설연도별 재료의 기본값
	철근강도 (f_y)	-	300	360	-	400 / 440	설계도서 참고

내진성능평가 해석모델

1) 해당 시설물은 위험물 저장 및 처리시설, 국가 또는 지방자치단체의 청사 · 외국공관 · 소방서 · 발전소 · 방송국 · 전신전화국, 긴급대피수용시설로 지정한 건축물이 아니므로 내진등급Ⅰ등급을 적용함.

2.1.8 해석모델

2.1.8.1 기존부

(1) 고유치해석 결과

Mode	UX	UY	UZ	RX	RY	RZ

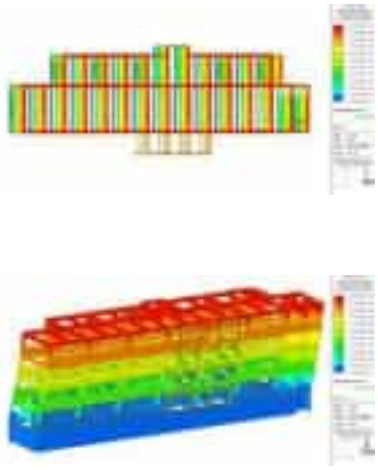
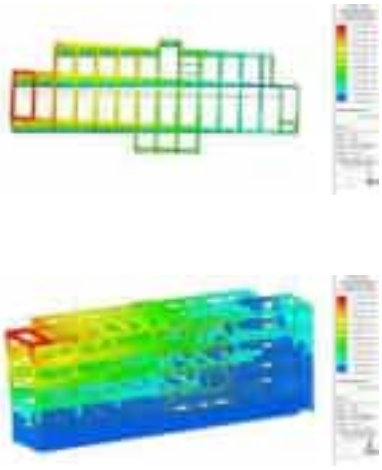
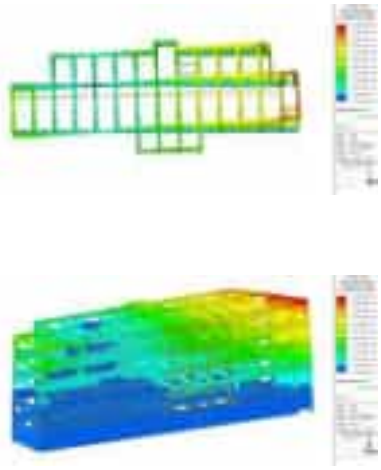
EIGENVALUE ANALYSIS

Mode No	Frequency (radian)	Frequency (cycle/sec)	Period (sec)	Tolerance
1	9.2520	1.4645	0.6828	0.0000e+00
2	12.8904	2.0197	0.4951	0.0000e+00
3	26.4444	4.2068	0.2376	0.0000e+00
4	26.9825	4.2817	0.2336	0.0000e+00
5	45.5870	7.2554	0.1378	0.0000e+00
6	45.8378	7.2953	0.1371	0.0000e+00
7	65.2870	10.3909	0.0962	0.0000e+00
8	85.2339	13.5654	0.0737	0.0000e+00
9	101.7925	16.1964	0.0618	0.0000e+00
10	117.9465	18.6265	0.0537	0.0000e+00

MODAL PARTICIPATION MASSES PRINTOUT

Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)
1	89.6159	89.6159	0.0005	0.0005	0.0000	0.0000	0.0000	0.0000	0.6708	0.6708	0.0077	0.0077
2	0.0001	89.6160	49.3734	49.3740	0.0000	0.0000	0.3843	0.3843	0.0001	0.6702	33.3520	33.3598
3	0.0007	89.6167	34.7543	84.1283	0.0000	0.0000	0.2596	0.6440	0.0003	0.6705	48.2490	81.6088
4	0.0603	97.6771	0.0882	84.1364	0.0000	0.0000	0.0000	0.6440	0.0071	0.6776	0.0341	81.6429
5	0.0035	98.5806	3.4328	87.5692	0.0000	0.0000	0.0050	0.6490	0.4864	1.1640	3.4224	85.0652
6	0.0378	99.3984	4.2832	91.8615	0.0000	0.0000	0.0051	0.6540	0.3768	1.5389	3.4289	88.4941
7	0.2974	99.6958	0.0000	91.8615	0.0000	0.0000	0.0000	0.6541	0.0427	1.5826	0.0001	88.4942
8	0.0002	99.6961	1.4104	93.2718	0.0000	0.0000	0.4188	1.0728	0.0022	1.5848	0.5592	89.2535
9	0.0004	99.6964	5.9001	99.1720	0.0000	0.0000	0.0021	1.0747	0.0001	1.5849	9.3082	98.5536
10	0.0000	99.6965	0.0963	99.2703	0.0000	0.0000	0.0200	1.0948	0.0000	1.5850	0.2415	98.7951

(2) 구조물의 동특성

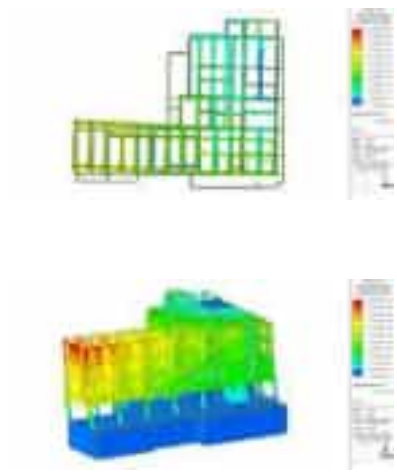
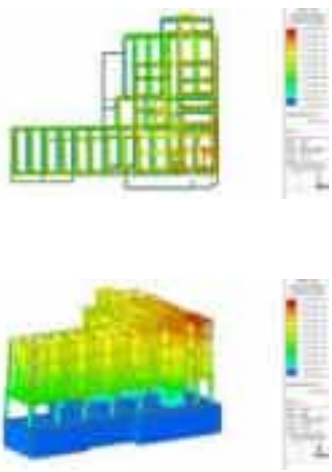
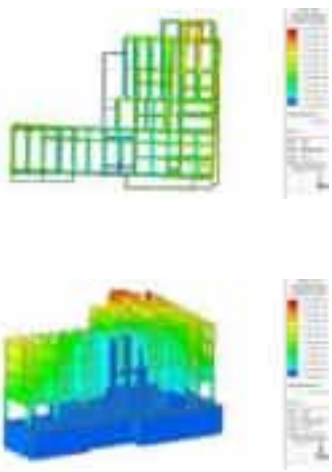
1차 모드 (X방향)	2차 모드 (Y방향)	3차 모드 (Z비틀림)
		

2.1.8.2 증측부

(1) 고유치해석 결과

Mode	UX		UY		UZ		RX		RY		RZ	
EIGENVALUE ANALYSIS												
Mode No	Frequency (radian/sec)		Frequency (cycle/sec)		Period (sec)		Tolerance					
1	19.5425		3.1103		0.3215		7.1911e-27					
2	25.1335		4.0001		0.2500		7.1911e-27					
3	28.7656		4.5782		0.2184		7.1911e-27					
4	58.2037		9.2634		0.1080		7.1911e-27					
5	66.3729		10.5619		0.0919		7.1911e-27					
6	75.7294		12.0527		0.0830		7.1911e-27					
7	146.5193		23.3193		0.0429		7.1911e-27					
8	181.3270		28.8591		0.0347		7.1911e-27					
9	204.2662		32.5100		0.0308		7.1911e-27					
10	235.5624		37.4809		0.0267		7.1911e-27					
11	283.1262		45.0612		0.0222		7.1911e-27					
12	321.4964		51.1968		0.0195		7.1911e-27					
MODAL PARTICIPATION MASSES PRINTOUT												
Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)
1	17.9834	17.9834	38.7833	38.7833	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	39.6999	39.6999
2	35.5064	53.4898	49.9350	88.7183	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.2995	47.9994
3	41.3871	94.8770	5.5150	94.2334	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	43.7636	91.7629
4	0.2358	95.2128	0.2369	94.4703	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.9503	95.7132
5	0.0002	95.2130	5.4260	99.8963	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0611	98.7744
6	4.7399	99.9530	0.3255	99.8218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.1498	99.9242
7	0.0084	99.9613	0.0889	99.9107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0673	99.9916
8	0.0203	99.9816	0.0091	99.9979	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	99.9916
9	0.0164	99.9980	0.0009	99.9987	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0068	99.9984
10	0.0005	99.9985	0.0010	99.9998	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	99.9998
11	0.0012	99.9997	0.0002	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	99.9998
12	0.0003	100.0000	0.0000	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	100.0000

(2) 구조물의 동특성

1차 모드 (X방향)	2차 모드 (Y방향)	3차 모드 (Z비틀림)
		

2.2 내진성능 예비평가

2.2.1 일반사항

내진성능 예비평가는 지진하중에 저항하는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가한다. 수직부재가 전단파괴될 경우는 비선형 거동이 일어나지 않으므로 전단파괴하중을 그 부재의 횡하중 저항능력으로 볼 수 있으며, 휨파괴되는 부재의 경우에는 비선형 거동에 의한 에너지 흡수능력을 고려하여 휨파괴강도에 적절한 계수를 곱한 값을 그 부재의 횡하중 저항능력으로 본다. 전단파괴 부재와 휨파괴 부재가 공존하는 경우는 두 종류의 부재가 최대하중에 도달하는 시점이 다르므로 구조물의 횡하중 저항능력을 두 값의 단순 합으로 볼 수는 없으며 휨과 전단 거동의 상호작용을 고려한 간략식을 사용한다.

2.2.2 적용대상 건물의 범위

예비평가 절차는 저층의 철근콘크리트조와 조적조 건물을 대상으로 한다.

2.2.3 평가용 지진하중

중저층 건축물의 경우 대부분 주기가 1.0초 이하일 것으로 예상되며, 보수적인 평가를 위해 내진성능 예비평가 단계에서는 단주기스펙트럼가속도(Sxs)를 적용한 지진하중으로 평가한다.

- 1400년 재현주기 지진력 Sxs = 0.49280 (S=0.176, S2)
- 2400년 재현주기 지진력 Sxs = 0.61601 (S=0.176, S2)

2.2.4 비정형계수

대상 구조물은 비정형계수 5. 항목에 해당하므로, $n=2$, $\lambda_s = 0.81$ 을 적용한다.

여기서, n은 아래의 6가지 사항 중 해당하는 항목의 수를 나타낸다. 단, 5번 항목에 해당할 경우 다른 항목의 수와 합에 2를 더한다.

1. L, T, U, H형 평면에서 돌출부의 면적이 전체평면면적의 20%를 초과할 경우. 단, 돌출부는 튀어나온 길이가 폭의 0.5배 이상인 경우만 고려.

2. 평면치수의 장변 대 단변의 비가 6를 초과하는 경우.

3. 층고가 가장 낮은 층의 층고가 가장 높은 층의 층고의 70%이하일 경우. 단, 최상층은 가장 층고가 낮은 층에 해당하지 않음.

4. 가장 면적이 작은 층의 면적이 가장 큰 층의 면적의 70%이하일 경우. 단, 최상층은 가장 면적이 작은 층에 해당하지 않음.

5. 상층부 수직부재의 단면적 합이 하층부 수직부재의 단면적 합에 비해 30%를 초과하는 경우(필로티 등) 또는 기둥사이의 조적벽체가 불실하게 채워진 경우. 조적벽체도 수직부재로 본다.

6. 벽체의 강성 중심이 평면의 중심에서 벽체의 수직방향으로 전체 평면길이의 1/6를 초과하는 경우. 단, 기둥만 존재하는 경우에는 해당되지 않음.

2.2.5 기존부

2.2.5.1 수직부재 정보 (기둥)

(1) 1층

Story	Level (m)	Story height (m)	Section Name	Member	A (m^2)	X-Direction			Y-Direction		
						D (m)	h0 (m)	Remark	D (m)	h0 (m)	Remark
1F	0.00	0.00	1C5	54	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	0.00	1C5	55	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	0.00	1C5	56	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	3.50	1C5	57	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	0.00	1C5	58	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	0.00	1C5	59	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	0.00	1C5	60	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	0.00	1C5	61	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	3.50	1C5	62	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	3.50	1C5	63	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	3.50	1C5	64	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	3.50	1C8	65	0.16	0.40	3.50	Long	0.40	3.50	Long
1F	0.00	0.00	1C5	66	0.20	0.50	0.70	Short	0.40	0.70	Short
1F	0.00	3.50	1C5	67	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	3.50	1C5	68	0.20	0.50	3.50	Long	0.40	3.50	Long
1F	0.00	0.00	1C5A	69	0.16	0.40	1.00	Normal	0.40	1.00	Normal
1F	0.00	0.00	1C8	70	0.16	0.40	1.00	Normal	0.40	1.00	Normal

(2) 2층

Story	Level (m)	Story height (m)	Section Name	Member	A (m^2)	X-Direction			Y-Direction		
						D (m)	h0 (m)	Remark	D (m)	h0 (m)	Remark
2F	3.50	3.50	2C5	144	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	145	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	146	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	147	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	148	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	149	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	150	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.50	2C5	151	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.10	2C5	152	0.20	0.50	3.10	Long	0.40	3.10	Long
2F	3.50	3.10	2C5	153	0.20	0.50	3.10	Long	0.40	3.10	Long
2F	3.50	3.10	2C5	154	0.20	0.50	3.10	Long	0.40	3.10	Long
2F	3.50	3.10	2C8	155	0.16	0.40	3.10	Long	0.40	3.10	Long
2F	3.50	3.50	2C5	156	0.20	0.50	0.90	Short	0.40	0.90	Normal
2F	3.50	3.10	2C5	157	0.20	0.50	3.10	Long	0.40	3.10	Long
2F	3.50	3.10	2C5	158	0.20	0.50	3.10	Long	0.40	3.10	Long
2F	3.50	3.50	2C5A	159	0.16	0.40	0.90	Normal	0.40	0.90	Normal
2F	3.50	3.50	2C8	160	0.16	0.40	0.90	Normal	0.40	0.90	Normal

(3) 3층

Story	Level (m)	Story height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	h0 (m)	Remark	D (m)	h0 (m)	Remark
3F	6.60	6.60	3C5	234	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	235	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	236	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	237	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	238	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	239	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	240	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	6.60	3C5	241	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	3.10	3C5	242	0.20	0.50	3.10	Long	0.40	3.10	Long
3F	6.60	3.10	3C5	243	0.20	0.50	3.10	Long	0.40	3.10	Long
3F	6.60	3.10	3C5	244	0.20	0.50	3.10	Long	0.40	3.10	Long
3F	6.60	3.10	3C8	245	0.18	0.40	3.10	Long	0.40	3.10	Long
3F	6.60	6.60	3C5	246	0.20	0.50	5.90	Short	0.40	0.90	Normal
3F	6.60	3.10	3C5	247	0.20	0.50	3.10	Long	0.40	3.10	Long
3F	6.60	3.10	3C5	248	0.20	0.50	3.10	Long	0.40	3.10	Long
3F	6.60	6.60	3C5A	249	0.16	0.40	5.90	Normal	0.40	0.90	Normal
3F	6.60	6.60	3C8	250	0.18	0.40	5.90	Normal	0.40	0.90	Normal

(4) 4층

Story	Level (m)	Story height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	h0 (m)	Remark	D (m)	h0 (m)	Remark
4F	9.70	9.70	4C5	324	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	325	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	326	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	327	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	328	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	329	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	330	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	9.70	4C5	331	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	3.40	4C5	332	0.20	0.50	3.40	Long	0.40	3.40	Long
4F	9.70	3.40	4C5	333	0.20	0.50	3.40	Long	0.40	3.40	Long
4F	9.70	9.70	4C5	334	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	3.40	4C8	335	0.18	0.40	3.40	Long	0.40	3.40	Long
4F	9.70	9.70	4C5	336	0.20	0.50	5.90	Short	0.40	0.90	Normal
4F	9.70	3.40	4C5	337	0.20	0.50	3.40	Long	0.40	3.40	Long
4F	9.70	3.40	4C5	338	0.20	0.50	3.40	Long	0.40	3.40	Long
4F	9.70	9.70	4C5A	339	0.16	0.40	5.90	Normal	0.40	0.90	Normal
4F	9.70	9.70	4C8	340	0.18	0.40	5.90	Normal	0.40	0.90	Normal

2.2.5.2 수직부재 정보 (벽체)

(1) 1층

Story	Level (m)	Story Height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num. of Columns	Length (m)	A (m²)	Num. of Columns
1F	0.00	3.50	wM2121	2121	0.20	0.75	0.15	0	-	-	-
1F	0.00	3.50	wM2122	2122	0.20	0.75	0.15	0	-	-	-
1F	0.00	3.50	wM2123	2123	0.15	1.72	0.26	1	-	-	-
1F	0.00	3.50	wM2131	2131	0.20	0.75	0.15	0	-	-	-
1F	0.00	3.50	wM2132	2132	0.20	0.75	0.15	0	-	-	-
1F	0.00	3.50	wM2211	2211	0.20	-	-	-	6.00	1.20	0
1F	0.00	3.50	wM2231	2231	0.20	-	-	-	5.00	1.20	1
1F	0.00	3.50	wM2251	2251	0.15	-	-	-	5.00	0.75	0
1F	0.00	3.50	wM2261	2261	0.20	-	-	-	5.00	1.10	1
1F	0.00	3.50	wM2271	2271	0.20	-	-	-	5.00	1.10	0

(2) 2층

Story	Level (m)	Story Height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num. of Columns	Length (m)	A (m²)	Num. of Columns
2F	3.50	3.10	wM3121	3121	0.20	0.75	0.15	0	-	-	-
2F	3.50	3.10	wM3122	3122	0.20	0.75	0.15	0	-	-	-
2F	3.50	3.10	wM3131	3131	0.15	1.72	0.26	1	-	-	-
2F	3.50	3.10	wM3141	3141	0.20	0.75	0.15	0	-	-	-
2F	3.50	3.10	wM3142	3142	0.20	0.75	0.15	0	-	-	-
2F	3.50	3.10	wM3211	3211	0.20	-	-	-	6.00	1.20	0
2F	3.50	3.10	wM3221	3221	0.20	-	-	-	5.00	1.20	1
2F	3.50	3.10	wM3241	3241	0.15	-	-	-	5.00	0.75	0
2F	3.50	3.10	wM3251	3251	0.20	-	-	-	5.00	1.10	1
2F	3.50	3.10	wM3261	3261	0.20	-	-	-	5.00	1.10	0

(3) 3층

Story	Level (m)	Story Height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num. of Columns	Length (m)	A (m²)	Num. of Columns
3F	6.60	3.10	w4121	4121	0.20	0.75	0.15	0	-	-	-
3F	6.60	3.10	w4122	4122	0.20	0.75	0.15	0	-	-	-
3F	6.60	3.10	w4131	4131	0.15	1.70	0.26	1	-	-	-
3F	6.60	3.10	w4141	4141	0.20	0.75	0.15	0	-	-	-
3F	6.60	3.10	w4142	4142	0.20	0.75	0.15	0	-	-	-
3F	6.60	3.10	w4211	4211	0.20	-	-	-	6.00	1.30	0
3F	6.60	3.10	w4231	4231	0.20	-	-	-	6.00	1.30	1
3F	6.60	3.10	w4251	4251	0.15	-	-	-	5.00	0.75	0
3F	6.60	3.10	w4261	4261	0.20	-	-	-	5.00	1.10	1
3F	6.60	3.10	w4271	4271	0.20	-	-	-	5.00	1.10	0

(4) 옥탑층

Story	Level (m)	Story Height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num. of Columns	Length (m)	A (m²)	Num. of Columns
4F	9.70	3.40	w5121	5121	0.20	0.75	0.15	0	-	-	-
4F	9.70	3.40	w5122	5122	0.20	0.75	0.15	0	-	-	-
4F	9.70	3.40	w5131	5131	0.15	1.70	0.26	1	-	-	-
4F	9.70	3.40	w5141	5141	0.20	0.75	0.15	0	-	-	-
4F	9.70	3.40	w5142	5142	0.20	0.75	0.15	0	-	-	-
4F	9.70	3.40	w5211	5211	0.20	-	-	-	6.00	1.30	0
4F	9.70	3.40	w5221	5221	0.20	-	-	-	6.00	1.30	1
4F	9.70	3.40	w5241	5241	0.15	-	-	-	5.00	0.75	0
4F	9.70	3.40	w5251	5251	0.20	-	-	-	5.00	1.10	1
4F	9.70	3.40	w5261	5261	0.20	-	-	-	5.00	1.10	0

2.2.5.3 수직부재 저항능력 (기둥)

(1) 1층

Story	Length (m)	Section Name	Member	α (m²)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	ΣT (kN)	Σa (kN)	Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	ΣT (kN)	Σa (kN)
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]

(2) 2층

Story	Length (m)	Section Name	Member	α (m²)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	ΣT (kN)	Σa (kN)	Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	ΣT (kN)	Σa (kN)
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
2F	[illegible]	[illegible]	[illegible]	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]	Shear	[illegible]	[illegible]	-	[illegible]

(3) 3층

Story	Level (m)	Section Name	Member	α (m²)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	0.7f (MPa)	0.7s (MPa)	Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	0.7f (MPa)	0.7s (MPa)
3F	8.60	3C3	234	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	235	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	236	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	237	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	238	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	239	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	240	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	241	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
3F	8.60	3C3	242	0.20	Flexural	460.00	92.00	92.00	-	Flexural	460.00	92.00	92.00	-
3F	8.60	3C3	243	0.20	Flexural	460.00	92.00	92.00	-	Flexural	460.00	92.00	92.00	-
3F	8.60	3C3	244	0.20	Flexural	460.00	92.00	92.00	-	Flexural	460.00	92.00	92.00	-
3F	8.60	3C3	245	0.18	Flexural	460.00	73.60	73.60	-	Flexural	460.00	73.60	73.60	-
3F	8.60	3C3	246	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00

(4) 4층

Story	Level (m)	Section Name	Member	α (m²)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	0.7f (MPa)	0.7s (MPa)	Controlled Action	Avg. Shear Stress (ton/m²)	Shear Strength (ton)	0.7f (MPa)	0.7s (MPa)
4F	8.10	4C3	224	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	225	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	226	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	227	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	228	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	229	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	230	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	231	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	232	0.20	Flexural	460.00	92.00	92.00	-	Flexural	460.00	92.00	92.00	-
4F	8.10	4C3	233	0.20	Flexural	460.00	92.00	92.00	-	Flexural	460.00	92.00	92.00	-
4F	8.10	4C3	234	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00
4F	8.10	4C3	235	0.18	Flexural	460.00	73.60	73.60	-	Flexural	460.00	73.60	73.60	-
4F	8.10	4C3	236	0.20	Shear	1170.00	234.00	-	234.00	Shear	710.00	142.00	-	142.00

2.2.5.4 수직부재 저항능력 (벽체)

(1) 1층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
1F	0.00	wM2121	2121	0.15	1000.00	150.00	150.00	-	-	-	-
1F	0.00	wM2122	2122	0.15	1000.00	150.00	150.00	-	-	-	-
1F	0.00	wM2123	2123	0.26	2000.00	510.00	510.00	-	-	-	-
1F	0.00	wM2131	2131	0.15	1000.00	150.00	150.00	-	-	-	-
1F	0.00	wM2132	2132	0.15	1000.00	150.00	150.00	-	-	-	-
1F	0.00	wM2211	2211	-	-	-	-	1.30	1000.00	1300.00	1300.00
1F	0.00	wM2221	2221	-	-	-	-	1.30	2000.00	2600.00	2600.00
1F	0.00	wM2241	2241	-	-	-	-	0.75	1000.00	750.00	750.00
1F	0.00	wM2261	2261	-	-	-	-	1.16	2000.00	2320.00	2320.00
1F	0.00	wM2271	2271	-	-	-	-	1.56	1000.00	1160.00	1160.00

(2) 2층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
2F	3.50	wM3121	3121	0.15	1000.00	150.00	150.00	-	-	-	-
2F	3.50	wM3122	3122	0.15	1000.00	150.00	150.00	-	-	-	-
2F	3.50	wM3131	3131	0.26	2000.00	510.00	510.00	-	-	-	-
2F	3.50	wM3141	3141	0.15	1000.00	150.00	150.00	-	-	-	-
2F	3.50	wM3142	3142	0.15	1000.00	150.00	150.00	-	-	-	-
2F	3.50	wM3211	3211	-	-	-	-	1.30	1000.00	1300.00	1300.00
2F	3.50	wM3221	3221	-	-	-	-	1.30	2000.00	2600.00	2600.00
2F	3.50	wM3241	3241	-	-	-	-	0.75	1000.00	750.00	750.00
2F	3.50	wM3251	3251	-	-	-	-	1.16	2000.00	2320.00	2320.00
2F	3.50	wM3261	3261	-	-	-	-	1.56	1000.00	1160.00	1160.00

(3) 3층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
3F	6.60	wM4121	4121	0.15	1000.00	150.00	150.00	-	-	-	-
3F	6.60	wM4122	4122	0.15	1000.00	150.00	150.00	-	-	-	-
3F	6.60	wM4131	4131	0.26	2000.00	510.00	510.00	-	-	-	-
3F	6.60	wM4141	4141	0.15	1000.00	150.00	150.00	-	-	-	-
3F	6.60	wM4142	4142	0.15	1000.00	150.00	150.00	-	-	-	-
3F	6.60	wM4211	4211	-	-	-	-	1.30	1000.00	1300.00	1300.00
3F	6.60	wM4231	4231	-	-	-	-	1.30	2000.00	2600.00	2600.00
3F	6.60	wM4251	4251	-	-	-	-	0.75	1000.00	750.00	750.00
3F	6.60	wM4261	4261	-	-	-	-	1.16	2000.00	2320.00	2320.00
3F	6.60	wM4271	4271	-	-	-	-	1.16	1000.00	1160.00	1160.00

(4) 옥탑층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
4F	9.70	wM5121	5121	0.15	1000.00	150.00	150.00	-	-	-	-
4F	9.70	wM5122	5122	0.15	1000.00	150.00	150.00	-	-	-	-
4F	9.70	wM5131	5131	0.26	2000.00	510.00	510.00	-	-	-	-
4F	9.70	wM5141	5141	0.15	1000.00	150.00	150.00	-	-	-	-
4F	9.70	wM5142	5142	0.15	1000.00	150.00	150.00	-	-	-	-
4F	9.70	wM5211	5211	-	-	-	-	1.30	1000.00	1300.00	1300.00
4F	9.70	wM5231	5231	-	-	-	-	1.30	2000.00	2600.00	2600.00
4F	9.70	wM5241	5241	-	-	-	-	0.75	1000.00	750.00	750.00
4F	9.70	wM5251	5251	-	-	-	-	1.16	2000.00	2320.00	2320.00
4F	9.70	wM5261	5261	-	-	-	-	1.16	1000.00	1160.00	1160.00

2.2.5.5 내진성능 예비평가 결과

(1) 1400년 재현주기 지진력

(2) 2400년 재현주기 지진력

※ 기존부의 경우 일부 철골조로 이루어져 있어 예비평가 대상에 포함되지 않음. (기존 시설물(건축물) 내진성능 평가요령에서 내진성능 예비평가의 범위는 철골조가 포함되어있지 않음.)

1400년 재현주기 지진력에 대한 내진성능 예비평가 결과, Demand Capacity Ratio는 X방향 1.67, Y방향 0.70으로 나타났다.

2400년 재현주기 지진력에 대한 내진성능 예비평가 결과, Demand Capacity Ratio는 X방향 2.09, Y방향 0.88으로 나타났다.

단, 예비평가는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가하기에 보수적인 결과의 산정될 수 있다.

따라서, 예비평가는 상세평가의 비교 검증 및 참고용으로 의미가 있으며 본 용역에선 정밀해석인 내진성능 상세평가를 통해 대상 구조물의 내진성능 수준을 판정한다.

2.2.6 증측부

2.2.6.1 수직부재 정보 (기둥)

(1) 1층

Story	Level (m)	Story Height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	b0 (m)	Remark	D (m)	b0 (m)	Remark
1F	0.00	5.60	1C1	656	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	658	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	660	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	661	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	662	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	663	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	664	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	665	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C3	666	0.30	0.50	5.60	Long	0.60	5.60	Long
1F	0.00	5.60	1C1	667	0.30	0.50	5.60	Long	0.60	5.60	Long

(2) 2층

Story	Level (m)	Story Height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	b0 (m)	Remark	D (m)	b0 (m)	Remark
2F	5.60	3.30	2C4	2097	0.06	0.20	3.30	Long	0.30	3.30	Long
2F	5.60	3.30	2C4	2100	0.06	0.20	3.30	Long	0.30	3.30	Long

(3) 3층

Story	Level (m)	Story Height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	b0 (m)	Remark	D (m)	b0 (m)	Remark
3F	8.90	3.30	3C4	2098	0.06	0.20	3.30	Long	0.30	3.30	Long
3F	8.90	3.30	3C4	2101	0.06	0.20	3.30	Long	0.30	3.30	Long

(4) 4층

Story	Level (m)	Story Height (m)	Section Name	Member	A (m²)	X-Direction			Y-Direction		
						D (m)	b0 (m)	Remark	D (m)	b0 (m)	Remark
4F	12.20	3.30	4C4	2099	0.06	0.20	3.30	Long	0.30	3.30	Long
4F	12.20	3.30	4C4	2102	0.06	0.20	3.30	Long	0.30	3.30	Long

2.2.6.2 수직부재 정보 (벽체)

(1) 1층

Story	Level (m)	Story height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m^2)	Num of Columns	Length (m)	A (m^2)	Num of Columns
1F	0.00	5.60	1-2W2	880	0.20	4.50	1.20	2	-	-	-
1F	0.00	5.60	1-2W2	881	0.20	4.20	0.84	3	-	-	-
1F	0.00	5.60	1-2W2	883	0.20	3.60	0.72	0	-	-	-
1F	0.00	5.60	1-2W2	885	0.20	-	-	-	4.37	0.89	0
1F	0.00	5.60	1-2W2	887	0.20	2.38	0.47	0	-	-	-
1F	0.00	5.60	1-2W2	888	0.20	4.20	0.84	1	-	-	-
1F	0.00	5.60	1-2W2	810	0.20	-	-	-	0.82	0.16	0
1F	0.00	5.60	1-2W2	811	0.20	-	-	-	0.68	0.14	0
1F	0.00	5.60	1-2W2	812	0.20	-	-	-	0.68	0.14	0
1F	0.00	5.60	1-2W2	813	0.20	-	-	-	0.68	0.14	0
1F	0.00	5.60	1-2W2	814	0.20	-	-	-	0.65	0.13	0
1F	0.00	5.60	1-2W2	815	0.20	0.53	0.11	0	-	-	-
1F	0.00	5.60	1-2W2	816	0.20	1.30	0.26	1	-	-	-
1F	0.00	5.60	1-2W2	817	0.20	0.67	0.13	0	-	-	-
1F	0.00	5.60	1-2W2	818	0.20	0.67	0.13	0	-	-	-

(2) 2층

Story	Level (m)	Story height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m^2)	Num of Columns	Length (m)	A (m^2)	Num of Columns
2F	5.60	3.30	1-2W2	880	0.20	6.50	1.30	0	-	-	-
2F	5.60	3.30	1-2W2	882	0.20	6.50	1.30	0	-	-	-
2F	5.60	3.30	1-2W2	884	0.20	1.54	0.31	0	-	-	-
2F	5.60	3.30	1-2W2	886	0.20	-	-	-	6.73	1.35	0
2F	5.60	3.30	1-2W2	889	0.20	8.86	1.77	0	-	-	-
2F	5.60	3.30	1-2W2	820	0.20	-	-	-	1.16	0.23	0
2F	5.60	3.30	1-2W2	821	0.20	-	-	-	0.43	0.09	0
2F	5.60	3.30	1-2W2	822	0.20	6.50	1.30	0	-	-	-
2F	5.60	3.30	1-2W2	823	0.20	-	-	-	0.54	0.11	0
2F	5.60	3.30	1-2W2	824	0.20	-	-	-	1.16	0.23	0
2F	5.60	3.30	1-2W2	825	0.20	-	-	-	0.62	0.12	0
2F	5.60	3.30	1-2W2	826	0.20	2.68	0.54	0	-	-	-
2F	5.60	3.30	1-2W2	828	0.20	1.57	0.31	0	-	-	-
2F	5.60	3.30	1-2W2	829	0.20	0.87	0.17	0	-	-	-
2F	5.60	3.30	1-2W2	830	0.20	-	-	-	0.72	0.15	0

(3) 3층

Story	Level (m)	Story height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num of Columns	Length (m)	A (m²)	Num of Columns
3F	8.90	3.30	3-RW2	900	0.20	0.62	0.12	3	-	-	-
3F	8.90	3.30	3-RW2	901	0.20	1.12	0.22	3	-	-	-
3F	8.90	3.30	3-RW2	902	0.20	1.31	0.26	0	-	-	-
3F	8.90	3.30	3-RW2	903	0.20	1.16	0.23	0	-	-	-
3F	8.90	3.30	3-RW2	904	0.20	0.86	0.17	0	-	-	-
3F	8.90	3.30	3-RW2	905	0.20	1.16	0.23	0	-	-	-
3F	8.90	3.30	3-RW2	906	0.20	1.46	0.29	3	-	-	-
3F	8.90	3.30	3-RW2	907	0.20	1.16	0.23	3	-	-	-
3F	8.90	3.30	3-RW2	908	0.20	1.73	0.35	3	-	-	-
3F	8.90	3.30	3-RW2	909	0.20	0.50	0.10	0	-	-	-
3F	8.90	3.30	3-RW2	910	0.20	-	-	-	8.58	1.30	3
3F	8.90	3.30	3-RW2	911	0.20	-	-	-	0.43	0.09	0
3F	8.90	3.30	3-RW2	912	0.20	-	-	-	4.18	0.83	0
3F	8.90	3.30	3-RW2	913	0.20	-	-	-	0.43	0.09	0
3F	8.90	3.30	3-RW2	914	0.20	0.58	0.12	3	-	-	-

(4) 4층

Story	Level (m)	Story height (m)	Wall Mark	Wall ID	Thickness (m)	X-Direction			Y-Direction		
						Length (m)	A (m²)	Num of Columns	Length (m)	A (m²)	Num of Columns
4F	12.20	3.30	3-RW2	900	0.20	0.62	0.12	3	-	-	-
4F	12.20	3.30	3-RW2	901	0.20	1.12	0.22	3	-	-	-
4F	12.20	3.30	3-RW2	902	0.20	1.31	0.26	0	-	-	-
4F	12.20	3.30	3-RW2	903	0.20	1.16	0.23	0	-	-	-
4F	12.20	3.30	3-RW2	904	0.20	0.86	0.17	0	-	-	-
4F	12.20	3.30	3-RW2	905	0.20	1.16	0.23	0	-	-	-
4F	12.20	3.30	3-RW2	906	0.20	1.46	0.29	3	-	-	-
4F	12.20	3.30	3-RW2	907	0.20	1.16	0.23	3	-	-	-
4F	12.20	3.30	3-RW2	908	0.20	1.73	0.35	3	-	-	-
4F	12.20	3.30	3-RW2	909	0.20	0.50	0.10	0	-	-	-
4F	12.20	3.30	3-RW2	910	0.20	-	-	-	8.58	1.30	3
4F	12.20	3.30	3-RW2	911	0.20	-	-	-	0.43	0.09	0
4F	12.20	3.30	3-RW2	912	0.20	-	-	-	4.18	0.83	0
4F	12.20	3.30	3-RW2	913	0.20	-	-	-	0.43	0.09	0
4F	12.20	3.30	3-RW2	914	0.20	0.58	0.12	3	-	-	-

2.2.6.3 수직부재 저항능력 (기둥)

(1) 1층

Story	Length (m)	Section Name	Member	h (cm)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)	Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-
1F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	-

(2) 2층

Story	Length (m)	Section Name	Member	h (cm)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)	Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	
2F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]	-	Flexural	[illegible]	[illegible]	[illegible]	

(3) 3층

Story	Length (m)	Section Name	Member	h (cm)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)	Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)
3F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]		Flexural	[illegible]	[illegible]	[illegible]	
3F	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]		Flexural	[illegible]	[illegible]	[illegible]	

(4) 옥탑층

Story	Length (m)	Section Name	Member	h (cm)	X-Direction					Y-Direction				
					Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)	Controlled Action	Avg. Shear Stress (kgf/cm²)	Shear Strength (kN)	Vf (kN)	Vu (kN)
RF	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]		Flexural	[illegible]	[illegible]	[illegible]	
RF	[illegible]	[illegible]	[illegible]	[illegible]	Flexural	[illegible]	[illegible]	[illegible]		Flexural	[illegible]	[illegible]	[illegible]	

2.2.6.4 수직부재 저항능력 (벽체)

(1) 1층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
1F	0.00	1-2W2	800	1.36	1000.00	1000.00	1000.00	-	-	-	-
1F	0.00	1-2W2	801	0.84	1000.00	840.00	840.00	-	-	-	-
1F	0.00	1-2W2	803	0.72	1000.00	720.00	720.00	-	-	-	-
1F	0.00	1-2W2	805	-	-	-	-	0.99	1000.00	994.00	994.00
1F	0.00	1-2W2	807	0.47	1000.00	475.00	475.00	-	-	-	-
1F	0.00	1-2W2	808	0.84	2000.00	1680.00	1680.00	-	-	-	-
1F	0.00	1-2W2	810	-	-	-	-	0.18	1000.00	184.00	184.00
1F	0.00	1-2W2	811	-	-	-	-	0.14	1000.00	136.00	136.00
1F	0.00	1-2W2	812	-	-	-	-	0.14	1000.00	136.00	136.00
1F	0.00	1-2W2	813	-	-	-	-	0.14	1000.00	136.00	136.00
1F	0.00	1-2W2	814	-	-	-	-	0.13	1000.00	130.00	130.00
1F	0.00	1-2W2	815	0.11	1000.00	106.00	106.00	-	-	-	-
1F	0.00	1-2W2	816	0.28	2000.00	552.00	552.00	-	-	-	-
1F	0.00	1-2W2	817	0.13	1000.00	134.00	134.00	-	-	-	-
1F	0.00	1-2W2	818	0.13	1000.00	134.00	134.00	-	-	-	-
1F	0.00	1-2W2	819	0.36	2000.00	716.00	716.00	-	-	-	-
1F	0.00	1-2W2	837	1.43	2000.00	2864.00	2864.00	-	-	-	-

(2) 2층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
2F	5.60	1-2W2	800	1.30	1000.00	1300.00	1300.00	-	-	-	-
2F	5.60	1-2W2	802	1.36	1000.00	1360.00	1360.00	-	-	-	-
2F	5.60	1-2W2	804	0.31	1000.00	308.00	308.00	-	-	-	-
2F	5.60	1-2W2	806	-	-	-	-	1.35	1000.00	1346.00	1346.00
2F	5.60	1-2W2	809	1.77	1000.00	1775.00	1775.00	-	-	-	-
2F	5.60	1-2W2	820	-	-	-	-	0.23	1000.00	232.00	232.00
2F	5.60	1-2W2	821	-	-	-	-	0.09	1000.00	88.00	88.00
2F	5.60	1-2W2	822	1.30	1000.00	1300.00	1300.00	-	-	-	-
2F	5.60	1-2W2	823	-	-	-	-	0.11	1000.00	108.00	108.00
2F	5.60	1-2W2	824	-	-	-	-	0.23	1000.00	232.00	232.00
2F	5.60	1-2W2	825	-	-	-	-	0.12	1000.00	124.00	124.00
2F	5.60	1-2W2	826	0.54	1000.00	536.00	536.00	-	-	-	-
2F	5.60	1-2W2	828	0.31	1000.00	314.00	314.00	-	-	-	-
2F	5.60	1-2W2	829	0.17	1000.00	174.00	174.00	-	-	-	-
2F	5.60	1-2W2	830	-	-	-	-	0.15	1000.00	146.00	146.00
2F	5.60	1-2W2	831	-	-	-	-	0.15	1000.00	146.00	146.00
2F	5.60	1-2W2	835	1.30	1000.00	1300.00	1300.00	-	-	-	-

(3) 3층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
3F	8.99	3-RW2	900	0.12	1000.00	124.00	124.00	-	-	-	-
3F	8.99	3-RW2	901	0.22	1000.00	224.00	224.00	-	-	-	-
3F	8.99	3-RW2	902	0.26	1000.00	262.00	262.00	-	-	-	-
3F	8.99	3-RW2	903	0.23	1000.00	232.00	232.00	-	-	-	-
3F	8.99	3-RW2	904	0.17	1000.00	172.00	172.00	-	-	-	-
3F	8.99	3-RW2	905	0.23	1000.00	232.00	232.00	-	-	-	-
3F	8.99	3-RW2	906	0.28	1000.00	282.00	282.00	-	-	-	-
3F	8.99	3-RW2	907	0.23	1000.00	232.00	232.00	-	-	-	-
3F	8.99	3-RW2	908	0.35	1000.00	346.00	346.00	-	-	-	-
3F	8.99	3-RW2	909	0.16	1000.00	166.00	166.00	-	-	-	-
3F	8.99	3-RW2	910	-	-	-	-	1.30	1000.00	1300.00	1300.00
3F	8.99	3-RW2	911	-	-	-	-	0.09	1000.00	86.00	86.00
3F	8.99	3-RW2	912	-	-	-	-	0.83	1000.00	832.00	832.00
3F	8.99	3-RW2	913	-	-	-	-	0.09	1000.00	98.00	98.00
3F	8.99	3-RW2	914	0.12	1000.00	116.00	116.00	-	-	-	-
3F	8.99	3-RW2	915	0.23	1000.00	232.00	232.00	-	-	-	-
3F	8.99	3-RW2	916	0.12	1000.00	116.00	116.00	-	-	-	-

(4) 4층

Story	Level (m)	Wall Mark	Wall ID	X-Direction				Y-Direction			
				A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)	A (m²)	Avg. Shear Stress (kN/m²)	Shear Strength (kN)	Cs (kN)
4F	12.28	3-RW2	900	0.12	1000.00	124.00	124.00	-	-	-	-
4F	12.28	3-RW2	901	0.22	1000.00	224.00	224.00	-	-	-	-
4F	12.28	3-RW2	902	0.26	1000.00	262.00	262.00	-	-	-	-
4F	12.28	3-RW2	903	0.23	1000.00	232.00	232.00	-	-	-	-
4F	12.28	3-RW2	904	0.17	1000.00	172.00	172.00	-	-	-	-
4F	12.28	3-RW2	905	0.23	1000.00	232.00	232.00	-	-	-	-
4F	12.28	3-RW2	906	0.28	1000.00	282.00	282.00	-	-	-	-
4F	12.28	3-RW2	907	0.23	1000.00	232.00	232.00	-	-	-	-
4F	12.28	3-RW2	908	0.35	1000.00	346.00	346.00	-	-	-	-
4F	12.28	3-RW2	909	0.16	1000.00	166.00	166.00	-	-	-	-
4F	12.28	3-RW2	910	-	-	-	-	1.30	1000.00	1300.00	1300.00
4F	12.28	3-RW2	911	-	-	-	-	0.09	1000.00	86.00	86.00
4F	12.28	3-RW2	912	-	-	-	-	0.83	1000.00	832.00	832.00
4F	12.28	3-RW2	913	-	-	-	-	0.09	1000.00	98.00	98.00
4F	12.28	3-RW2	914	0.12	1000.00	116.00	116.00	-	-	-	-
4F	12.28	3-RW2	915	0.23	1000.00	232.00	232.00	-	-	-	-
4F	12.28	3-RW2	916	0.12	1000.00	116.00	116.00	-	-	-	-

2.2.6.5 내진성능 예비평가 결과

(1) 1400년 재현주기 지진력

(2) 2400년 재현주기 지진력

1400년 재현주기 지진력에 대한 내진성능 예비평가 결과, Demand Capacity Ratio는 X방향 0.82, Y방향 0.98으로 나타났다. 층별 성능수준은 붕괴방지(CP)로 목표 내진성능 인명안전(LS)을 불만족하는 것으로 나타났다.

2400년 재현주기 지진력에 대한 내진성능 예비평가 결과, Demand Capacity Ratio는 X방향 1.03, Y방향 1.22로 나타났다. 층별 성능수준은 붕괴(Collapse)로 목표 내진성능 붕괴방지(CP)를 불만족하는 것으로 나타났다.

단, 예비평가는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가하기에 보수적인 결과의 산정될 수 있다.

따라서, 예비평가는 상세평가의 비교 검증 및 참고용으로 의미가 있으며 본 용역에선 정밀해석인 내진성능 상세평가를 통해 대상 구조물의 내진성능 수준을 판정한다.

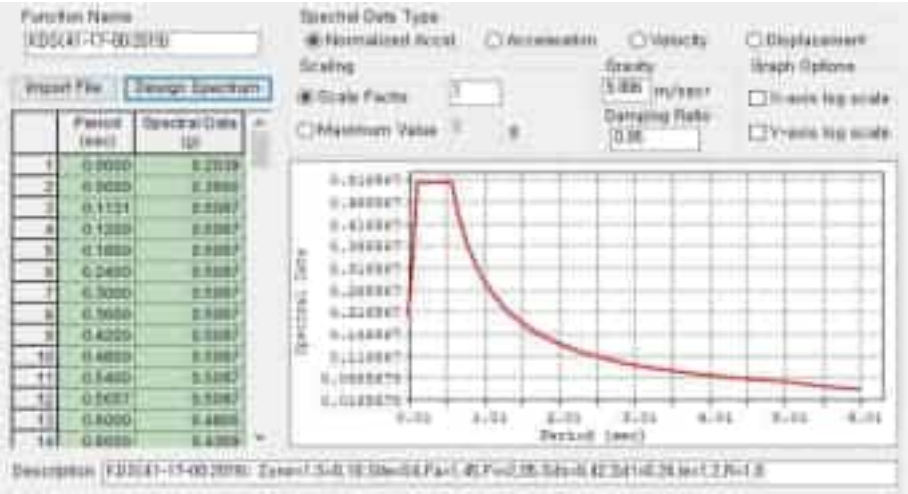
2.3 지진하중 산정

비선형정적절차는 구조물의 비선형성을 고려한 구조물의 역량스펙트럼과 요구 스펙트럼의 중첩을 통해 형성되는 성능점에 대한 평가이며, 내진등급에 따른 목표성능과 요구 스펙트럼은 아래와 같이 정의된다.

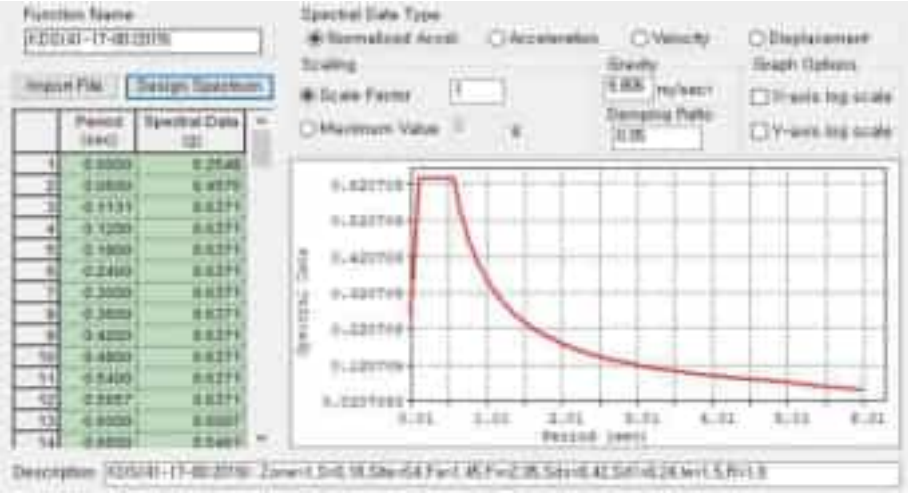
2.3.1 기존부

< 평가용 지진하중 산정 >

유효지반 가속도	지반등급	반응수정계수	재현주기	목표성능	지진위험도
0.176g	S4	1.0 (비선형해석)	1400년	인명안전	설계응답스펙트럼 가속도 1.2배
			2400년	붕괴방지	설계응답스펙트럼 가속도 1.5배



< 1400년 재현주기 지진력 설계응답스펙트럼 >

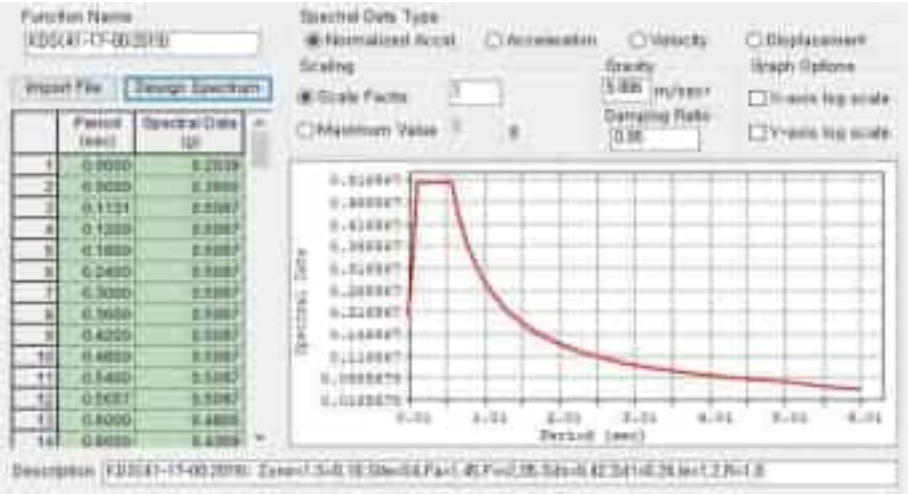


< 2400년 재현주기 지진력 설계응답스펙트럼 >

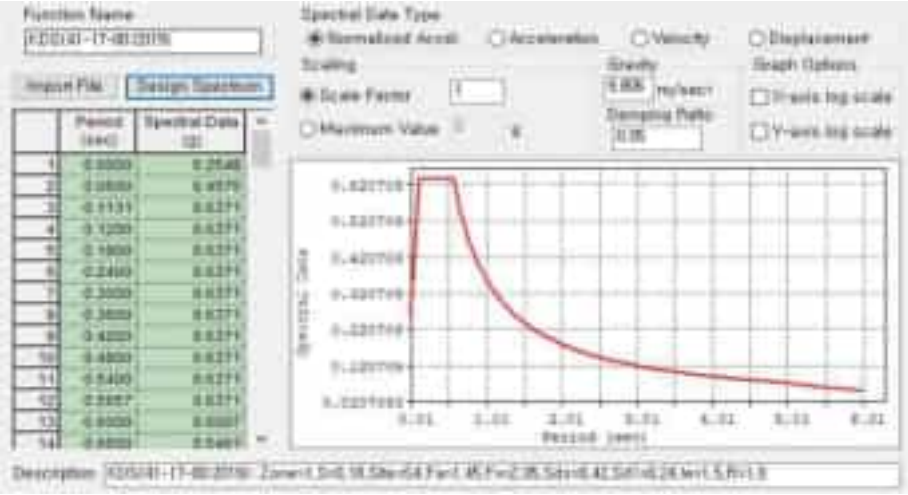
2.3.2 증측부

< 평가용 지진하중 산정 >

유효지반 가속도	지반등급	반응수정계수	재현주기	목표성능	지진위험도
0.176g	S4	1.0 (비선형해석)	1400년	인명안전	설계응답스펙트럼 가속도 1.2배
			2400년	붕괴방지	설계응답스펙트럼 가속도 1.5배



< 1400년 재현주기 지진력 설계응답스펙트럼 >



< 2400년 재현주기 지진력 설계응답스펙트럼 >

2.4 비정형성 평가

(1) 평면비정형성의 종류

① H-1. 비틀림 비정형 : 층의 강성 중심과 질량 중심 간의 거리가 평면 폭의 20%보다 큰 경우에는 비틀림을 고려하여야 한다.

$$E_{c.s-c.m} > 0.2D$$

여기서, $E_{c.s-c.m}$: 강성 중심과 질량 중심과의 편심거리
D : 지진방향과 직각방향의 평면의 폭

강성중심은 해당 층 수직부재의 면적의 도심점, 질량중심은 해당 층 보와 슬래브의 질량, 수직부재의 경우 상하층 중심까지의 질량을 고려한 질량중심으로 산정한다.

② H-2. 요철형 평면 : 돌출한 부분의 치수가 해당하는 방향의 평면치수의 15%를 초과하면 요철형 평면을 갖는 것으로 간주한다.

③ H-4. 격막의 불연속 : 격막에서 잘려나간 부분이나 뚫린 부분이 전체 격막 면적의 50%를 초과하거나 인접한 층간 격막 강성의 변화가 50%를 초과하는 급격한 불연속이나 강성의 변화가 있는 격막.

④ H-4. 면외 어긋남 : 수직부재의 면외 어긋남 등과 같이 횡력전달 경로에 있어서의 불연속성.

⑤ H-5. 비평행 시스템 : 횡력저항 수직요소가 전체 횡력저항 시스템에 직교하는 주축에 평행하지 않거나 대칭이 아닌 경우.

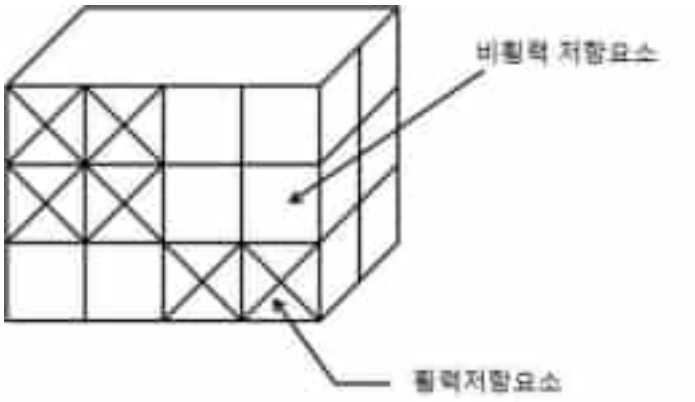
(2) 수직비정형성의 종류

① V-1. 강성비정형-연층 : 어떤 층의 조적 채움벽 등의 비구조재를 포함한 강성에 영향을 주는 수직부재단면적의 합이 인접한 상부층 수직부재단면적의 합의 70% 미만이거나 상부 3개 층 평균 수직부재단면적의 합의 80% 미만인 층이 존재하는 경우 강성분포의 비정형이 있는 것으로 간주한다.

② V-2. 중량비정형 : 어떤 층의 유효중량이 인접층 유효중량의 150%를 초과할 때 중량 분포의 비정형인 것으로 간주한다. 단, 지붕층이 하부층보다 가벼운 경우는 이를 적용하지 않는다.

③ V-4. 기하학적 비정형 : 횡력 저항시스템의 수평치수가 인접층 치수의 130%를 초과할 경우 기하학적 비정형이 존재하는 것으로 간주하며, 내진성능 평가시 140%를 초과 할 경우 수평치수의 비정형이 존재하는 것으로 간주한다.

④ V-4. 횡력저항 수직 저항요소의 비정형 : 횡력 저항요소의 면내 어긋남이 그 요소의 길이보다 크거나, 인접한 하부층 저항요소에 강성감소가 일어나는 경우 수직 저항요소의 면내 불연속에 의한 비정형이 있는 것으로 간주한다.



< 횡력 저항요소의 면내 어긋남 >

⑤ V-5. 강도의 불연속-약층 : 임의 층의 횡강도가 지상층 횡강도의 80% 미만인 약층이 존재하는 경우 강도의 불연속에 의한 비정형이 존재하는 것으로 간주한다. 각층의 횡강도는 층전단력을 부담하는 내진요소들의 저항 방향 강도의 합을 말한다.

2.4.1 기존부 비정형성 평가

< 평면 비정형성 검토 결과 >

유형번호	유형		정의	판정
H-1	비틀림 비정형		격막이 유연하지 않을 때 고려함. 어떤 축에 직교하는 구조물의 한 단부에서 우발편심을 고려한 최대 층변위가 그 구조물 양단부 층변위 평균값의 1.2배보다 클 때 비틀림 비정형인 것으로 간주한다.	**비정형 (Irregular)**
H-2	요철형 평면		돌출한 부분의 치수가 해당하는 방향의 평면치수 15%를 초과하면 요철형 평면을 갖는 것으로 간주한다.	**비정형 (Irregular)**
H-3	격막의 불연속		격막에서 잘려나간 부분이나 뚫린 부분이 전체 격막 면적의 50%를 초과하거나 또는 인접한 층간 격막 강성의 변화가 50%를 초과하는 경우, 격막의 불연속이 존재하는 것으로 간주한다.	**정형 (Regular)**
H-4	면외 어긋남		수직 부재의 면외 어긋남 등과 같이 하중전달 경로의 불연속성이 존재하는 경우	**정형 (Regular)**
H-5	비평행 시스템		횡력저항 수직 요소가 전체 횡력저항 시스템에 직교하는 주축에 평행하지 않은 경우	**정형 (Regular)**

< 수직 비정형성 검토 결과 >

유형번호	유형		정의	판정
V-1	강성 비정형 - 연층		어떤 층의 횡강성이 인접한 상부층 횡강성의 70% 미만이거나 상부 3개층 평균강성의 80% 미만인 연층이 존재하는 경우에는 강성분포의 비정형이 있는 것으로 간주한다.	**비정형** **(Irregular)**
V-2	중량 비정형		어떤 층의 유효중량이 인접층 유효중량의 150%를 초과할 때 중량 분포의 비정형이 존재하는 것으로 간주한다. 단, 지붕층이 하부층보다 가벼운 경우는 이를 적용하지 않는다.	**정형** **(Regular)**
V-3	기하학적 비정형		횡력저항 시스템의 수평치수가 인접층치수의 130%를 초과할 경우에는 기하학적 비정형이 존재하는 것으로 간주한다.	**정형** **(Regular)**
V-4	횡력저항 수직요소 비정형		횡력저항요소의 면내 어긋남이 그 요소의 길이보다 크거나 인접한 하부층 저항요소에 강성감소가 일어나는 경우에는 수직저항요소의 면내불연속에 의한 비정형이 있는 것으로 간주한다.	**정형** **(Regular)**
V-5	강도의 불연속 - 약층		임의 층의 횡강도가 직상층 횡강도의 80% 미만인 약층이 존재하는 경우에는 강도의 불연속에 의한 비정형이 존재하는 것으로 간주한다. 각층의 횡강도는 층전단력을 부담하는 내진요소들의 저항방향 강도의 합을 말한다.	**정형** **(Regular)**

2.4.2 증측부 비정형성 평가

< 평면 비정형성 검토 결과 >

유형번호	유형		정의	판정
H-1	비틀림 비정형		격막이 유연하지 않을 때 고려함. 어떤 축에 직교하는 구조물의 한 단부에서 우발편심을 고려한 최대 층변위가 그 구조물 양단부 층변위 평균값의 1.2배보다 클 때 비틀림 비정형인 것으로 간주한다.	**비정형 (Irregular)**
H-2	요철형 평면		돌출한 부분의 치수가 해당하는 방향의 평면치수 15%를 초과하면 요철형 평면을 갖는 것으로 간주한다.	**비정형 (Irregular)**
H-3	격막의 불연속		격막에서 잘려나간 부분이나 뚫린 부분이 전체 격막 면적의 50%를 초과하거나 또는 인접한 층간 격막 강성의 변화가 50%를 초과하는 경우, 격막의 불연속이 존재하는 것으로 간주한다.	**정형 (Regular)**
H-4	면외 어긋남		수직 부재의 면외 어긋남 등과 같이 하중전달 경로의 불연속성이 존재하는 경우	**비정형 (Irregular)**
H-5	비평행 시스템		횡력저항 수직 요소가 전체 횡력저항 시스템에 직교하는 주축에 평행하지 않은 경우	**정형 (Regular)**

< 수직 비정형성 검토 결과 >

유형번호	유형		정의	판정
V-1	강성 비정형 - 연층		어떤 층의 횡강성이 인접한 상부층 횡강성의 70% 미만이거나 상부 3개층 평균강성의 80% 미만인 연층이 존재하는 경우에는 강성분포의 비정형이 있는 것으로 간주한다.	**비정형** **(Irregular)**
V-2	중량 비정형		어떤 층의 유효중량이 인접층 유효중량의 150%를 초과할 때 중량 분포의 비정형이 존재하는 것으로 간주한다. 단, 지붕층이 하부층보다 가벼운 경우는 이를 적용하지 않는다.	**정형** **(Regular)**
V-3	기하학적 비정형		횡력저항 시스템의 수평치수가 인접층치수의 130%를 초과할 경우에는 기하학적 비정형이 존재하는 것으로 간주한다.	**비정형** **(Irregular)**
V-4	횡력저항 수직요소 비정형		횡력저항요소의 면내 어긋남이 그 요소의 길이보다 크거나 인접한 하부층 저항요소에 강성감소가 일어나는 경우에는 수직저항요소의 면내불연속에 의한 비정형이 있는 것으로 간주한다.	**비정형** **(Irregular)**
V-5	강도의 불연속 - 약층		임의 층의 횡강도가 직상층 횡강도의 80% 미만인 약층이 존재하는 경우에는 강도의 불연속에 의한 비정형이 존재하는 것으로 간주한다. 각층의 횡강도는 층전단력을 부담하는 내진요소들의 저항방향 강도의 합을 말한다.	**비정형** **(Irregular)**

2.5 주기 비정형성 검토

선형 정적 절차의 제한사항인 구조물의 지반조건에 따라 산정되는 단주기 영역과 1초 주기의 비율($T_s = S_{D1}/S_{DS}$)의 3.5배($3.5T_S$)와 각 구조물의 특성에 따른 기본주기(T_{XY}) 비를 검토하여 주기에 따른 비정형성을 검토한다.

< 기존부 주기 비정형성 검토 결과 >

구 분	평 가 항 목			검 토 결 과
X 방향	지반의 한계 주기 $3.5T_S$	1.9799	Sec	Regular
	건물의 기본주기 T_X	0.6828	Sec	
Y 방향	지반의 한계 주기 $3.5T_S$	0.4951	Sec	Regular
	건물의 기본주기 T_Y	0.6380	Sec	

< 증측부 주기 비정형성 검토 결과 >

구 분	평 가 항 목			검 토 결 과
X 방향	지반의 한계 주기 $3.5T_S$	1.9799	Sec	Regular
	건물의 기본주기 T_X	0.2184	Sec	
Y 방향	지반의 한계 주기 $3.5T_S$	1.9799	Sec	Regular
	건물의 기본주기 T_Y	0.2500	Sec	

2.6 고차모드 영향검토

비선형정적절차 평가의 유효성을 판정하기 위하여 모드 참여율이 90%인 해석모델과 1차모드만을 사용한 해석모델의 층전단력 차이가 130% 이하인지를 검토하여 고차모드 영향성을 검토한다.

< 기존부 X방향 고차모드 영향성 검토 결과 >

층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	3,075	3,242	1.05	저차모드 지배
3F	5,589	5,651	1.01	저차모드 지배
2F	7,441	7,447	1.00	저차모드 지배
1F	8,534	8,594	1.01	저차모드 지배

< 기존부 Y방향 고차모드 영향성 검토 결과 >

층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	2,167	2,799	1.29	저차모드 지배
3F	3,931	4,898	1.25	저차모드 지배
2F	5,075	6,256	1.23	저차모드 지배
1F	5,668	7,084	1.25	저차모드 지배

< 증측부 X방향 고차모드 영향성 검토 결과 >

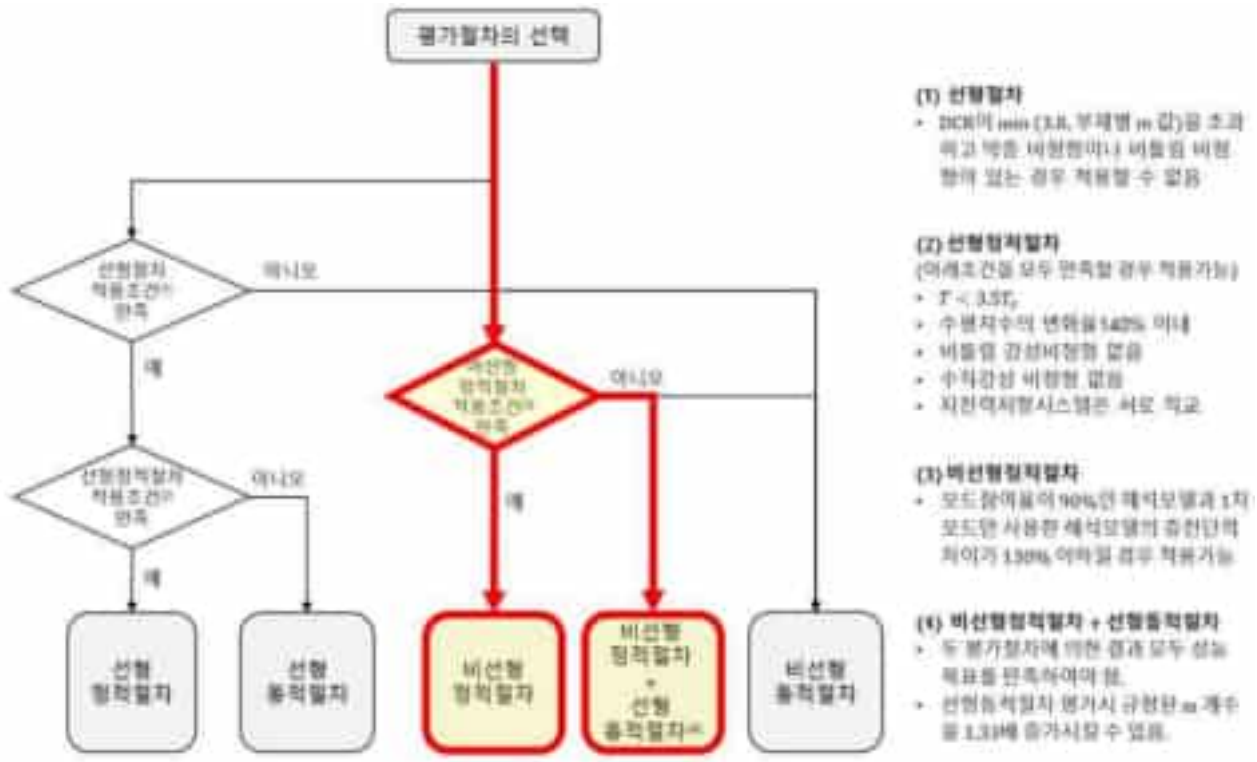
층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	1,903	3,434	1.80	고차모드 지배
3F	3,279	5,684	1.73	고차모드 지배
2F	4,364	7,445	1.71	고차모드 지배
1F	6,472	10,636	1.64	고차모드 지배

< 증측부 Y방향 고차모드 영향성 검토 결과 >

층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	2,572	3,554	1.38	고차모드 지배
3F	4,238	5,852	1.38	고차모드 지배
2F	5,573	7,670	1.38	고차모드 지배
1F	7,807	10,834	1.39	고차모드 지배

2.7 내진성능평가 절차의 선택

상세평가에서는 선형정적절차(LSP), 선형동적절차(LDP), 비선형정적절차(NSP), 비선형동적절차(NDP)를 통해 내진성능평가를 수행할 수 있다.



< 평가 절차의 선택 >

본 용역에서는 '기존 시설물(건축물) 내진성능 평가요령(국토안전관리원, 2021)'에 따라 대상 구조물의 연성능력, 즉 비선형 거동을 파악하기 위해 비선형정적절차 내진성능평가를 실시한다. 단, 상기 평가 절차의 선택에서 '비선형정적절차 적용조건의 만족' 여부인 고차모드 지배적인 구조물로 판단될 경우에는 선형동적절차(m계수1.33배)를 추가적으로 실시하여 두가지 평가결과 중 불리한 해석결과로 구조물의 성능수준을 판정한다.

< 내진성능평가 절차 선정 >

평가 동	내진성능평가 절차 선정
기존부	비선형정적절차
증측부	비선형정적절차 + 선형동적절차(m계수 1.33배)

2.8 비선형정적해석 결과

(1) 횡하중 분포 산정

비선형정적절차에 사용되는 횡하중의 분포는 구조물의 1차모드가 지배적이라는 가정으로부터 구한 밑면전단력의 수직분포를 사용한다.

< 기존부 X방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
Roof	3029	18	0
4F	2481	6	0
3F	1832	0	0
2F	1092	4	0
1F	16	0	0

< 기존부 Y방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
Roof	50	2128	0
4F	2	1741	0
3F	16	1131	0
2F	23	590	0
1F	2	7	0

< 증측부 X방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
5F	1,903	996	0
4F	1,376	515	0
3F	1,085	369	0
2F	2,108	482	0
1F	0	0	0

< 증측부 Y방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
5F	2,180	2,572	0
4F	1,408	1,666	0
3F	1,134	1,335	0
2F	1,867	2,234	0
1F	0	0	0

(2) 초기 중력하중 입력

비선형해석 절차에서 초기 중력하중 조합에 의한 변형과 부재력은 '평가요령 4.3.4 하중조합'에 따라 1.0DL+0.25LL을 적용한다.

(3) 다축가진효과

완전한 대칭구조물이 아닐 경우 최대효과를 발생시키는 하중의 방향은 일반적으로 파악하기 힘들다. 다축가진효과는 가력방향이 구조물의 주축과 동일하지 않을 때 발생하는 효과를 고려하기 위한 것으로 비정형 평면일 혹은 여러 지진력저항시스템에 속해 있는 기둥이 있을 경우 고려하여야 하며 주방향하중 대 직교방향하중의 비율을 100 : 30으로 입력하여 비선형해석을 수행한다.

(4) 보정계수

성능수준에 따른 보정계수(χ) : 거주가능, 인명안전 수준 1.3 / 붕괴방지 수준 1.0 적용

하중계수(γ) : 수평부재 1.0 / 수직부재 1.3 적용

※ 단, χ와γ의 곱은 1.5를 초과하지 않음.

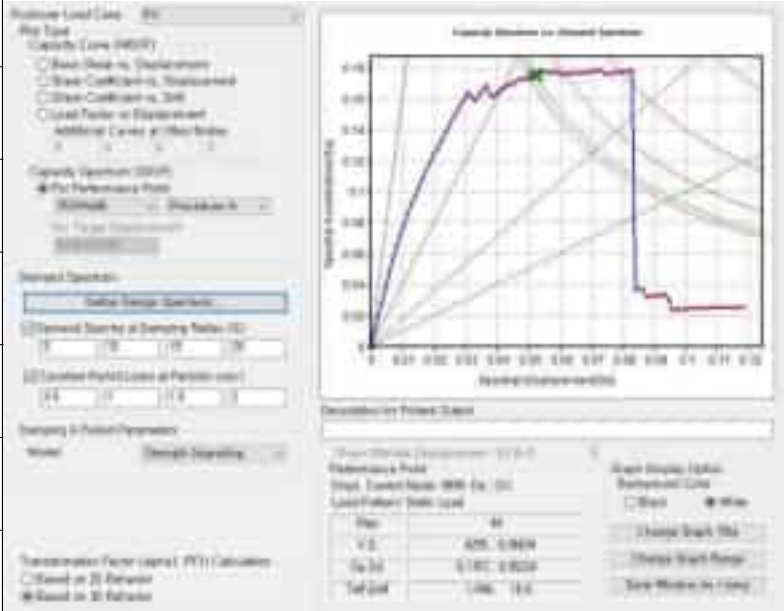
(5) 해석조건 공통 입력사항

2.8.1 기존부

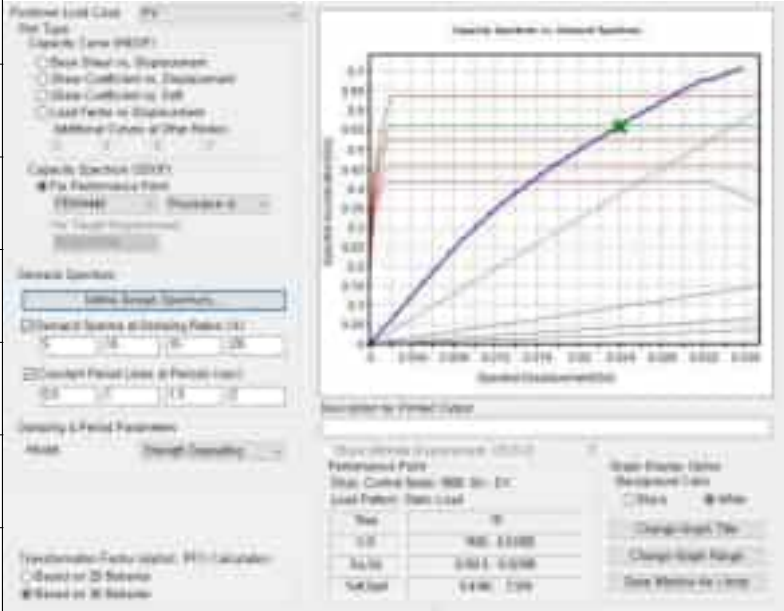
2.8.1.1 목표성능 : 1400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

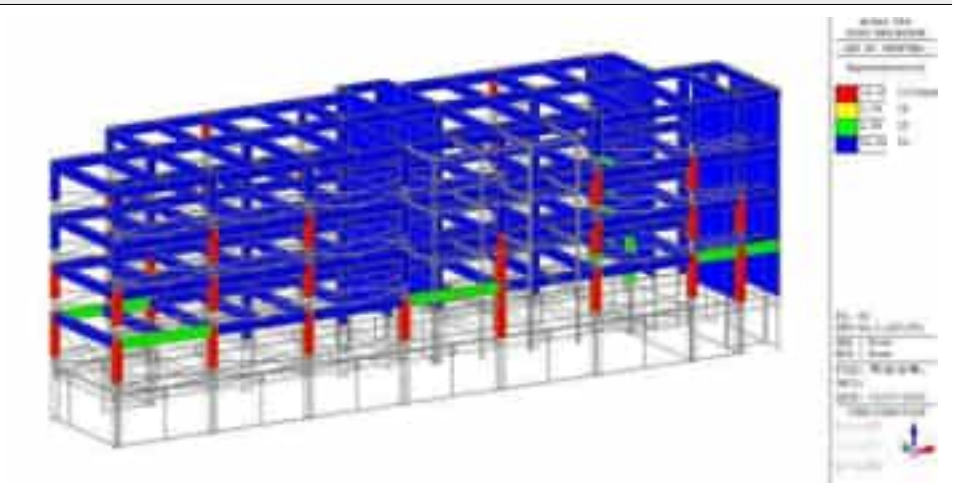
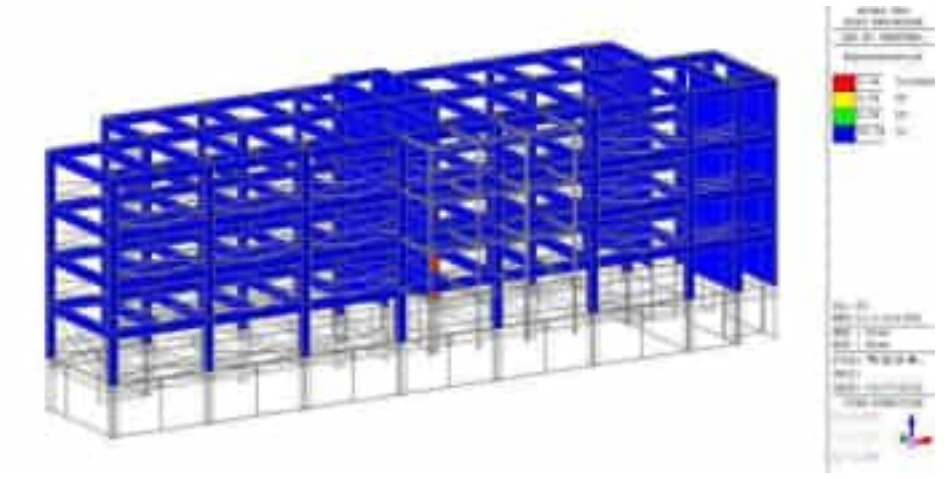
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	44	
Base Shear [kN]	4,255	
Roof Disp. [mm]	66.34	
Spectral Acc. [Sa]	0.1757	
Spectral Disp. [Sd]	0.05224	
Teff [sec]	1.094	
Deff [%]	18.8	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	13	
Base Shear [kN]	6111	
Roof Disp. [mm]	13.92	
Spectral Acc. [Sa]	0.4579	
Spectral Disp. [Sd]	0.01771	
Teff [sec]	0.3946	
Deff [%]	7.434	

(2) 중력하중 저항능력 검토

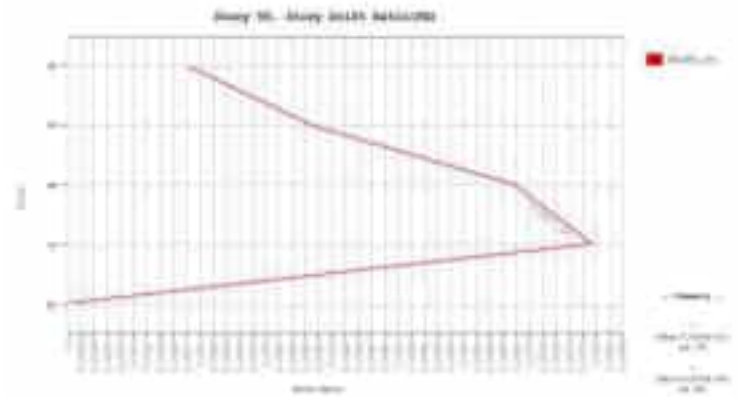
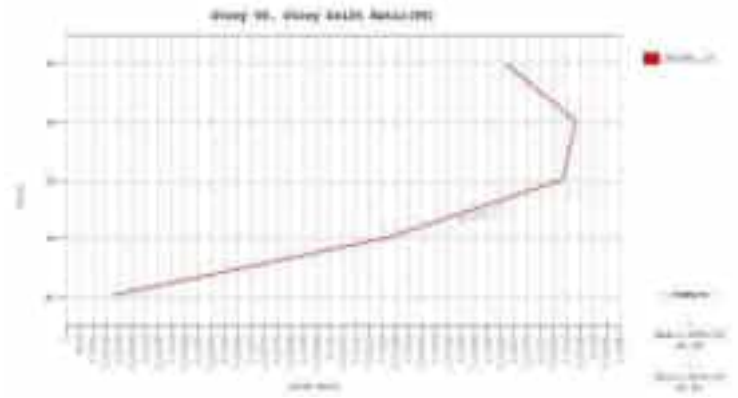
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	붕괴(CO)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	붕괴(CO)

(3) 층간변형각 검토

내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

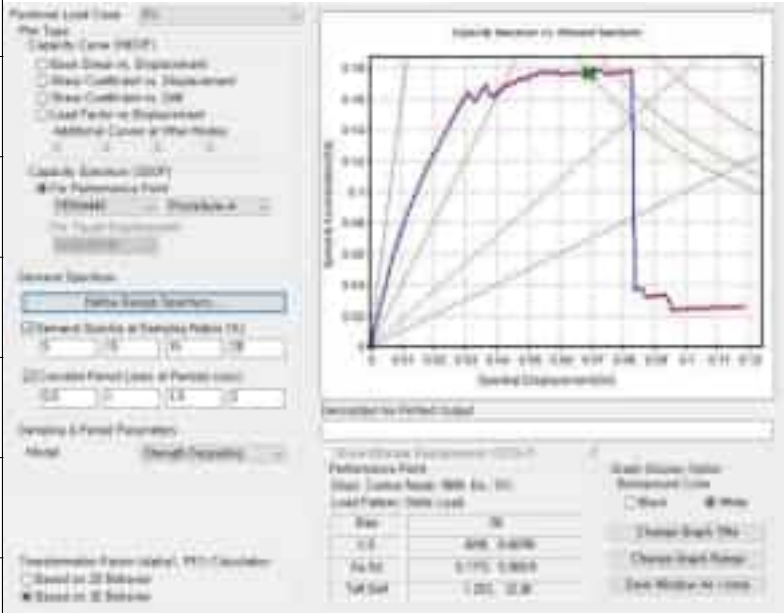
구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(RC 모멘트골조)**				
	최대발생 층간변형각	0.79 %	허용기준	1.40 %
	인명안전 (LS)			
Y방향 **(조적채움벽이 있는 RC모멘트골조)**				
	최대발생 층간변형각	0.19 %	허용기준	0.70 %
	거주가능 (IO)			

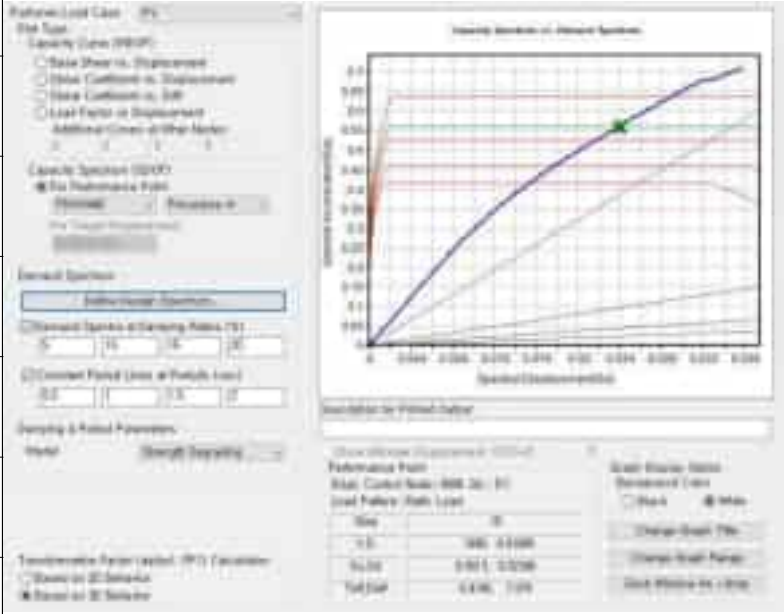
2.8.1.2 목표성능 : 2400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

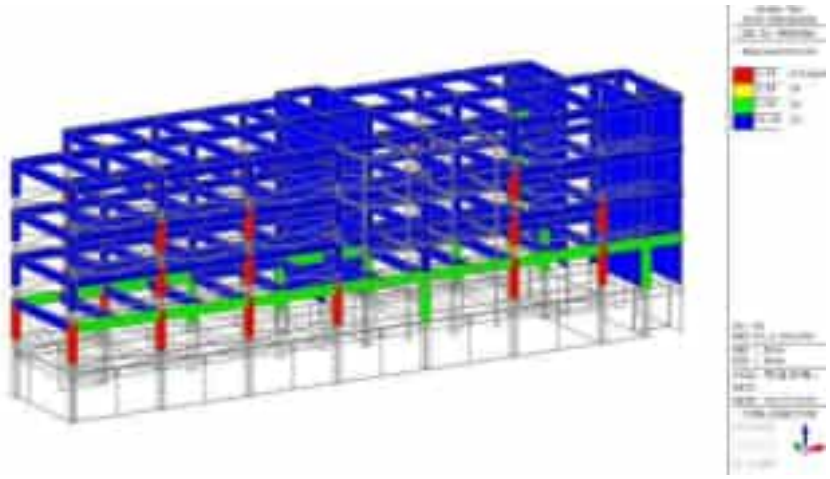
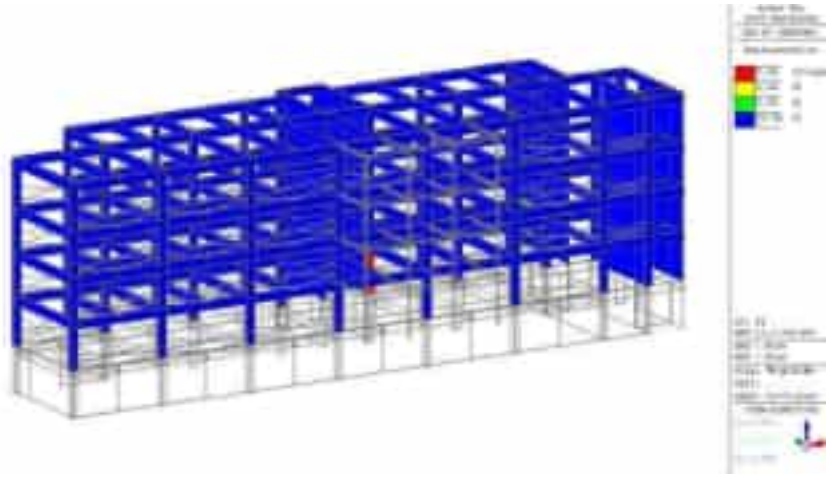
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	58	
Base Shear [kN]	4295	
Roof Disp. [mm]	87.85	
Spectral Acc. [Sa]	0.1773	
Spectral Disp. [Sd]	0.06918	
Teff [sec]	1.253	
Deff [%]	22.96	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	18	
Base Shear [kN]	7490	
Roof Disp. [mm]	18.85	
Spectral Acc. [Sa]	0.5613	
Spectral Disp. [Sd]	0.02398	
Teff [sec]	0.4148	
Deff [%]	7.974	

(2) 중력하중 저항능력 검토

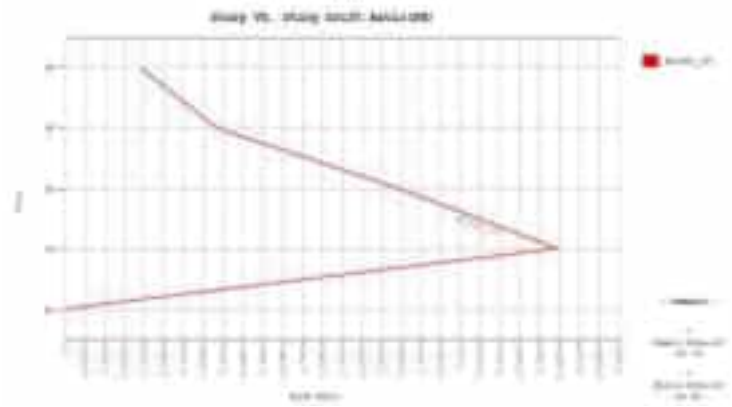
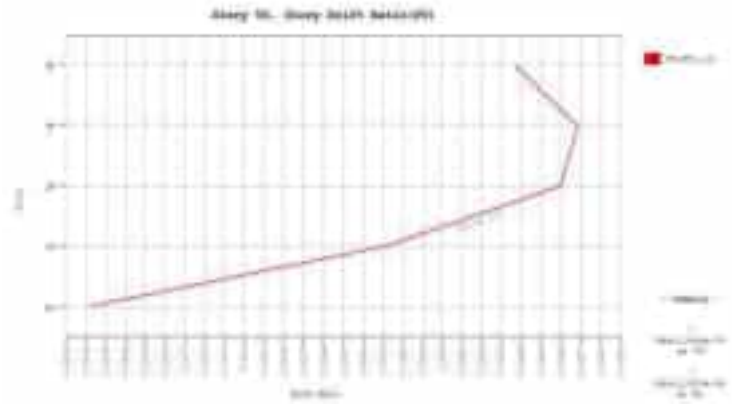
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	인명안전(LS)	수직부재 성능수준	붕괴(CO)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	붕괴(CO)

(3) 층간변형각 검토

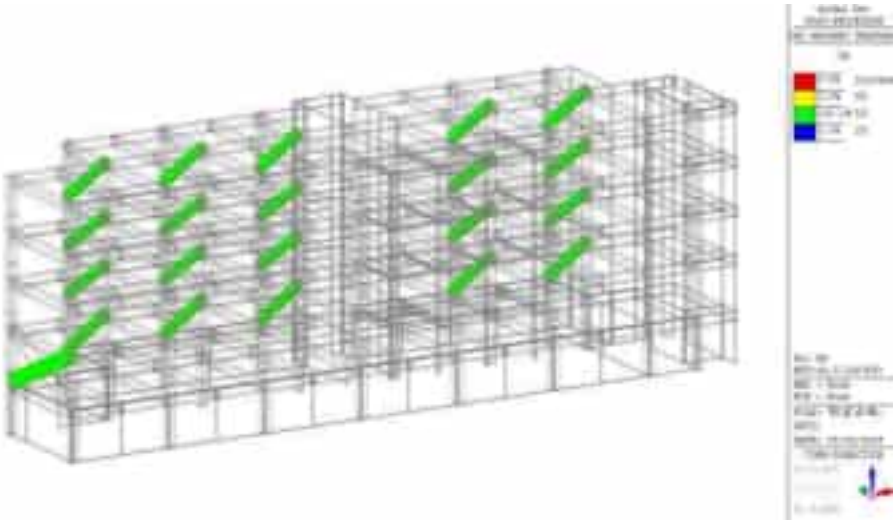
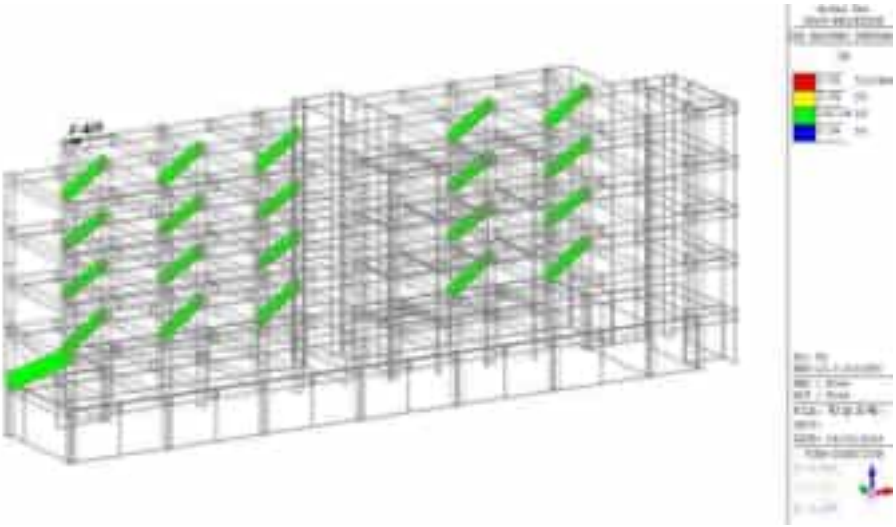
내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(RC 모멘트골조)**				
	최대발생 층간변형각	1.24 %	허용기준	2.10 %
	인명안전 (LS)			
Y방향 **(조적채움벽이 있는 RC모멘트골조)**				
	최대발생 층간변형각	0.27 %	허용기준	1.05 %
	거주가능 (IO)			

(4) 조적채움벽 면내파괴 검토

조적채움벽을 가진 모멘트골조에서 조적채움벽이 면내로 파괴되거나 혹은 면외로 전도될 경우 전체 구조물은 거주가능과 인명안전의 성능수준을 만족하지 못하는 것으로 판정한다. 그러나 목표성능수준이 붕괴방지일 경우, 조적채움벽의 파괴는 전체 건물의 성능수준 판정에 고려하지 않는다.

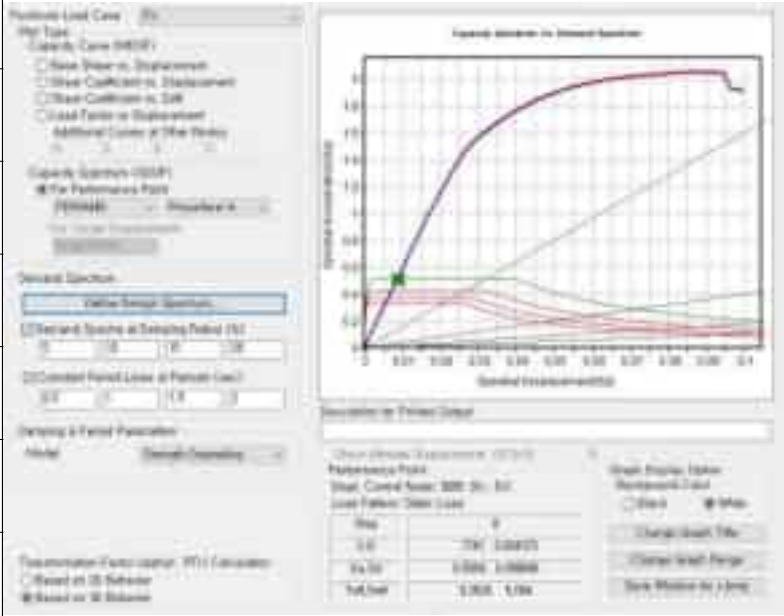
방 향	조적채움벽 면내파괴 검토
X방향 **1400년 재현주기** **성능수준 LS**	
Y방향 **1400년 재현주기** **성능수준 LS**	

2.8.2 증측부

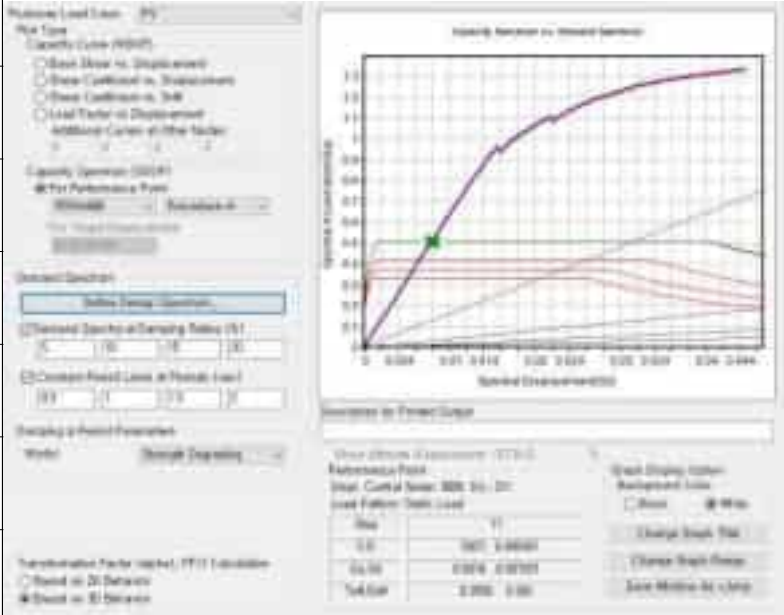
2.8.2.1 목표성능 : 1400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

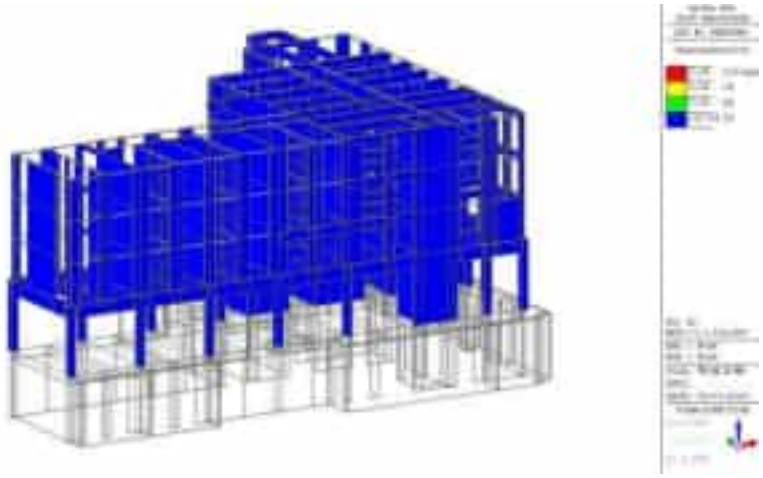
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	8	
Base Shear [kN]	7747	
Roof Disp. [mm]	4.373	
Spectral Acc. [Sa]	0.5084	
Spectral Disp. [Sd]	0.008696	
Teff [sec]	0.2624	
Deff [%]	5.004	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	17	
Base Shear [kN]	9327	
Roof Disp. [mm]	5.347	
Spectral Acc. [Sa]	0.5074	
Spectral Disp. [Sd]	0.007937	
Teff [sec]	0.2509	
Deff [%]	5.042	

(2) 중력하중 저항능력 검토

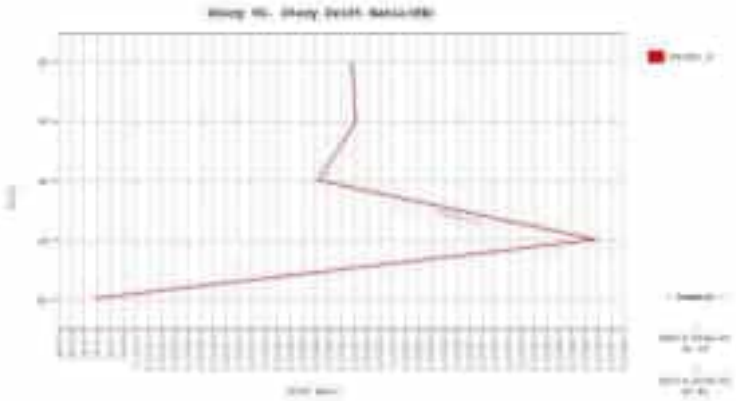
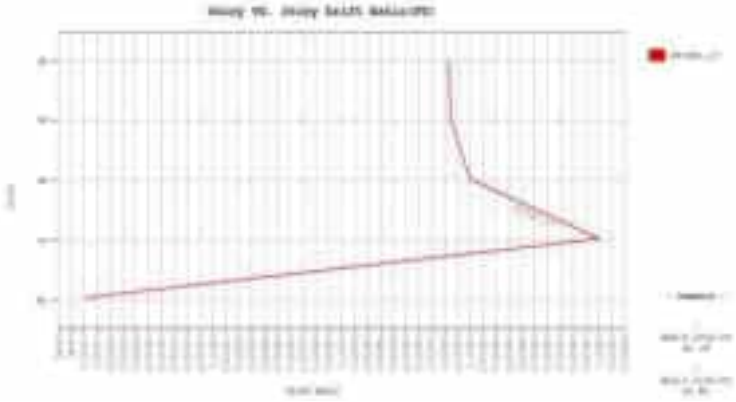
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)

(3) 층간변형각 검토

내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

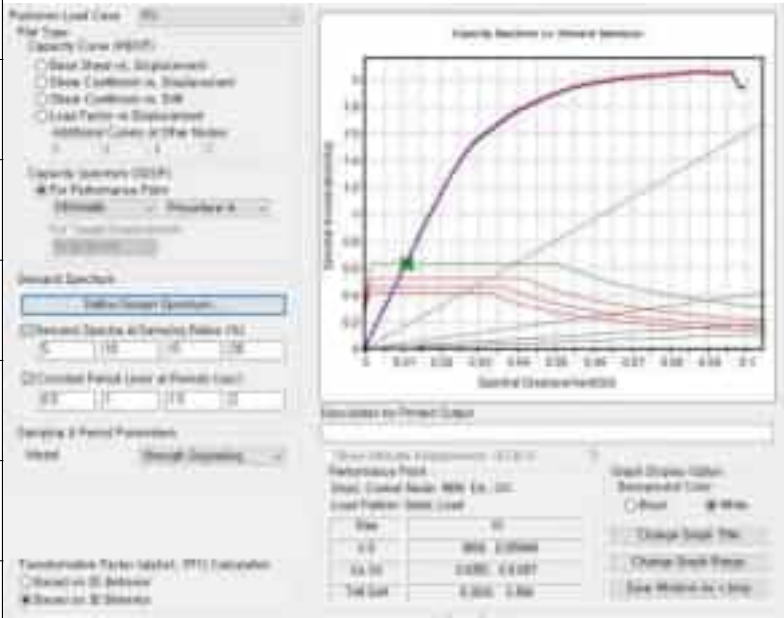
구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(전단지배형 RC 전단벽 시스템)**				
	최대발생 층간변형각	0.046 %	허용기준	0.35 %
	거주가능 (IO)			
Y방향 **(전단지배형 RC 전단벽 시스템)**				
	최대발생 층간변형각	0.05 %	허용기준	0.35 %
	거주가능 (IO)			

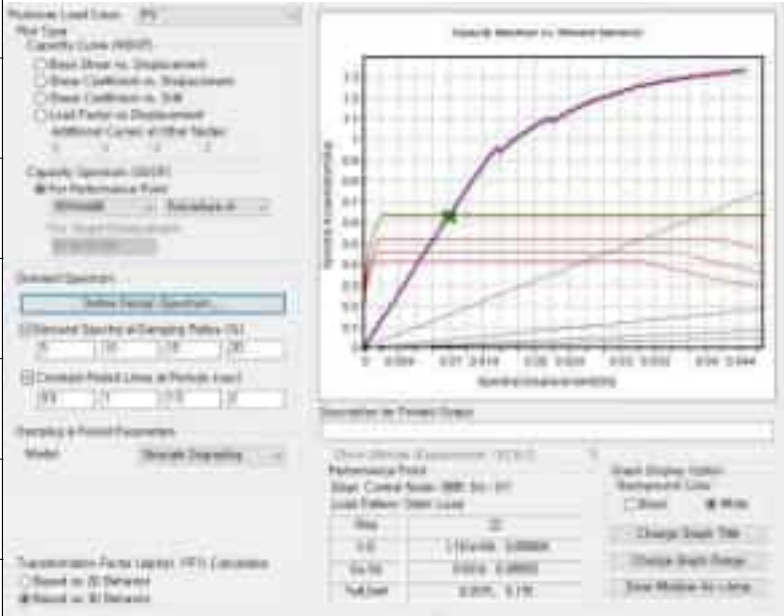
2.8.2.2 목표성능 : 2400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

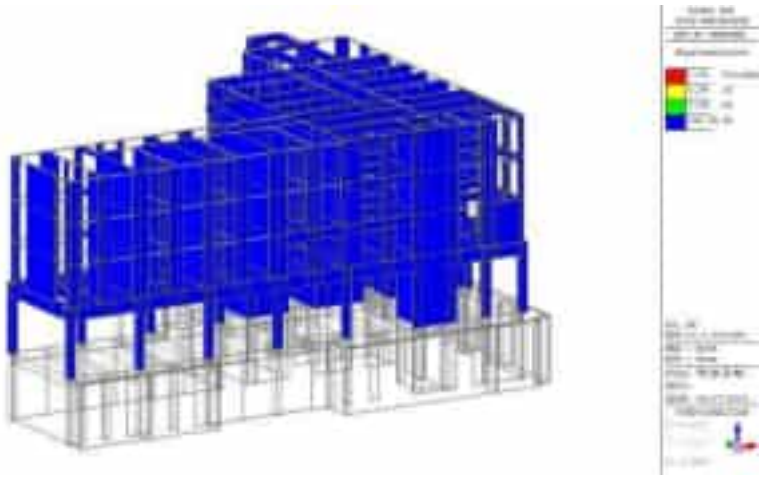
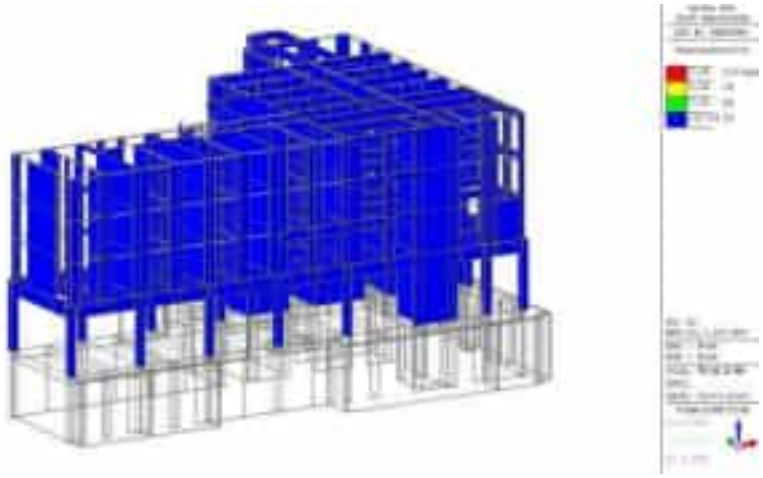
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	10	
Base Shear [kN]	9684	
Roof Disp. [mm]	5.466	
Spectral Acc. [Sa]	0.6355	
Spectral Disp. [Sd]	0.01087	
Teff [sec]	0.2624	
Deff [%]	5.004	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	22	
Base Shear [kN]	11610	
Roof Disp. [mm]	6.684	
Spectral Acc. [Sa]	0.6314	
Spectral Disp. [Sd]	0.009922	
Teff [sec]	0.2515	
Deff [%]	5.135	

(2) 중력하중 저항능력 검토

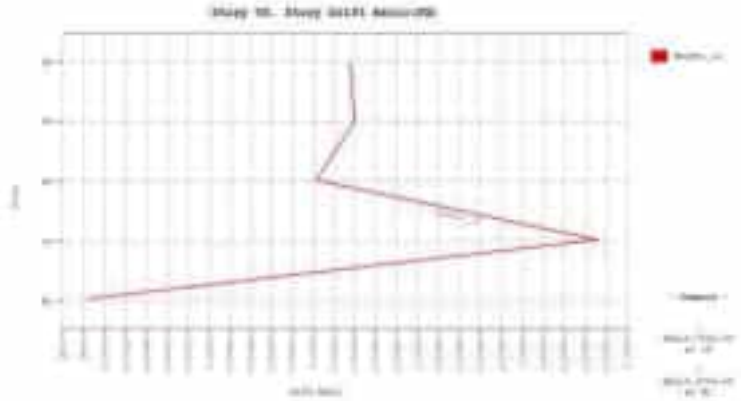
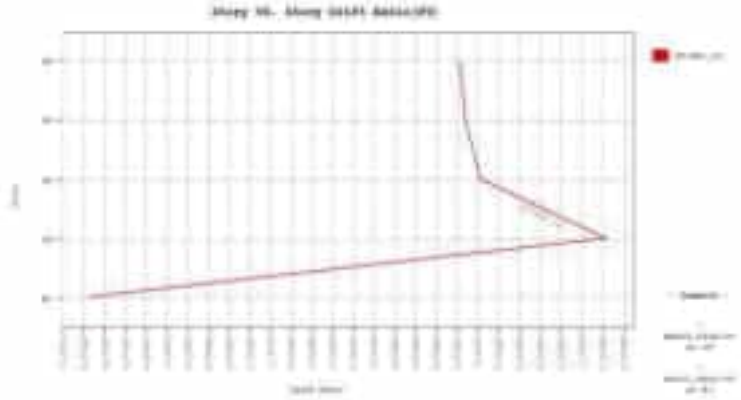
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)

(3) 층간변형각 검토

내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(전단지배형 RC 전단벽 시스템)**				
	최대발생 층간변형각	0.057 %	허용기준	0.70 %
	인명안전 (LS)			
Y방향 **(전단지배형 RC 전단벽 시스템)**				
	최대발생 층간변형각	0.062 %	허용기준	0.70 %
	거주가능 (IO)			

2.9 선형동적해석 결과

고차모드 지배적인 구조물로 나타남에 따라 비선형정적절차에 선형동적절차를 추가로 수행함으로써 불리한 결과값으로 내진성능을 판정한다.

(1) 최대 비탄성변위와 선형 탄성변위의 보정을 위한 수정계수, C

해당 구조물은 4층 이상의 모멘트골조로 분류하여 수정계수 C=1.0을 적용하였다.

건물의 형식	층수			
	1	2	3	4층 이상
모멘트 골조	1.3	1.1	1.0	1.0
전단벽 구조, 가새골조	1.4	1.2	1.1	1.0
조적조	1.0	1.0	1.0	1.0

(3) 하중전달 감소계수, J

해당 구조물은 지진구역1에 해당하므로 하중전달 감소계수 J=2.0을 적용하였다.

항목	지진구역1	지진구역2	거주가능수준 검토
하중전달 감소계수, J	2.0	1.5	1.0

(4) 성능수준에 따른 보정계수, χ

해당 구조물의 목표성능 수준에 따른 보정계수는 아래 표와 같이 적용하였다.

항목	거주가능, 인명안전	붕괴방지
성능수준에 따른 보정계수, χ	1.3	1.0

(5) m Factor

고차모드 지배적인 구조물로 판단하여 비선형정적절차에 추가적인 선형동적절차를 수행함으로써 '기존 시설물(건출물) 내진성능 평가요령(2021) 해그림 4.2.1 (4)'에 따라 선형동적절차 평가시 규정된 m계수에 1.33배를 증가시켜 내진성능평가를 수행한다.

(6) 검토 하중조합

< 선형동적절차 검토 하중조합 > (1)

No.	하중조합
eLCB1	1.1D + 0.275L + (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB2	1.1D + 0.275L + (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB3	1.1D + 0.275L + (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB4	1.1D + 0.275L + (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB5	1.1D + 0.275L + (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB6	1.1D + 0.275L + (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB7	1.1D + 0.275L + (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB8	1.1D + 0.275L + (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB9	1.1D + 0.275L + (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB10	1.1D + 0.275L + (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB11	1.1D + 0.275L + (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB12	1.1D + 0.275L + (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB13	1.1D + 0.275L + (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB14	1.1D + 0.275L + (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB15	1.1D + 0.275L + (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB16	1.1D + 0.275L + (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB17	1.1D + 0.275L - (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB18	1.1D + 0.275L - (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB19	1.1D + 0.275L - (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB20	1.1D + 0.275L - (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB21	1.1D + 0.275L - (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB22	1.1D + 0.275L - (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB23	1.1D + 0.275L - (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB24	1.1D + 0.275L - (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB25	1.1D + 0.275L - (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB26	1.1D + 0.275L - (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB27	1.1D + 0.275L - (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB28	1.1D + 0.275L - (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB29	1.1D + 0.275L - (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB30	1.1D + 0.275L - (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB31	1.1D + 0.275L - (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB32	1.1D + 0.275L - (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))

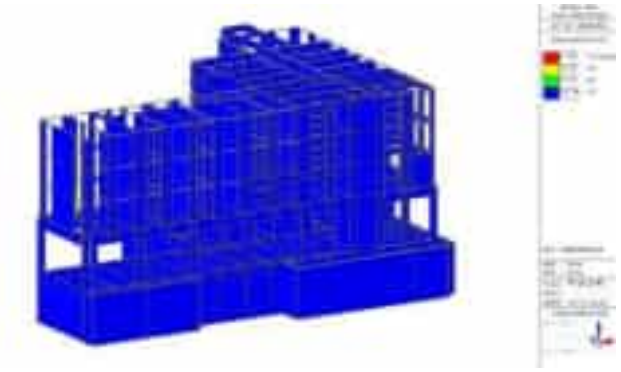
< 선형동적절차 검토 하중조합 > (2)

No.	하중조합
eLCB33	0.9D + (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB34	0.9D + (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB35	0.9D + (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB36	0.9D + (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB37	0.9D + (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB38	0.9D + (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB39	0.9D + (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB40	0.9D + (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB41	0.9D + (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB42	0.9D + (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB43	0.9D + (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB44	0.9D + (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB45	0.9D + (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB46	0.9D + (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB47	0.9D + (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB48	0.9D + (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB49	0.9D - (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB50	0.9D - (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB51	0.9D - (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB52	0.9D - (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB53	0.9D - (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB54	0.9D - (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB55	0.9D - (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))
eLCB56	0.9D - (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB57	0.9D - (1.0(1.00)(RX(RS)+RX(ES))+0.3(1.00)(RY(RS)-RY(ES)))
eLCB58	0.9D - (1.0(1.00)(RX(RS)-RX(ES))+0.3(1.00)(RY(RS)+RY(ES)))
eLCB59	0.9D - (1.0(1.00)(RX(RS)+RX(ES))-0.3(1.00)(RY(RS)-RY(ES)))
eLCB60	0.9D - (1.0(1.00)(RX(RS)-RX(ES))-0.3(1.00)(RY(RS)+RY(ES)))
eLCB61	0.9D - (1.0(1.00)(RY(RS)+RY(ES))+0.3(1.00)(RX(RS)-RX(ES)))
eLCB62	0.9D - (1.0(1.00)(RY(RS)-RY(ES))+0.3(1.00)(RX(RS)+RX(ES)))
eLCB63	0.9D - (1.0(1.00)(RY(RS)+RY(ES))-0.3(1.00)(RX(RS)-RX(ES)))
eLCB64	0.9D - (1.0(1.00)(RY(RS)-RY(ES))-0.3(1.00)(RX(RS)+RX(ES)))

2.9.1 증측부

2.9.1.1 목표성능 : 1400년 재현주기 지진력 인명안전

중력하중 저항능력 검토 결과

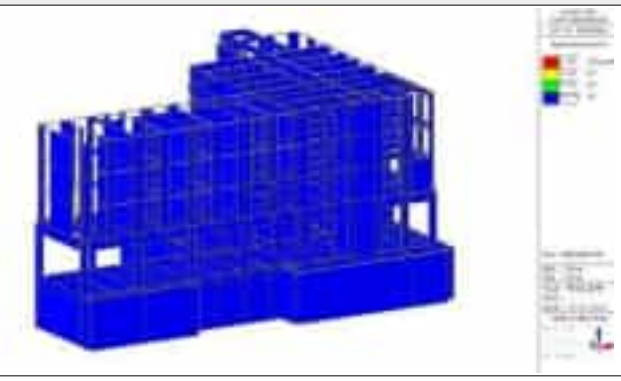


수평부재 성능수준	**거주가능(IO)**	수직부재 성능수준	**거주가능(IO)**

방 향	층간변형각 검토 결과			
X방향 (전단지배형 RC 전단벽 시스템)	층	층간변위(m)	층간변위비	
	4F	0.0024	0.0007	
	3F	0.0025	0.0008	
	2F	0.0022	0.0007	
	1F	0.0082	0.0015	
	최대발생 층간변형각	0.15 %	허용기준	0.35 %
	거주가능(IO)			
Y방향 (전단지배형 RC 전단벽 시스템)	층	층간변위(m)	층간변위비	
	4F	0.0043	0.0013	
	3F	0.0044	0.0013	
	2F	0.0039	0.0012	
	1F	0.0152	0.0027	
	최대발생 층간변형각	0.27 %	허용기준	0.35 %
	인명안전(LS)			

2.9.1.2 목표성능 : 2400년 재현주기 지진력 붕괴방지

중력하중 저항능력 검토 결과



수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)

방 향	층간변형각 검토 결과			
X방향 (전단지배형 RC 전단벽 시스템)	층	층간변위(m)	층간변위비	
	4F	0.0029	0.0009	
	3F	0.0030	0.0009	
	2F	0.0027	0.0008	
	1F	0.0103	0.0018	
	최대발생 층간변형각	0.18 %	허용기준	0.70 %
	인명안전(LS)			
Y방향 (전단지배형 RC 전단벽 시스템)	층	층간변위(m)	층간변위비	
	4F	0.0052	0.0016	
	3F	0.0053	0.0016	
	2F	0.0047	0.0014	
	1F	0.0191	0.0034	
	최대발생 층간변형각	0.34 %	허용기준	0.70 %
	인명안전(LS)			

2.10 소결

본 장에서는 대상 건축물에 대해 「기존 시설물(건축물) 내진성능 평가요령(국토안전관리원, 2021)」에 따라 내진성능 예비평가 및 상세평가를 수행하였다. 목표성능은 내진Ⅰ등급에 따른 1400년 재현주기 지진력 인명안전 수준, 2400년 재현주기 지진력 붕괴방지 수준을 적용했으며 이에 대한 검토결과는 다음과 같다.

< 내진성능 예비평가 결과 >

구분		1400 년 재현주기 지진력		2400 년 재현주기 지진력	
		X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표	인명안전		붕괴방지	
	성능수준	검토불가	검토불가	검토불가	검토불가
	검토결과	검토불가		검토불가	
		검토불가		검토불가	
증측부	성능목표	인명안전		붕괴방지	
	성능수준	붕괴방지	붕괴방지	붕괴	붕괴
	검토결과	붕괴방지		붕괴	
		목표성능 불만족		목표성능 불만족	

※ 기존부의 경우 일부 철골조로 이루어져 있어 예비평가 대상에 포함되지 않음.(기존 시설물(건축물) 내진성능 평가요령에서 내진성능 예비평가의 범위는 철골조가 포함되어있지 않음.)

예비평가는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가하기에 보수적인 결과의 산정될 수 있다.

따라서, 예비평가는 상세평가의 비교 검증 및 참고용으로 의미가 있으며 본 용역에선 정밀해석인 내진성능 상세평가를 통해 대상 구조물의 내진성능 수준을 판정한다.

< 기존구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	붕괴	붕괴	붕괴	붕괴
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	보강 후 만족			
	검토결과		붕괴		붕괴	
			성능목표 불만족		성능목표 불만족	
증측부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	거주가능	거주가능	거주가능	거주가능
		층간변위비	거주가능	거주가능	거주가능	거주가능
		기초 검토	만족			
	검토결과		거주가능		거주가능	
			성능목표 만족		성능목표 만족	

< 기존구조물 내진성능 상세평가 결과 – 선형동적절차(m계수 1.33배) >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
증측부	성능목표		인명안전		붕괴방지	
	보유성능	연직하중 저항능력	거주 가능	거주 가능	거주 가능	거주 가능
		층간변위비	거주 가능	인명 안전	인명 안전	인명 안전
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

기존 구조물 내진성능평가 결과,

기존부는 조적 허리벽으로 인한 기둥 단주효과로 기둥의 전단파괴가 발생하였고, 또한 연직하중 저항능력에 대해서 목표성능에 따른 허용기준을 불만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 불만족하는 것으로 나타나 내진보강이 필요한 것으로 판단된다.

증측부는 고차모드 영향성검토에서 고차모드가 지배적인 구조물로 나타나 비선형정적절차 (Pushover), 선형동적절차 (m계수 1.33배)를 함께 수행하여 불리한 결과값으로 내진성능을 판정하였으며, 두 가지 절차 모두 연직하중 저항능력, 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 별도의 내진보강은 필요하지 않은 것으로 판단된다.

제3장 보강 구조물 내진성능평가

3.1 보강공법 선정
3.2 보강 개요
3.3 비정형성 평가
3.4 주기 비정형성 검토
3.5 고차모드 영향검토
3.6 내진성능평가 절차의 선택
3.7 비선형정적해석 결과
3.8 소결

3.1 보강공법 선정

3.1.1 보강공법의 선정

합리적인 내진보강목표를 달성하기 위해서는 내진성능평가에서 분석된 상세, 부재, 그리고 시스템의 내진 취약성을 종합적으로 분석 및 검토하여 보강설계의 기본방향을 설정하여야 한다.

보강 전 내진성능평가 결과로 보강공법 선정을 위한 분석 항목은 다음과 같다.

(1) 기존 시설의 보유성능의 재평가
(2) 기존 시설의 보유성능 분석
(3) 목표성능 미달한 부재의 강도비와 평면 및 입면상 분포 분석
(4) 가능한 보강계획 및 방법 고려
(5) 경제성, 공사기간의 비교
(6) 시설물의 사용성 고려

3.1.2 시스템 보강방안

일반적으로 건축물에 사용되는 주요 시스템보강공법의 종류 및 장단점은 다음과 같다. 각각의 내진보강공법이 가지는 장단점을 분석한 후 보강목적과 대상 시설물의 특성을 고려하여 보강공법을 선정하는 것이 바람직하다.

[내진보강 일반공법]

< 내진보강공법 비교표 >

보강방법	평면 계획	시공성	채광	외관	기초 보강	경제성	보강성능
전단벽 신설	△	△	X	△	X	O	O
전단벽 두께 증가	O	O	△	△	△	△	△
기둥 날개벽 신설	O	△	△	X	△	O	△
골조 신설/끼움골조	O	△	O	△	△	△	△
철골가새	△	O	△	△	X	△	O
부축벽	△	△	O	X	X	O	O
프리캐스트 벽체	O	O	△	△	X	△	O
조적허리벽 컷팅	O	O	O	O	X	O	△

3.1.3 적용 내진보강 공법

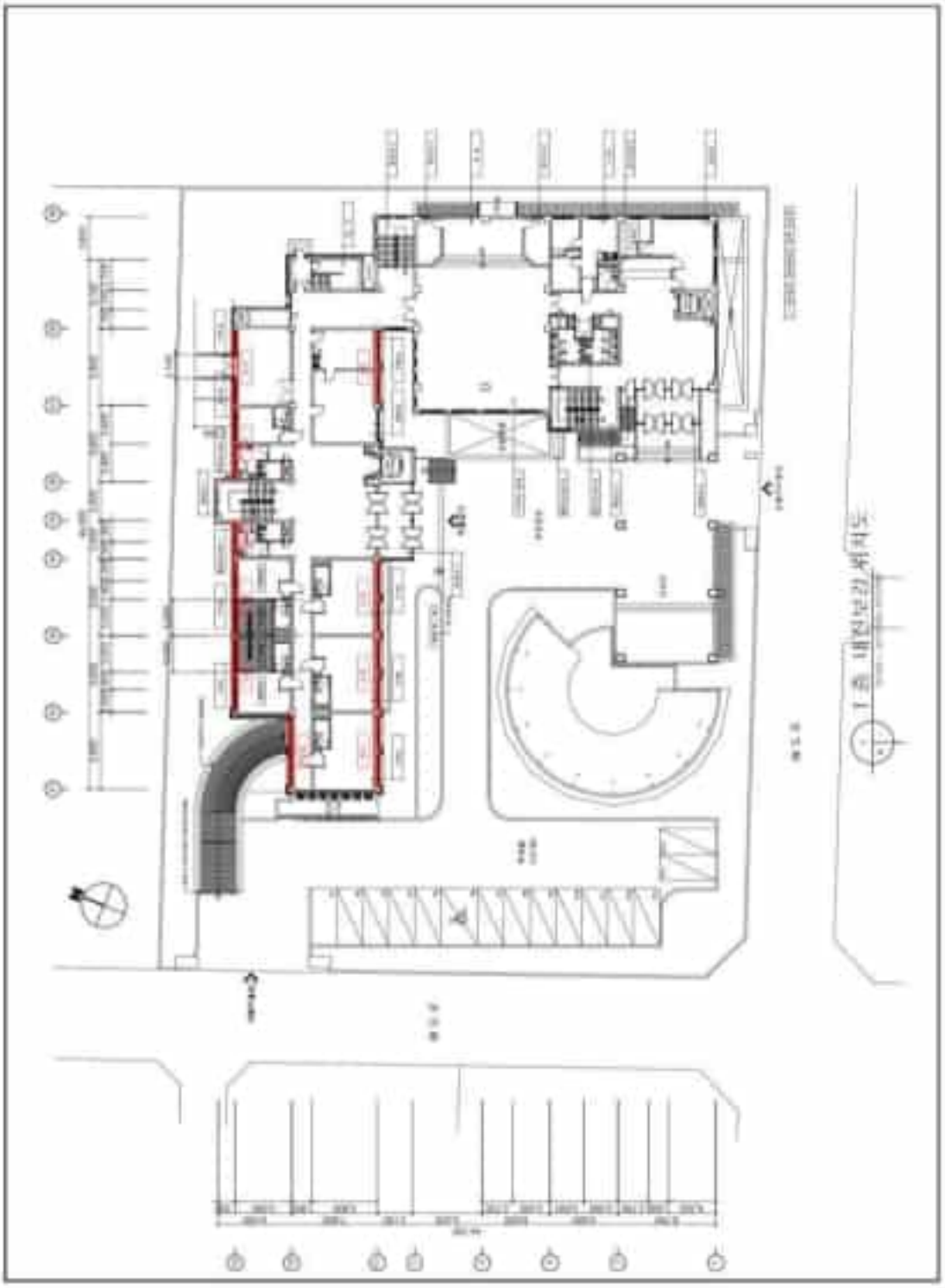
기존 구조물에 대한 내진성능 평가 결과, 기존부의 경우 조적 허리벽으로 인해 기둥 단주효과로 전단파괴가 발생하는 것으로 나타났다. 따라서 허리벽 양단컷팅 하여 내진성능을 확보할 수 있도록 계획하였다.

3.2 보강 개요

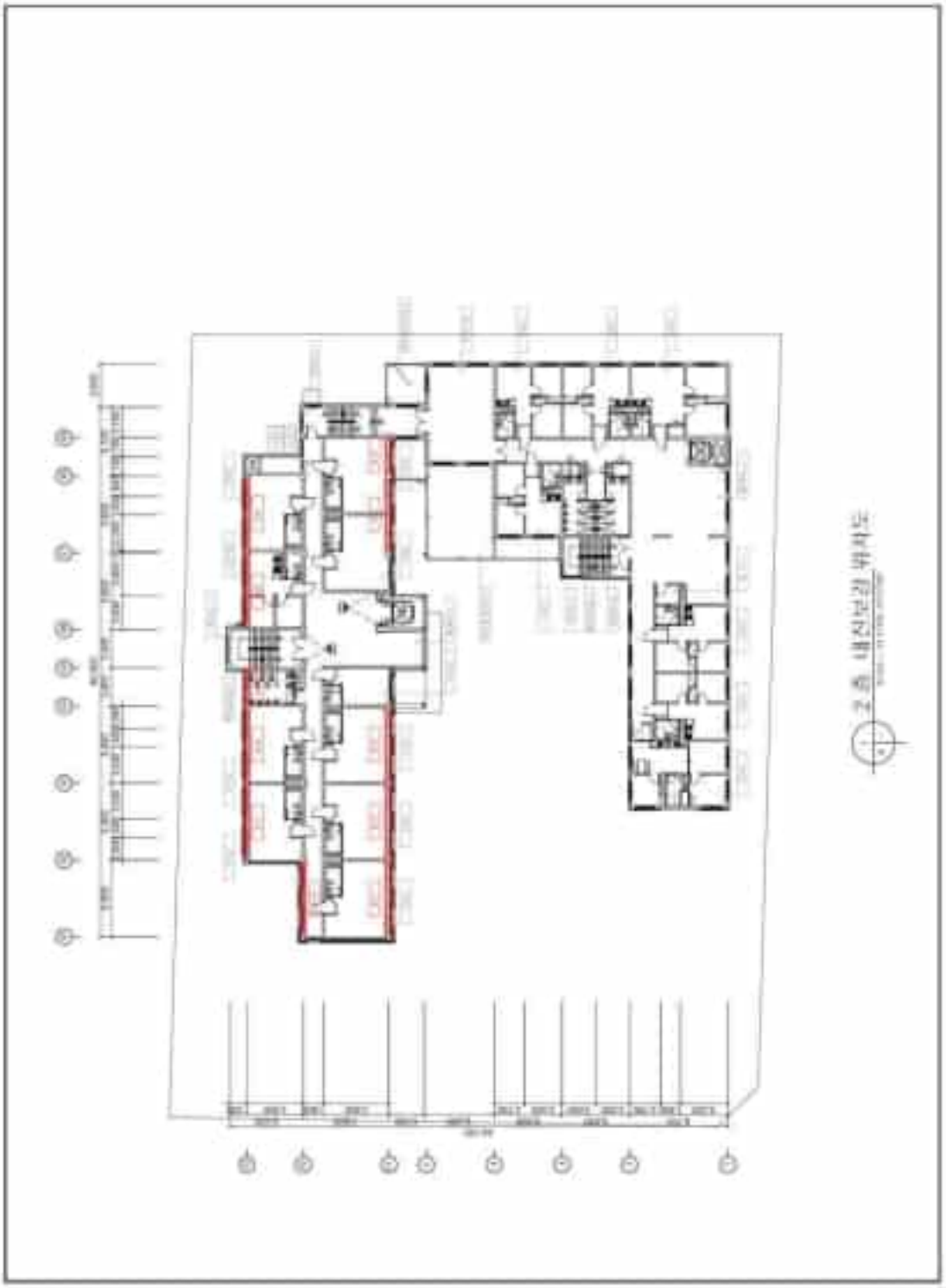
3.2.1 내진보강도면

(1) 내진보강 위치도

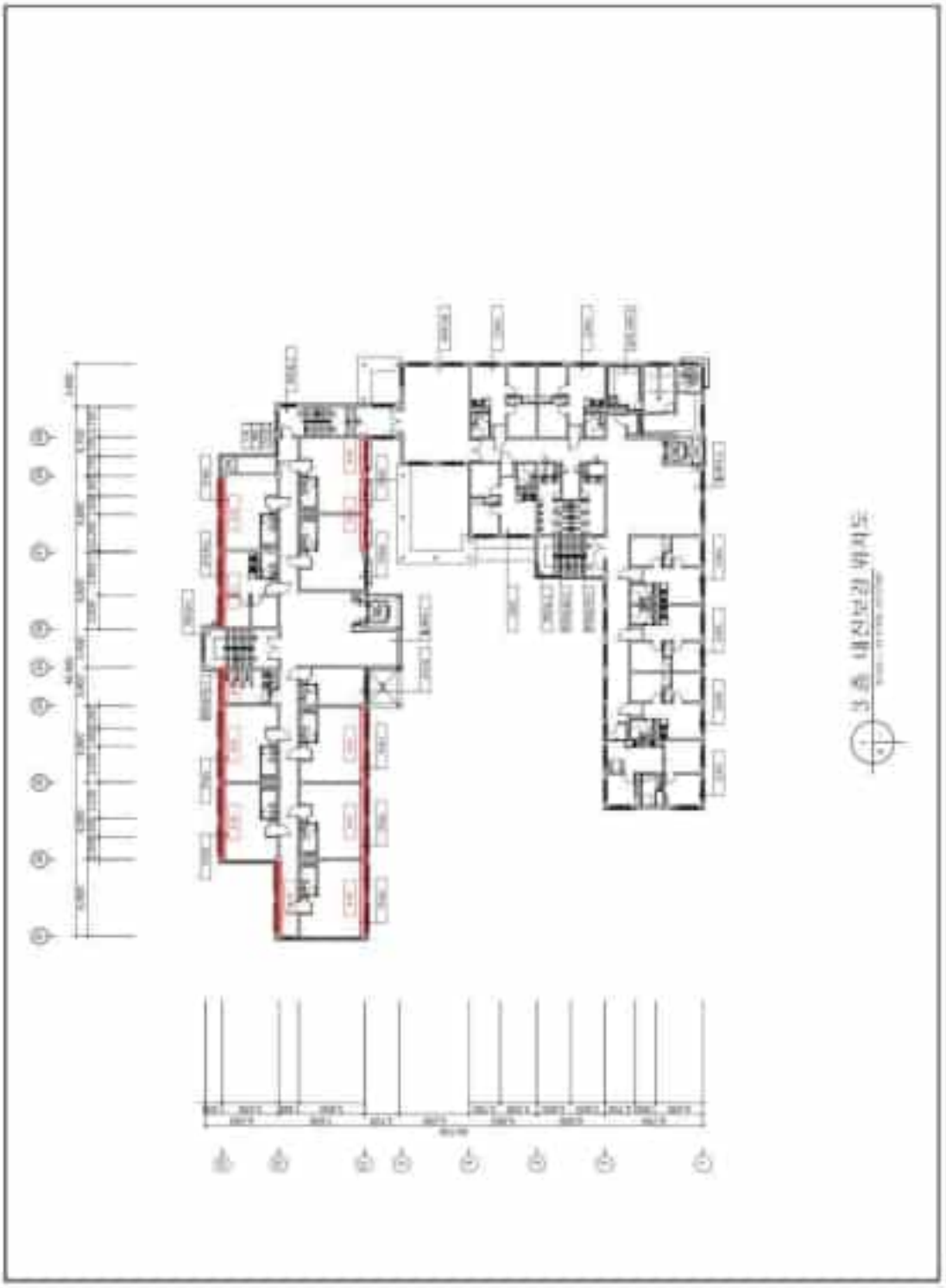
내진보강 위치도



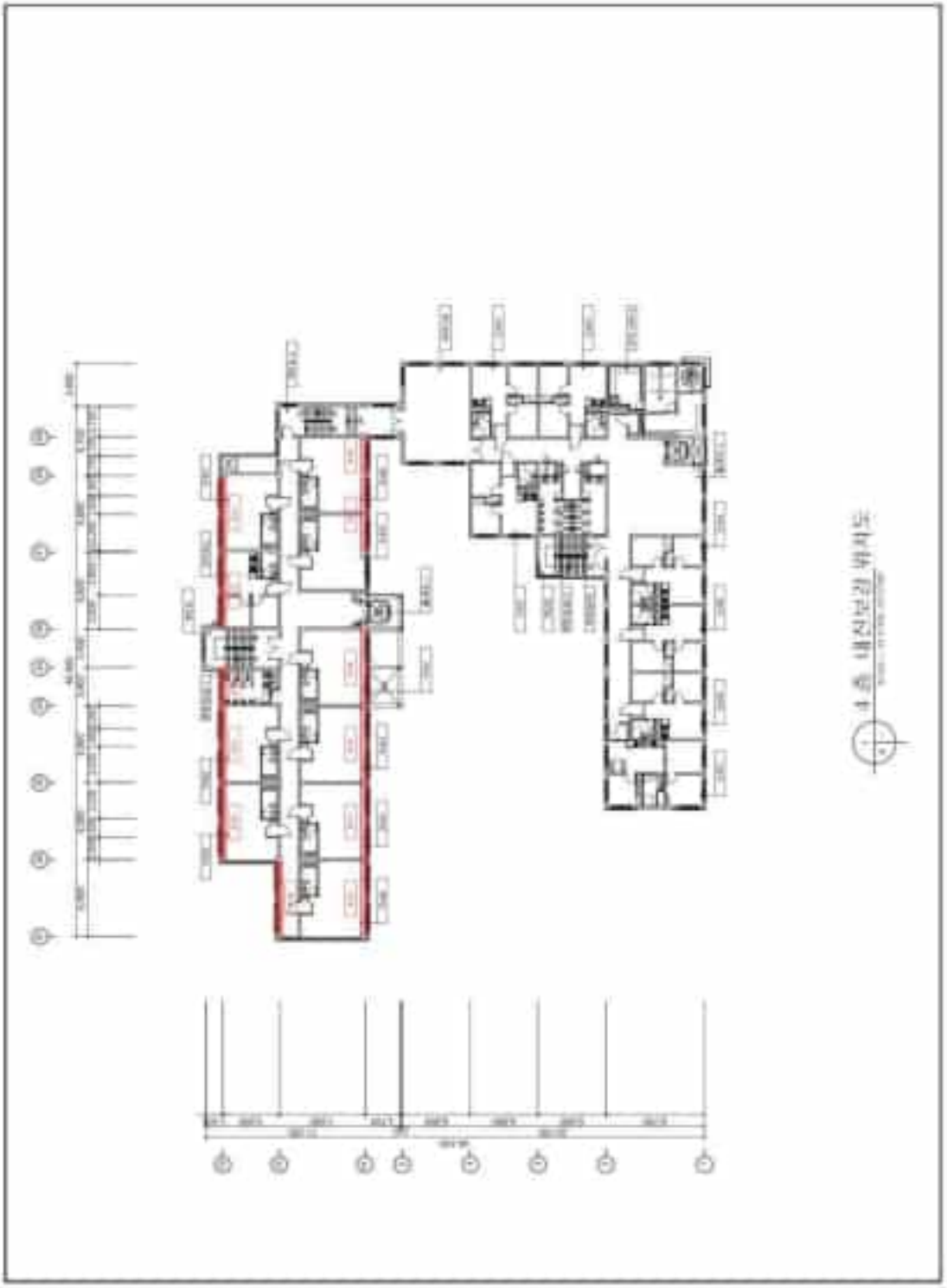
내진보강 위치도



내진보강 위치도

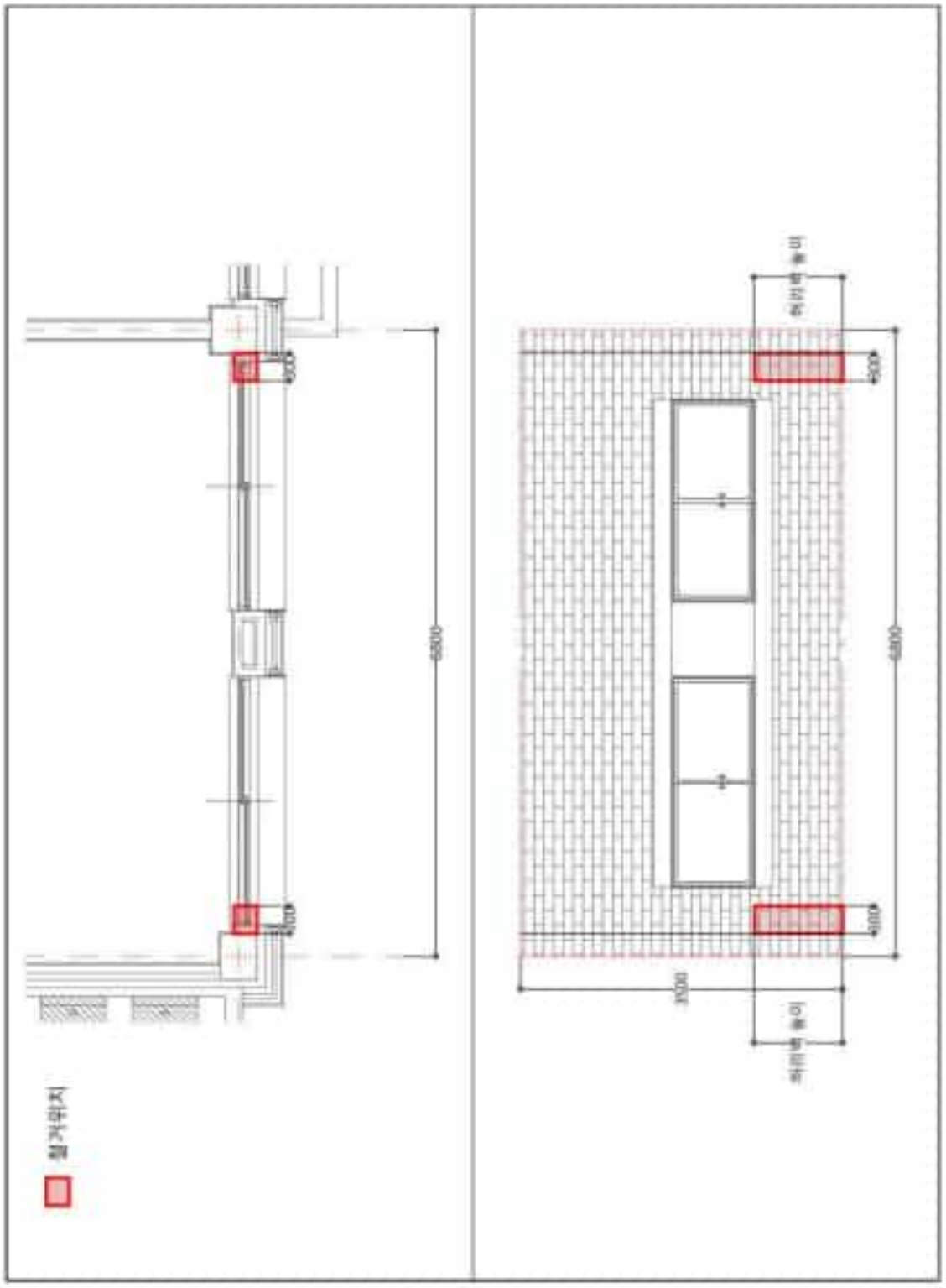


내진보강 위치도



(2) 내진보강 상세도

허리벽 양단 컷팅 일반상세도



3.2.2 보강 후 해석모델

3.2.2.1 기존부

(1) 고유치해석 결과

Mode	UX	UY	UZ	RX	RY	RZ

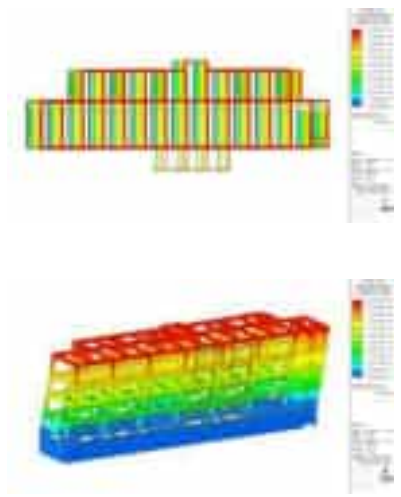
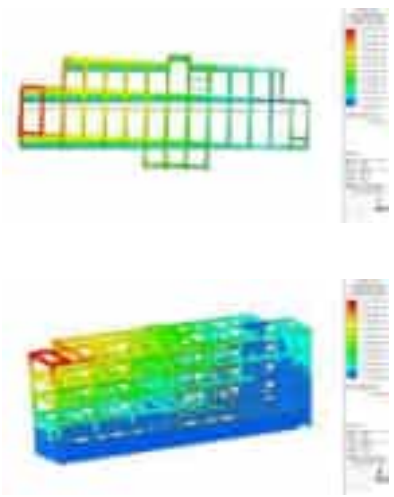
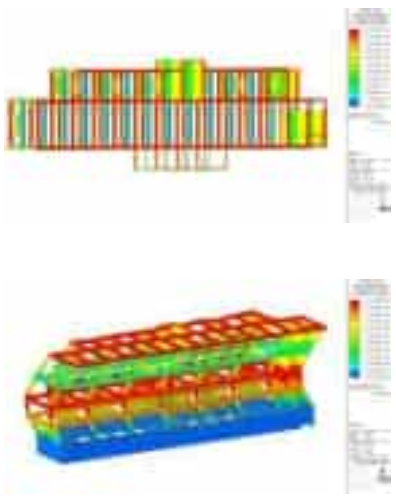
EIGENVALUE ANALYSIS

Mode No	Frequency (rad/sec)	Frequency (cycle/sec)	Period (sec)	Tolerance
1	6.9380	1.1043	0.9055	0.0000e+00
2	12.5428	1.9963	0.5009	0.0000e+00
3	21.6931	3.4521	0.2897	0.0000e+00
4	26.2940	4.1848	0.2390	0.0000e+00
5	39.6361	6.3565	0.1573	0.0000e+00
6	45.4549	7.2344	0.1382	0.0000e+00
7	59.7715	9.5129	0.1051	0.0000e+00
8	84.6007	13.4664	0.0741	0.0000e+00
9	101.4044	16.1517	0.0619	0.0000e+00
10	116.3088	18.5113	0.0540	0.0000e+00

MODAL PARTICIPATION MASSES PRINTOUT

Mode No	TRAN-X MASS(%)	TRAN-X SUM(%)	TRAN-Y MASS(%)	TRAN-Y SUM(%)	TRAN-Z MASS(%)	TRAN-Z SUM(%)	ROTN-X MASS(%)	ROTN-X SUM(%)	ROTN-Y MASS(%)	ROTN-Y SUM(%)	ROTN-Z MASS(%)	ROTN-Z SUM(%)
1	86.2823	86.2823	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.2288	0.2288	0.0209	0.0209
2	0.0853	86.3676	48.6551	48.6551	0.0000	0.0000	0.0048	0.0050	0.0029	0.2317	34.2969	34.2279
3	10.7254	97.0930	0.0077	48.6628	0.0000	0.0000	0.0002	0.0052	0.0006	0.2323	0.0157	34.2434
4	0.0808	97.3188	35.7121	84.3749	0.0000	0.0000	0.3863	0.3915	0.0029	0.2352	47.3458	81.5891
5	2.4880	99.5168	0.0016	84.3765	0.0000	0.0000	0.0000	0.3915	0.2922	0.5273	0.0203	81.6094
6	0.0036	99.5204	7.5919	91.9683	0.0000	0.0000	0.0048	0.3963	0.0017	0.5290	7.3603	88.9697
7	0.4791	99.9995	0.0002	91.9686	0.0000	0.0000	0.0000	0.3963	0.0048	0.5338	0.0008	88.9705
8	0.0002	99.9997	1.4068	93.3754	0.0000	0.0000	0.0032	0.3995	0.0271	0.5609	0.5616	89.5321
9	0.0003	100.0000	5.3443	98.7197	0.0000	0.0000	0.0127	0.4122	0.0014	0.5623	9.3185	98.8506
10	0.0000	100.0000	0.0011	98.7208	0.0000	0.0000	0.0006	0.4128	0.0011	0.5634	0.2438	99.0944

(2) 구조물의 동특성

1차 모드 (X방향)	2차 모드 (Y방향)	3차 모드 (X방향)
		

3.3 비정형성 평가

3.3.1 기존부 보강 후

< 평면 비정형성 검토 결과 >

유형번호	유형		정의	판정
H-1	비틀림 비정형		격막이 유연하지 않을 때 고려함. 어떤 축에 직교하는 구조물의 한 단부에서 우발편심을 고려한 최대 층변위가 그 구조물 양단부 층변위 평균값의 1.2배보다 클 때 비틀림 비정형인 것으로 간주한다.	**비정형 (Irregular)**
H-2	요철형 평면		돌출한 부분의 치수가 해당하는 방향의 평면치수 15%를 초과하면 요철형 평면을 갖는 것으로 간주한다.	**비정형 (Irregular)**
H-3	격막의 불연속		격막에서 잘려나간 부분이나 뚫린 부분이 전체 격막 면적의 50%를 초과하거나 또는 인접한 층간 격막 강성의 변화가 50%를 초과하는 경우, 격막의 불연속이 존재하는 것으로 간주한다.	**정형 (Regular)**
H-4	면외 어긋남		수직 부재의 면외 어긋남 등과 같이 하중전달 경로의 불연속성이 존재하는 경우	**정형 (Regular)**
H-5	비평행 시스템		횡력저항 수직 요소가 전체 횡력저항 시스템에 직교하는 주축에 평행하지 않은 경우	**정형 (Regular)**

< 수직 비정형성 검토 결과 >

유형번호	유형		정의	판정
V-1	강성 비정형 - 연층		어떤 층의 횡강성이 인접한 상부층 횡강성의 70% 미만이거나 상부 3개층 평균강성의 80% 미만인 연층이 존재하는 경우에는 강성분포의 비정형이 있는 것으로 간주한다.	**비정형** **(Irregular)**
V-2	중량 비정형		어떤 층의 유효중량이 인접층 유효중량의 150%를 초과할 때 중량 분포의 비정형이 존재하는 것으로 간주한다. 단, 지붕층이 하부층보다 가벼운 경우는 이를 적용하지 않는다.	**정형** **(Regular)**
V-3	기하학적 비정형		횡력저항 시스템의 수평치수가 인접층치수의 130%를 초과할 경우에는 기하학적 비정형이 존재하는 것으로 간주한다.	**정형** **(Regular)**
V-4	횡력저항 수직요소 비정형		횡력저항요소의 면내 어긋남이 그 요소의 길이보다 크거나 인접한 하부층 저항요소에 강성감소가 일어나는 경우에는 수직저항요소의 면내불연속에 의한 비정형이 있는 것으로 간주한다.	**정형** **(Regular)**
V-5	강도의 불연속 - 약층		임의 층의 횡강도가 직상층 횡강도의 80% 미만인 약층이 존재하는 경우에는 강도의 불연속에 의한 비정형이 존재하는 것으로 간주한다. 각층의 횡강도는 층전단력을 부담하는 내진요소들의 저항방향 강도의 합을 말한다.	**정형** **(Regular)**

3.4 주기 비정형성 검토

선형 정적 절차의 제한사항인 구조물의 지반조건에 따라 산정되는 단주기 영역과 1초 주기의 비율($T_s = S_{D1}/S_{DS}$)의 3.5배($3.5T_S$)와 각 구조물의 특성에 따른 기본주기(T_{XY}) 비를 검토하여 주기에 따른 비정형성을 검토한다.

< 기존부 보강 후 주기 비정형성 검토 결과 >

구 분	평 가 항 목			검 토 결 과
X 방향	지반의 한계 주기 $3.5T_S$	1.9799	Sec	**Regular**
	건물의 기본주기 T_X	0.9055	Sec	
Y 방향	지반의 한계 주기 $3.5T_S$	1.9799	Sec	**Regular**
	건물의 기본주기 T_Y	0.5009	Sec	

3.5 고차모드 영향검토

비선형정적절차 평가의 유효성을 판정하기 위하여 모드 참여율이 90%인 해석모델과 1차모드만을 사용한 해석모델의 층전단력 차이가 130% 이하인지를 검토하여 고차모드 영향성을 검토한다.

< 기존부 보강 후 X방향 고차모드 영향성 검토 결과 >

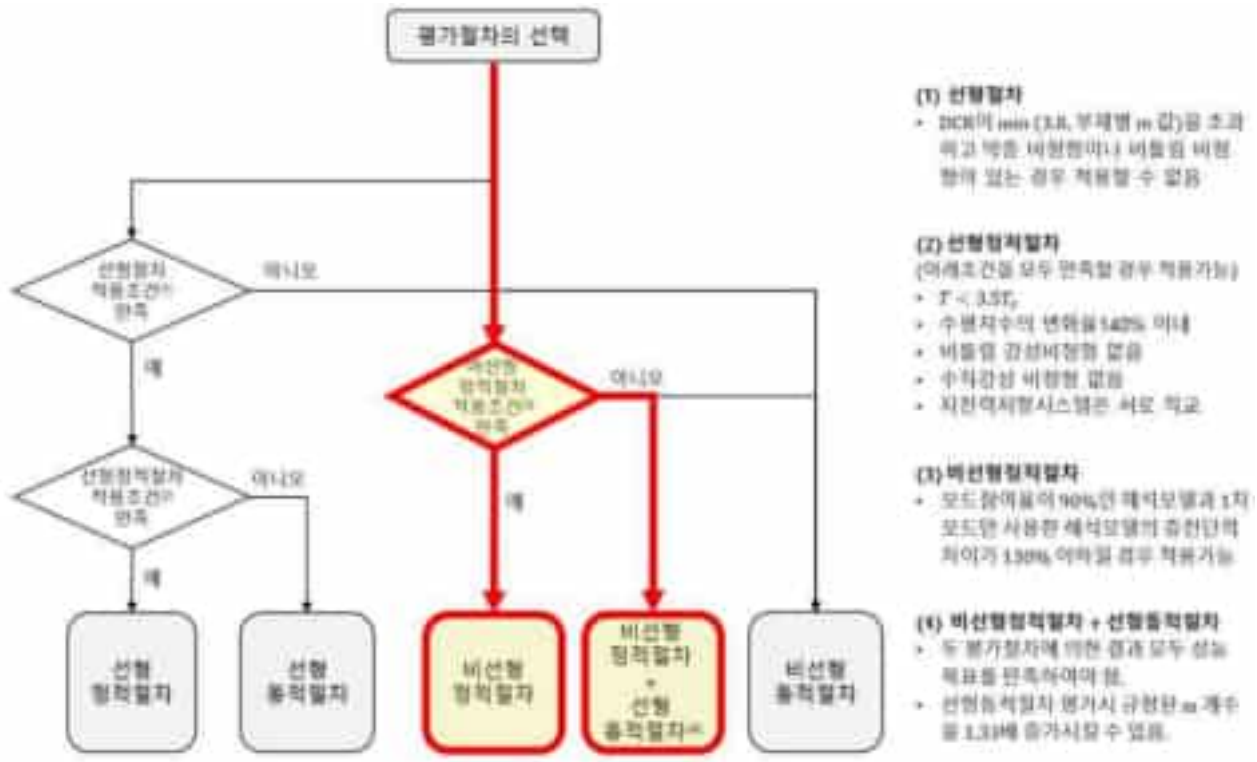
층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	2,331	2,596	1.11	저차모드 지배
3F	4,217	4,310	1.02	저차모드 지배
2F	5,515	5,530	1.00	저차모드 지배
1F	6,184	6,320	1.02	저차모드 지배

< 기존부 보강 후 Y방향 고차모드 영향성 검토 결과 >

층	층 전단력 [kN]		전단력비	검토 결과
	1st Mode	All Modes	All Modes /1st Mode	
4F	2,106	2,716	1.29	저차모드 지배
3F	3,854	4,867	1.26	저차모드 지배
2F	4,984	6,227	1.25	저차모드 지배
1F	5,569	7,059	1.27	저차모드 지배

3.6 내진성능평가 절차의 선택

상세평가에서는 선형정적절차(LSP), 선형동적절차(LDP), 비선형정적절차(NSP), 비선형동적절차(NDP)를 통해 내진성능평가를 수행할 수 있다.



< 평가 절차의 선택 >

본 용역에서는 '기존 시설물(건축물) 내진성능 평가요령(국토안전관리원, 2021)'에 따라 대상 구조물의 연성능력, 즉 비선형 거동을 파악하기 위해 비선형정적절차 내진성능평가를 실시한다. 단, 상기 평가 절차의 선택에서 '비선형정적절차 적용조건의 만족' 여부인 고차모드 지배적인 구조물로 판단될 경우에는 선형동적절차(m계수1.33배)를 추가적으로 실시하여 두가지 평가결과 중 불리한 해석결과로 구조물의 성능수준을 판정한다.

< 내진성능평가 절차 선정 >

평가 동	내진성능평가 절차 선정
기존부 보강 후	비선형정적절차

3.7 비선형정적해석 결과

(1) 횡하중 분포 산정

비선형정적절차에 사용되는 횡하중의 분포는 구조물의 1차모드가 지배적이라는 가정으로부터 구한 밑면전단력의 수직분포를 사용한다.

< X방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
4F	1,881.12	0.6424	0
3F	1,294.33	2.1426	0
2F	669.333	2.195	0
1F	16.4006	0.0821	0

< Y방향 1차모드에 따른 횡하중 분포 산정 >

층	X-dir [kN]	Y-dir [kN]	RZ-dir [kN]
4F	12.5606	1,747.91	0
3F	6.2148	1,130.2	0
2F	10.8648	585.645	0
1F	2.3973	7.0475	0

(2) 초기 중력하중 입력

비선형해석 절차에서 초기 중력하중 조합에 의한 변형과 부재력은 '평가요령 4.3.4 하중조합'에 따라 1.0DL+0.25LL을 적용한다.

(3) 다축가진효과

완전한 대칭구조물이 아닐 경우 최대효과를 발생시키는 하중의 방향은 일반적으로 파악하기 힘들다. 다축가진효과는 가력방향이 구조물의 주축과 동일하지 않을 때 발생하는 효과를 고려하기 위한 것으로 비정형 평면일 혹은 여러 지진력저항시스템에 속해 있는 기둥이 있을 경우 고려하여야 하며 주방향하중 대 직교방향하중의 비율을 100 : 30으로 입력하여 비선형해석을 수행한다.

(4) 보정계수

성능수준에 따른 보정계수(χ) : 거주가능, 인명안전 수준 1.3 / 붕괴방지 수준 1.0 적용

하중계수(γ) : 수평부재 1.0 / 수직부재 1.3 적용

※ 단, χ와γ의 곱은 1.5를 초과하지 않음.

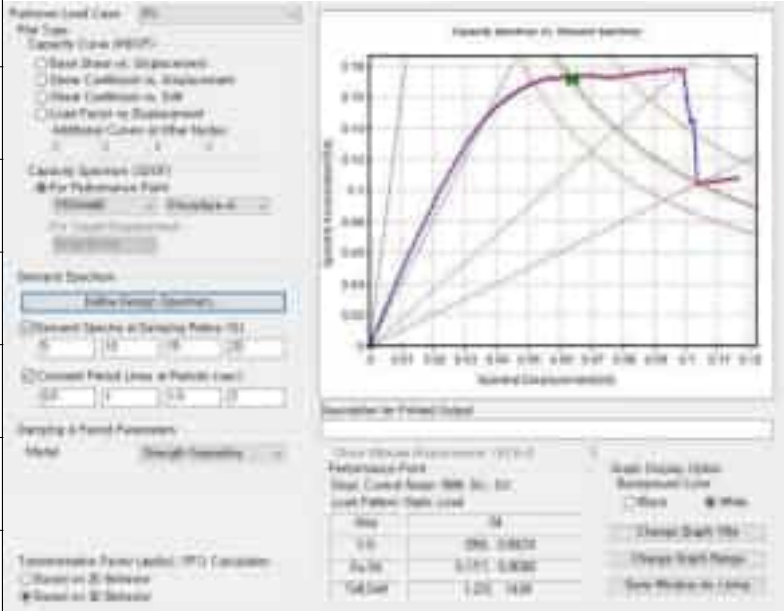
(5) 해석조건 공통 입력사항

3.7.1 기존부

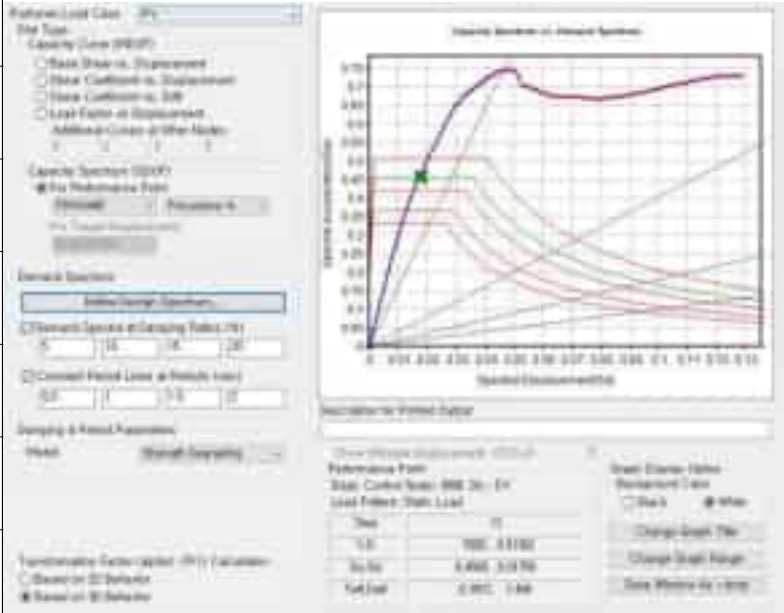
3.7.1.1 목표성능 : 1400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

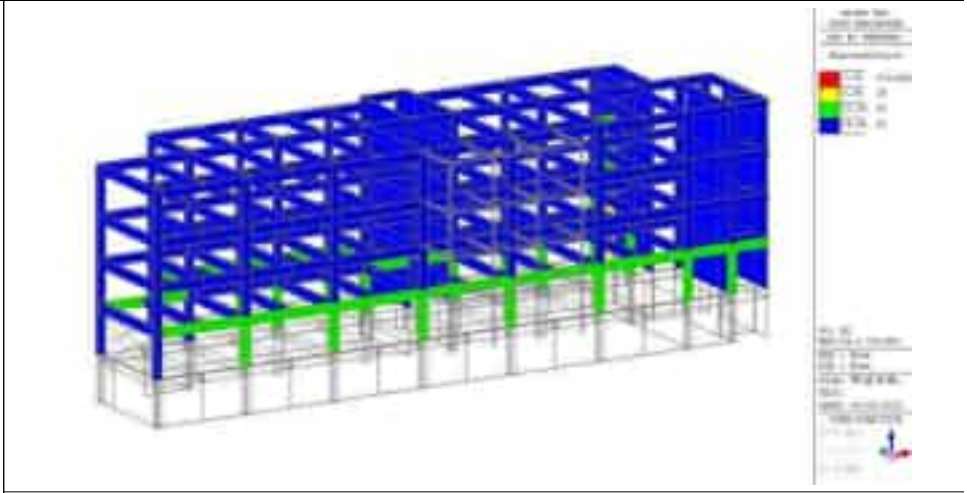
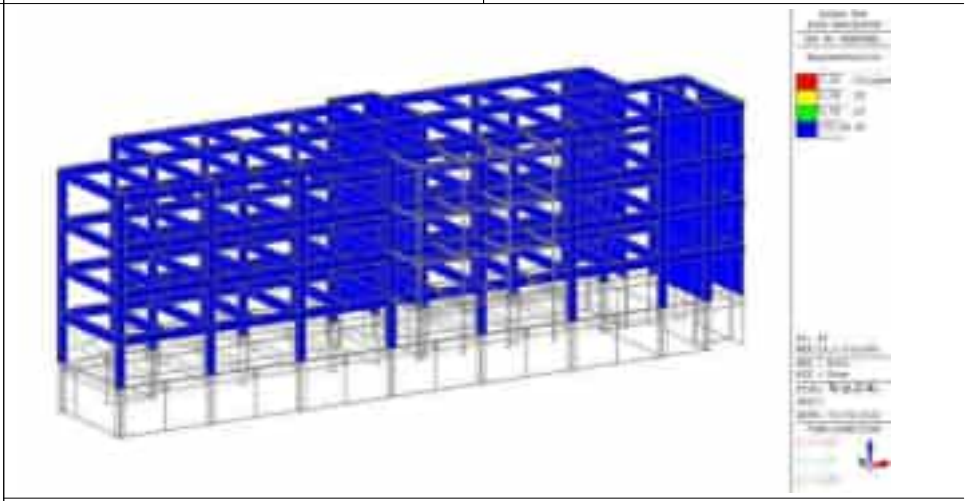
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	54	
Base Shear [kN]	3993	
Roof Disp. [mm]	82.18	
Spectral Acc. [Sa]	0.1717	
Spectral Disp. [Sd]	0.06382	
Teff [sec]	1.223	
Deff [%]	14.68	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	13	
Base Shear [kN]	5992	
Roof Disp. [mm]	13.62	
Spectral Acc. [Sa]	0.4569	
Spectral Disp. [Sd]	0.01759	
Teff [sec]	0.3937	
Deff [%]	7.494	

(2) 중력하중 저항능력 검토

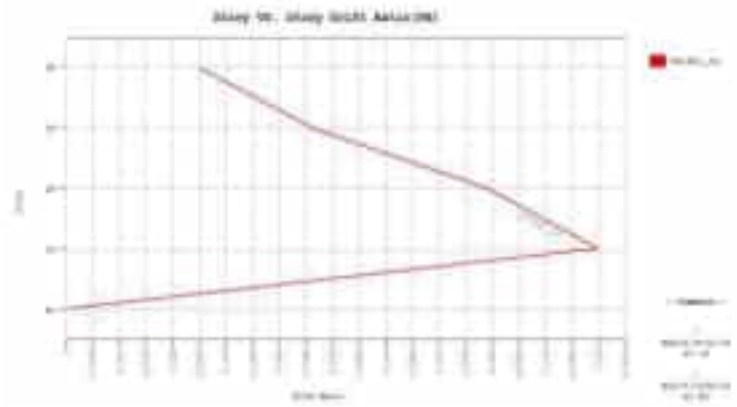
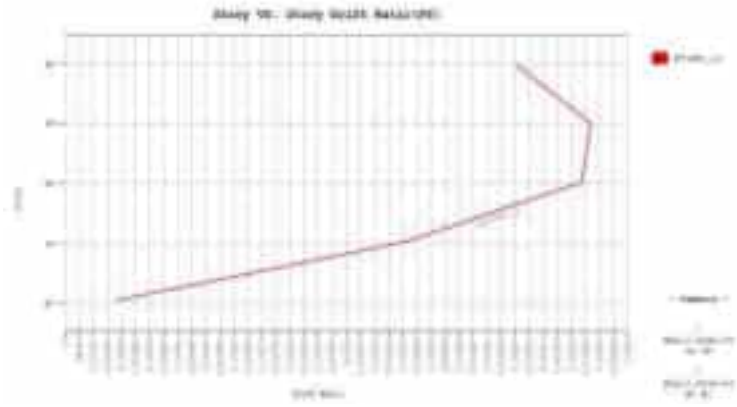
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	인명안전(LS)	수직부재 성능수준	인명안전(LS)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)

(3) 층간변형각 검토

내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

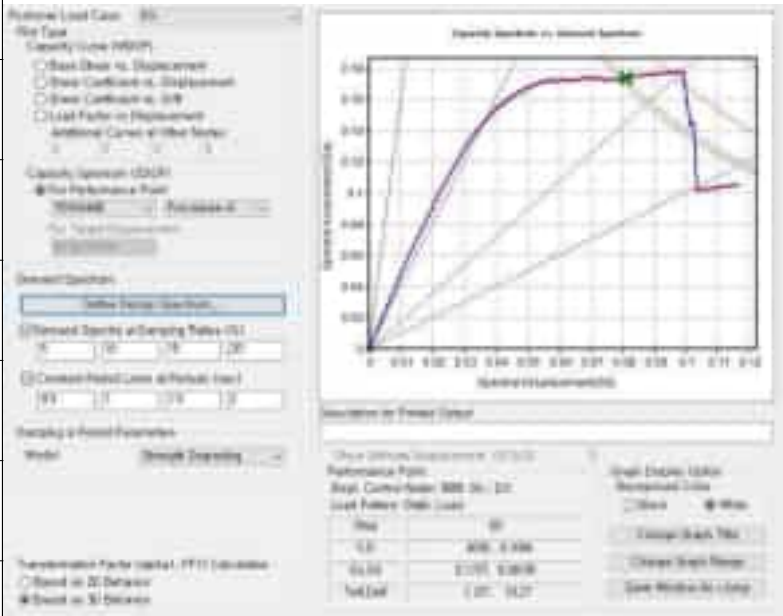
구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(RC 모멘트골조)**				
	최대발생 층간변형각	0.99 %	허용기준	1.40 %
	인명안전 (LS)			
Y방향 **(조적채움벽이 있는 RC모멘트골조)**				
	최대발생 층간변형각	0.19 %	허용기준	0.70 %
	거주가능 (IO)			

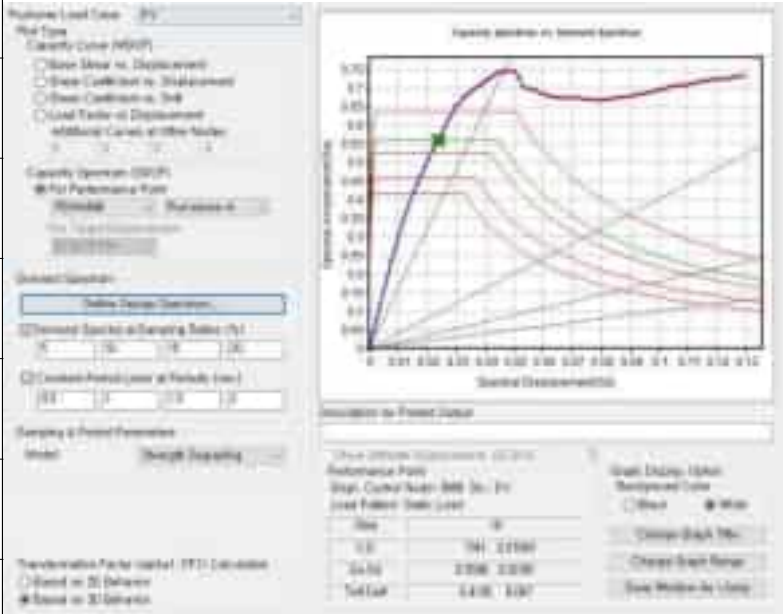
3.7.1.2 목표성능 : 2400년 재현주기 지진력 인명안전

(1) 성능점 검토

- X방향

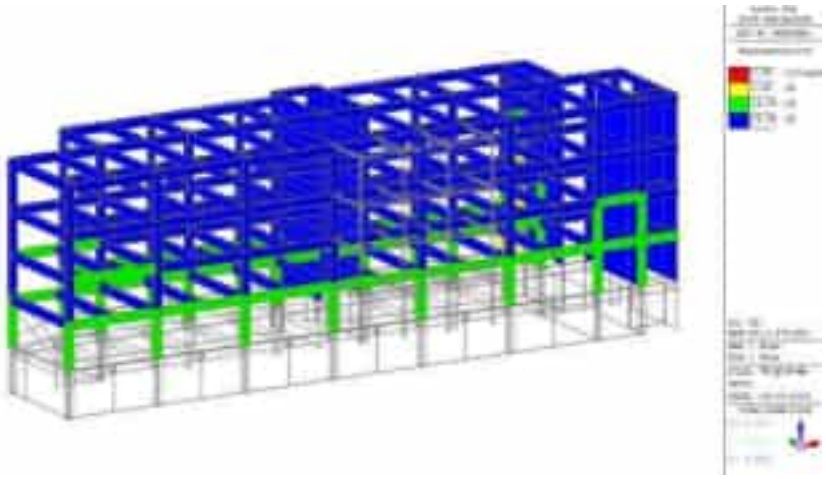
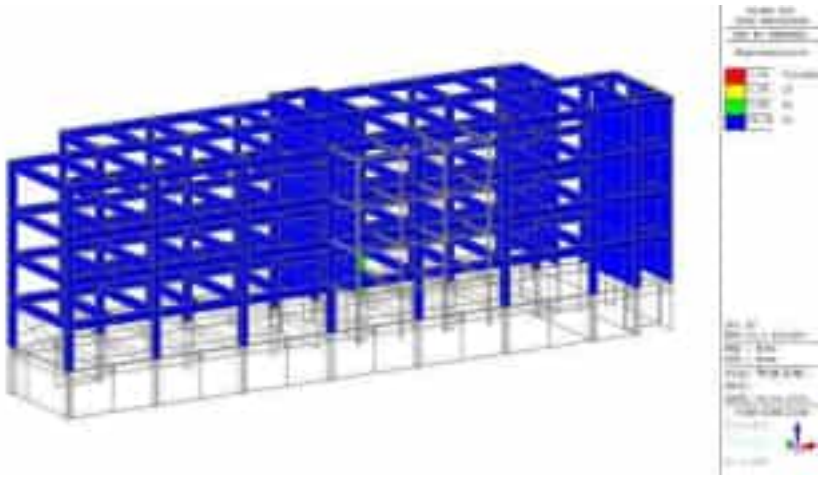
성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	69	
Base Shear [kN]	4038	
Roof Disp. [mm]	104.4	
Spectral Acc. [Sa]	0.1737	
Spectral Disp. [Sd]	0.08105	
Teff [sec]	1.371	
Deff [%]	19.27	

- Y방향

성능점 산정방법 : FEMA440, Procedure-A, Damping & Period Parameters Strength Degrading Model		
STEP	18	
Base Shear [kN]	7341	
Roof Disp. [mm]	18.43	
Spectral Acc. [Sa]	0.5598	
Spectral Disp. [Sd]	0.02381	
Teff [sec]	0.4138	
Deff [%]	8.047	

(2) 중력하중 저항능력 검토

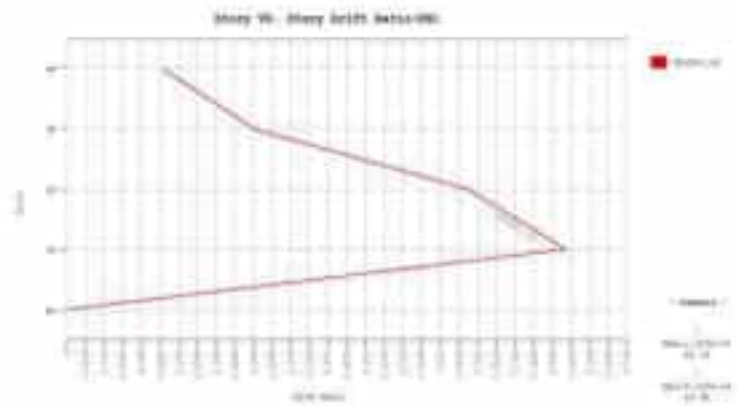
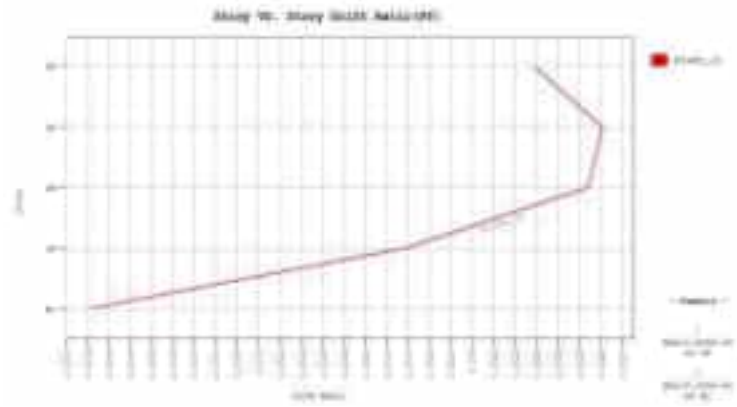
성능점에서의 부재별 중력하중 저항능력을 검토하여 성능수준을 판정한다.

방 향	중력하중 저항능력 검토 결과			
X방향				
	수평부재 성능수준	인명안전(LS)	수직부재 성능수준	인명안전(LS)
Y방향				
	수평부재 성능수준	거주가능(IO)	수직부재 성능수준	거주가능(IO)

(3) 층간변형각 검토

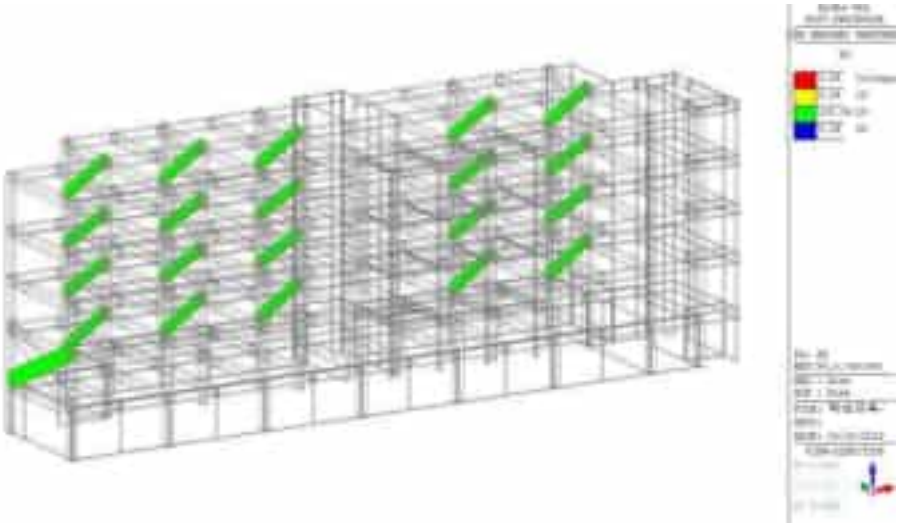
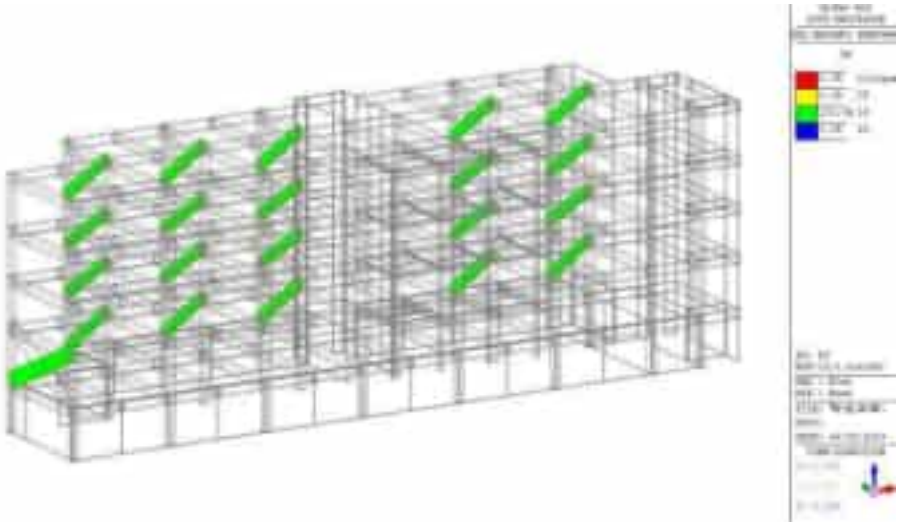
내진설계된 구조물의 성능수준별 허용 층간변형각은 아래 표와 같으며 대상건물의 방향별, 층별로 만족여부를 검토한다. 이때 내진설계되지 않은 건물의 허용층간변형각은 내진설계된 구조물의 성능수준별 허용 층간변형각의 70 %로 제한한다.

구조시스템	내진설계 된 건물의 허용 층간변형각 (%)		
	거주가능	인명안전	붕괴방지
RC 모멘트골조	0.7 (0.49)	2.0 (1.40)	3.0 (2.10)
조적채움벽이 있는 RC모멘트골조	0.5 (0.35)	1.0 (0.70)	1.5 (1.05)
전단지배형 RC 전단벽 시스템	0.25 (0.175)	0.5 (0.35)	1.0 (0.70)
휨지배형 RC 전단벽 시스템	0.5 (0.35)	1.0 (0.70)	2.0 (1.40)
무보강 조적 전단벽 시스템	0.3 (0.21)	0.6 (0.42)	1.0 (0.70)
철골골조	0.7 (0.49)	2.5 (1.75)	4.0 (2.80)
가새가 있는 철골골조	0.5 (0.35)	1.5 (1.05)	2.0 (1.40)

방 향	층간변형각 검토 결과			
X방향 **(RC 모멘트골조)**				
	최대발생 층간변형각	1.34 %	허용기준	2.10 %
	인명안전 (LS)			
Y방향 **(조적채움벽이 있는 RC모멘트골조)**				
	최대발생 층간변형각	0.26 %	허용기준	1.05 %
	거주가능 (IO)			

(4) 조적채움벽 면내파괴 검토

조적채움벽을 가진 모멘트골조에서 조적채움벽이 면내로 파괴되거나 혹은 면외로 전도될 경우 전체 구조물은 거주가능과 인명안전의 성능수준을 만족하지 못하는 것으로 판정한다. 그러나 목표성능수준이 붕괴방지일 경우, 조적채움벽의 파괴는 전체 건물의 성능수준 판정에 고려하지 않는다.

방 향	조적채움벽 면내파괴 검토
X방향 **1400년 재현주기** **성능수준 LS**	
Y방향 **1400년 재현주기** **성능수준 LS**	

3.8 소결

기존부 보강 구조물에 대해 「기존 시설물(건축물) 내진성능 평가요령(국토안전관리원, 2021)」에 따라 내진성능 상세평가를 수행하였다. 목표성능은 내진Ⅰ등급에 따른 1400년 재현주기 지진력 인명안전 수준, 2400년 재현주기 지진력 붕괴방지 수준을 적용했으며 이에 대한 검토결과는 다음과 같다.

< 보강구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유 성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	인명안전	거주가능	인명안전	거주가능
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	만족			
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

보강 구조물 내진성능평가 결과,

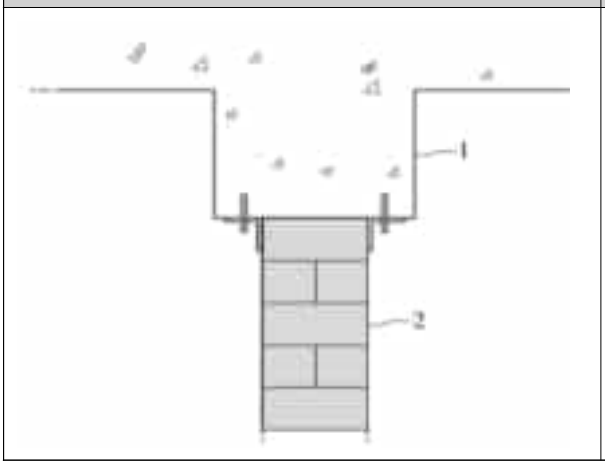
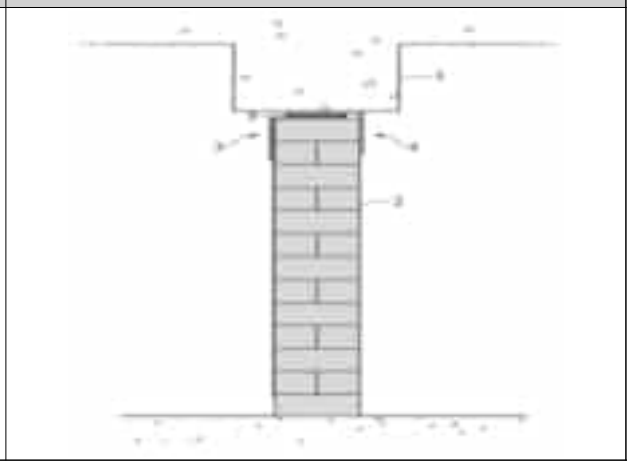
기존부는 X,Y방향 모두 연직하중 저항능력 및 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 보강 후 구조물에 대해서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 적절한 내진보강이 이루어진 것으로 판단된다.

제4장 조적벽체 면외전도 검토

4. 조적벽체 면외전도 검토

구조물의 비구조 요소인 조적벽체에 대하여 전도 여부를 검토한 결과, 모든 조적허리벽 및 조적채움벽은 설계지진력에 대하여 면외전도에 대한 안정성을 확보한 것으로 나타났다.

그러나 추후 시설물의 유지관리 측면에서 벽돌면에 미 시공된 부분과 상부 조적채움벽과 보 사이의 몰탈 밀실 정도를 확인하여 불량한 부분이 발생되면 면외 전도가 추가로 발생할 가능성이 크므로, 아래에서 제시한 그림과 같은 보강을 실시하는 것이 바람직하다고 판단된다.

앵글과 철물을 사용하는 방법	앵글과 덧댄판을 이용하는 방법
	

[그림 4-1] 조적벽체 전도방지 보강 안

< 학생교육원 대천임해 별관동 기존부 조적벽체 면외전도 검토 결과 >

구 분	채움벽 두께 tm (mm)	채움벽 높이 hm (mm)	압축 강도 f'm (Mpa)	인장 강도 f't (Mpa)	단위 중량 Wp (kPa)	높이 두께비 hm/tm	아치 작용 요건	목표 성능	χ	면외방향 검토생략		높이 두께비 계수 λ2	단위면적당			판정
										가능 높이 두께비	가능 여부		면외강도		관성력 Fp (kPa)	
													QCL (아치) (kPa)	QCL (캔티) (kPa)		
C : 2.90m (채움벽)	190	2,900	2.1	0.00	3.8	15.3	만족	LS	1.3	9.0	검토 필요	0.0334	3.2		1.0	OK
C : 2.80m (채움벽)	190	2,800	2.1	0.00	3.8	14.7	만족	LS	1.3	9.0	검토 필요	0.0354	3.5		1.0	OK
C : 2.50m (채움벽)	190	2,500	2.1	0.00	3.8	13.2	만족	LS	1.3	9.0	검토 필요	0.0436	4.9		1.0	OK

* 아치작용요건 만족 : hm/tm 이 25 이하 and 채움벽이 주위 골조와 완전히 접촉
* 아치작용요건 불만족 : 위의 만족이 아닌 경우

[표 4-2] 조적채움벽의 설계기준강도 기본값(MPa)

조적의 상태		양호[1]	보통[2]	불량[3]
설계기준 압축강도		6.2	5.1	2.1
설계기준 인장강도		0.14	0.07	0
설계기준 전단강도	수평 및 수직 줄눈이 밀실하게 채워진 경우	0.19	0.14	0.09
	수직 줄눈이 밀실하게 채워지지 않은 경우	0.076	0.055	0.035

1) 조적개채와 줄눈에 열화가 나타나지 않고 육안으로 확인되는 균열이 없는 경우
2) 조적개채와 줄눈에 열화가 나타나지 않고 육안으로 확인되는 미세한 균열이 있는 경우
3) 조적개채와 줄눈에 열화가 나타나거나 또는 심각한 균열이 있는 경우

[표 4-3] 조적채움벽 면외방향 검토생략 가능 높이-두께비(hm/tm) 상한치

성능수준 (or)	SDS<0.33	SDS<0.5	SDS≥0.5
	SD1<0.133	SD1<0.2	SD1≥0.2
즉시거주	14	13	8
인명안전	15	14	9
붕괴방지	16	15	10

[표 4-4] 벽체의 높이-두께 비(hm/tm)에 대한 계수 λ2

hm/tm	5	10	15	25
λ_2	0.129	0.06	0.034	0.013

제5장 기초 안전성 검토

5. 기초 안전성 검토

기초의 안전성은 기초의 기대지지력에 기초하여 평가한다. 기초의 기대지지력은 지반조사에 의한 극한지지력으로 결정하거나 설계도서에 명시된 허용지지력과 그에 포함된 안전율을 고려하여 다음 식으로 산정할 수 있다.

$$q_e = \phi(3.0\, q_{all})$$

$$Q_e = \phi(3.0\, Q_{all})$$

여기서,

q_e : 얕은기초의 기대지지력 (MPa)

q_{all} : 설계도서에 명시된 얕은기초의 중력하중 설계용 허용지지력 (MPa)

Q_e : 말뚝기초의 기대지지력 (kN)

Q_{all} : 설계도서에 명시된 말뚝기초의 중력하중 설계용 허용지지력 (kN)

ϕ : 강도감소계수로서 성능기반의 선형절차 및 비선형절차에 모두 1.0을 적용

(1) 허용지지력이 명시된 설계도서가 없는 경우에 「건축구조기준」에 따른 고정하중의 1.0배와 활하중의 0.25배를 적용한 경우의 기초반력을 허용지지력으로 간주할 수 있다.

(2) 설계 당시의 활하중을 조사하여 고정하중의 1.0배와 활하중의 1.0배를 적용한 경우의 기초반력을 허용지지력으로 간주할 수 있다.

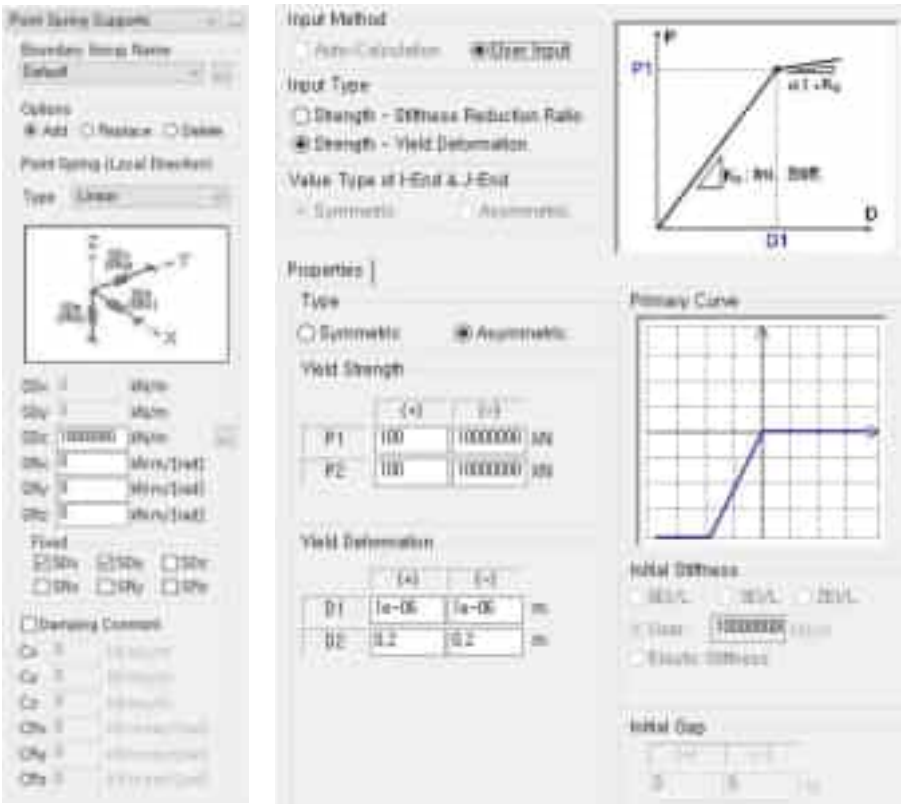
(3) 증축된 건물의 설계 당시 활하중은 증축설계에 적용된 활하중으로 본다.

(4) (1) 또는 (2)를 적용하기 위해서 현재 사용하중 하에서 침하 등의 문제가 없음을 확인하여야 한다.

(5) 지반조사를 통해서 기초의 기대지지력을 구할 수 있다

<u>본 구조물은 설계도서가 존재하지 않으므로 상기 항목중 (1)을 적용하여 기초의 허용지지력 및 기대지지력으로 산정하였다.</u>

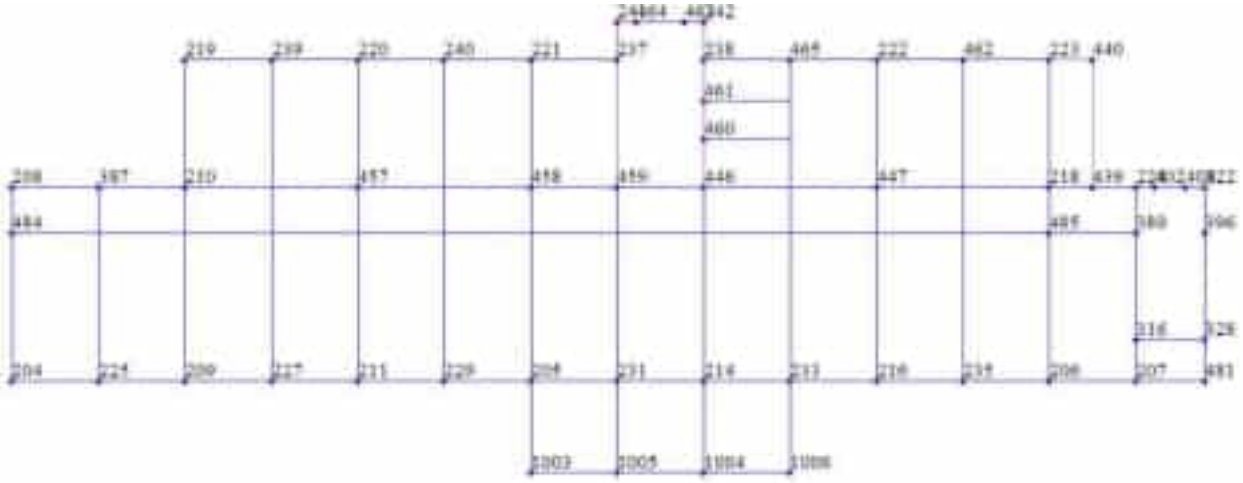
기초 안전성 검토 시 아래 그림과 같이 기초 지점에 Spring Support를 설정하였다. Spring Support의 강성은 구조물 동적 특성이 변하지 않도록 무한에 가깝게 입력하였으며, 인발에 대한 기초의 들림 현상을 인정하고 인발 저항력을 기초 자중 및 상부 토피하중을 100kN으로 고려하여 설정하였다. 해당 설정으로 비선형정적절차를 수행하며 재현주기 2400년 성능점에서의 반력을 통해 소요 압축/인장력을 산정하였다. Spring Support을 적용한 해석모델에 대하여 성능점에서의 상부 구조물의 성능수준을 재검토한 결과 목표 내진성능을 만족하는 것으로 나타났다.



[Point Spring 강성 및 강도 입력]

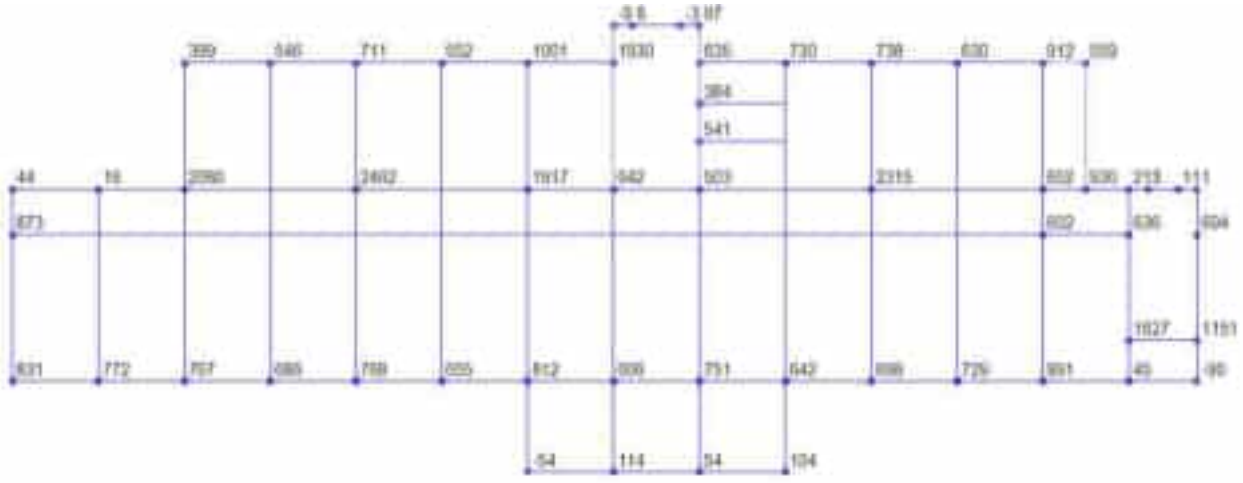
5.1 기존부

(1) 기초 안전성 검토 결과

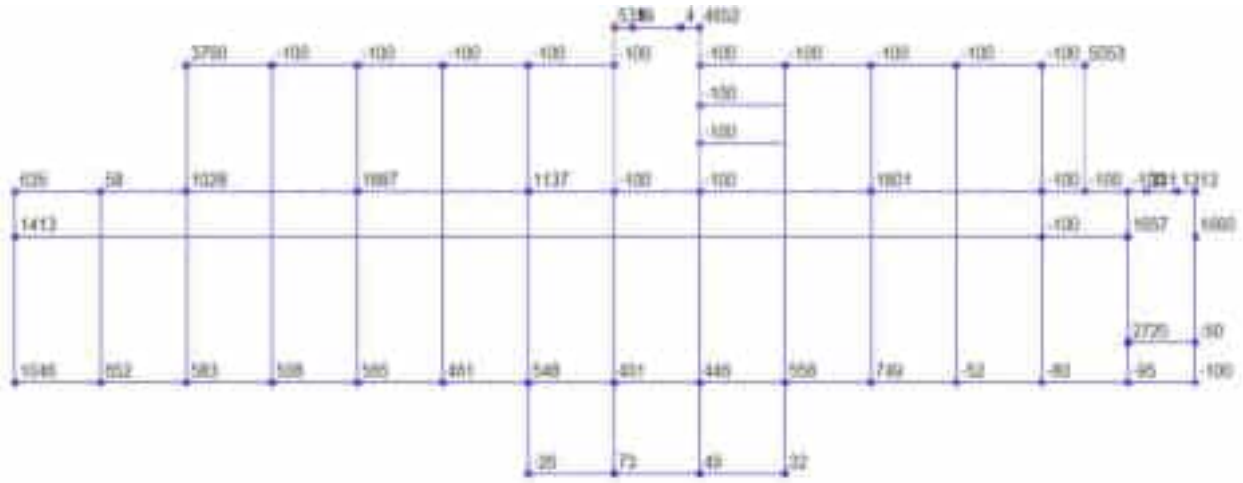


< 기초검토 위치 (Node No.) >

< 구조물의 기대지지력 (3.0×1.0×(1.0DL+0.25LL)) >



< 설계응답스펙트럼 가속도 1.5배 지진력 수준 X방향 성능점의 지점반력 >



< 설계응답스펙트럼 가속도 1.5배 지진력 수준 Y방향 성능점의 지점반력 >

< 기존부 기초 안전성 검토 결과 (1) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
204	3281	831	1046	-	-	0.32	
205	2640	812	548	-	-	0.31	
206	4206	991	-80	-	-	0.24	
207	313	45	-95	-	-	0.14	
208	751	44	635	-	-	0.85	
209	2628	767	583	-	-	0.29	
210	6657	2080	1028	-	-	0.31	
211	2676	768	565	-	-	0.29	
214	2592	751	446	-	-	0.29	
216	2552	698	749	-	-	0.29	
218	2264	652	-100	-	-	0.29	
219	3892	399	3760	-	-	0.97	
220	1681	711	-100	-	-	0.42	
221	2160	1001	-100	-	-	0.46	
222	1990	738	-100	-	-	0.37	
223	2562	912	-100	-	-	0.36	
224	311	213	-100	-	-	0.69	
225	2464	772	652	-	-	0.31	
227	2069	686	508	-	-	0.33	
229	2036	655	461	-	-	0.32	
231	2013	606	401	-	-	0.30	
233	1982	642	558	-	-	0.32	
235	1889	729	-52	-	-	0.39	
237	5436	1930	-100	-	-	0.35	
238	2224	635	-100	-	-	0.29	
239	1427	546	-100	-	-	0.38	
240	1372	552	-100	-	-	0.40	
241	5488	-9	5319	-	-	0.97	
242	4815	97	4652	-	-	0.97	
316	4123	1627	2720	-	-	0.66	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

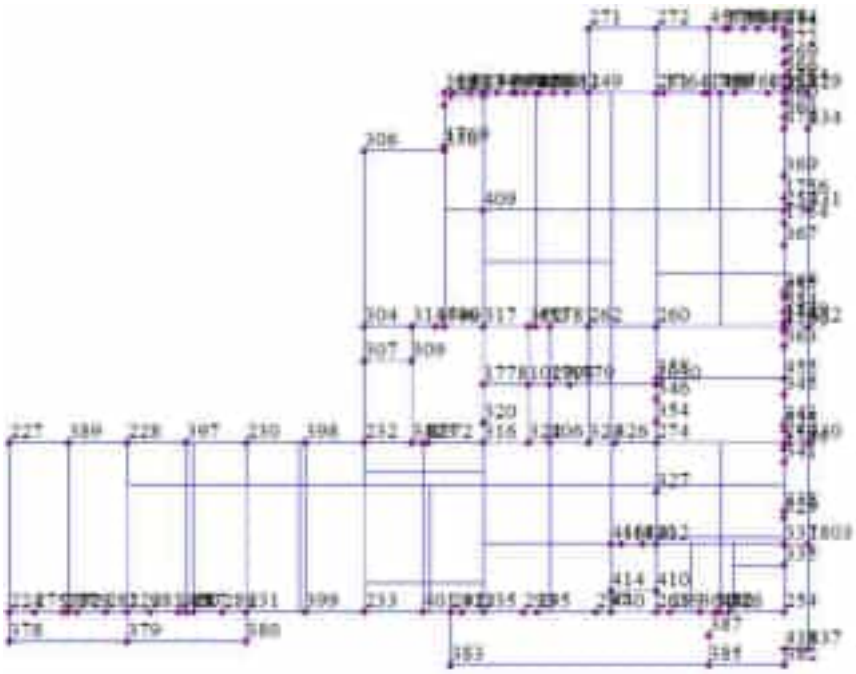
< 기존부 기초 안전성 검토 결과 (2) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
322	38	1	13	-	-	0.35	
328	2691	1151	-50	-	-	0.43	
387	432	16	58	-	-	0.13	
389	1845	636	1657	-	-	0.90	
396	1878	694	1660	-	-	0.88	
402	421	3	331	-	-	0.79	
408	30	11	13	-	-	0.44	
439	1324	930	-100	-	-	0.70	
440	5188	559	5053	-	-	0.97	
446	2926	503	-100	-	-	0.17	
447	7218	2315	1801	-	-	0.32	
457	7659	2462	1887	-	-	0.32	
458	5761	1917	1137	-	-	0.33	
459	2477	642	-100	-	-	0.26	
460	2240	541	-100	-	-	0.24	
461	1405	384	-100	-	-	0.27	
462	1681	630	-100	-	-	0.37	
463	6	-3	4	-	-	0.75	
464	11	8	8	-	-	0.74	
465	1958	730	-100	-	-	0.37	
481	1	-90	-100	-	-	0.00	
484	3293	873	1413	-	-	0.43	
485	1852	602	-100	-	-	0.33	
1003	69	-54	-26	-	-	0.00	
1004	233	54	49	-	-	0.23	
1005	260	114	73	-	-	0.44	
1006	78	104	32	-	-	1.32	Y

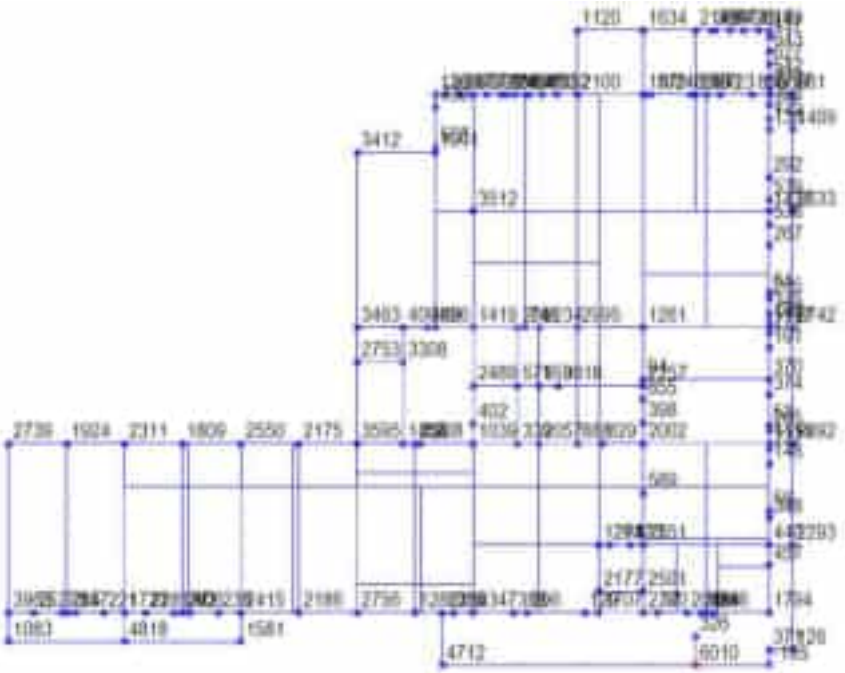
※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

5.2 증측부

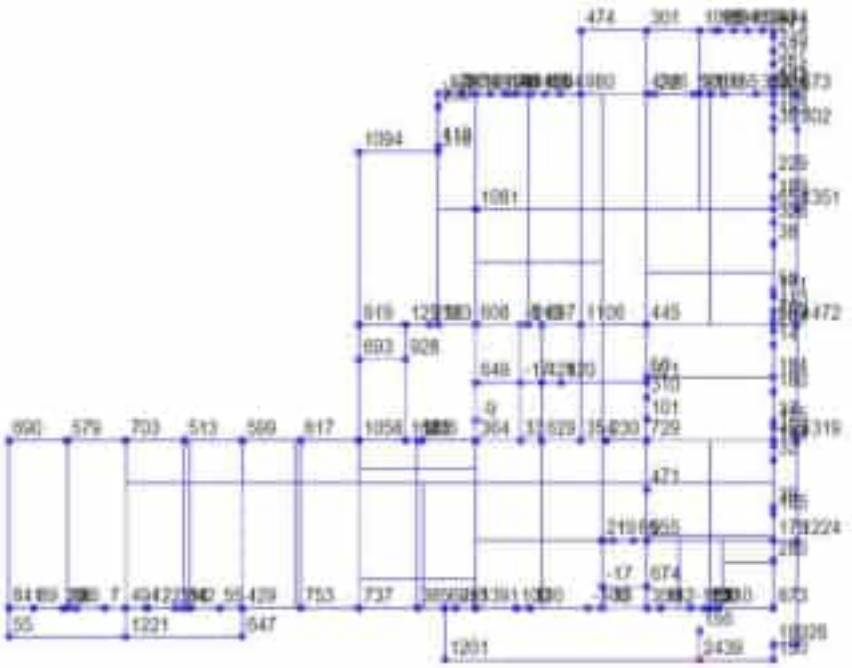
(1) 기초 안전성 검토 결과



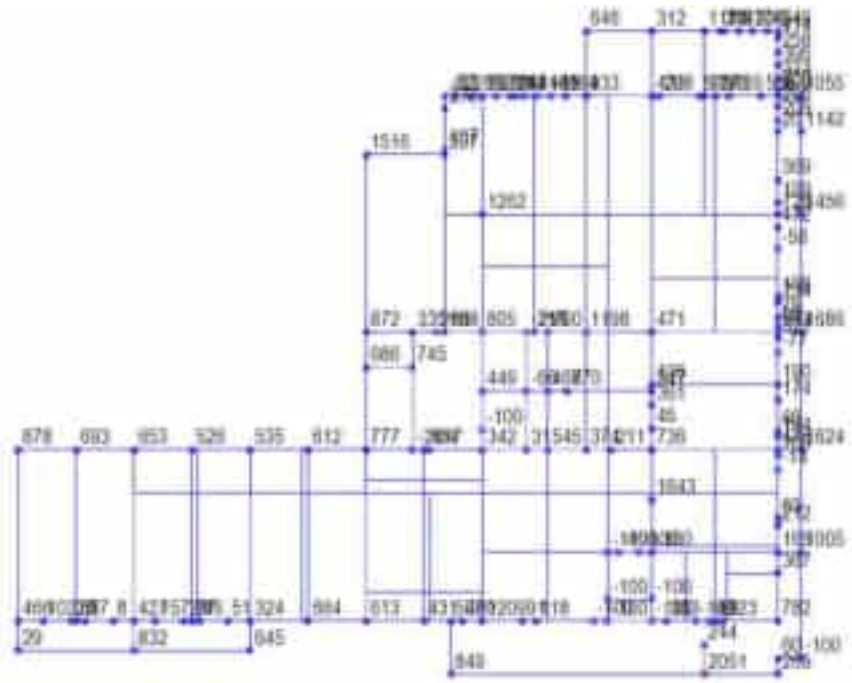
< 기초검토 위치 (Node No.) >



< 구조물의 기대지지력 (3.0×1.0×(1.0DL+0.25LL)) >



< 설계응답스펙트럼 가속도 1.5배 지진력 수준 X방향 성능점의 지점반력 >



< 설계응답스펙트럼 가속도 1.5배 지진력 수준 Y방향 성능점의 지점반력 >

< 기초 안전성 검토 결과 (1) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
224	3963	841	466	-	-	0.21	
227	2739	690	878	-	-	0.32	
228	2311	703	653	-	-	0.30	
229	1723	494	427	-	-	0.29	
230	2550	599	535	-	-	0.24	
231	2415	429	324	-	-	0.18	
232	3595	1058	777	-	-	0.29	
233	2756	737	613	-	-	0.27	
234	867	349	392	-	-	0.45	
235	4347	1391	1209	-	-	0.32	
249	2100	980	933	-	-	0.47	
251	1375	432	431	-	-	0.31	
253	1747	906	900	-	-	0.52	
254	1794	873	782	-	-	0.49	
257	1437	654	728	-	-	0.51	
258	1137	509	583	-	-	0.51	
259	1114	465	476	-	-	0.43	
260	1261	445	471	-	-	0.37	
261	2770	358	-100	-	-	0.13	
262	2995	1106	1198	-	-	0.40	
271	1120	474	646	-	-	0.58	
272	1634	301	312	-	-	0.19	
274	2002	729	736	-	-	0.37	
275	252	89	102	-	-	0.40	
277	76	20	20	-	-	0.27	
279	147	55	57	-	-	0.39	
281	221	7	8	-	-	0.04	
283	228	122	157	-	-	0.69	
285	127	31	28	-	-	0.24	
287	106	42	46	-	-	0.43	
289	238	55	51	-	-	0.23	
291	1385	605	507	-	-	0.44	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

< 기초 안전성 검토 결과 (2) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
293	388	109	91	-	-	0.28	
295	396	130	118	-	-	0.33	
297	129	-100	-100	-	-	0.00	
299	345	142	333	-	-	0.97	
301	200	-100	-100	-	-	0.00	
304	3463	919	872	-	-	0.27	
306	3412	1094	1516	-	-	0.44	
307	2753	693	686	-	-	0.25	
309	3308	928	745	-	-	0.28	
312	1452	166	-24	-	-	0.11	
314	406	129	335	-	-	0.82	
316	1039	364	342	-	-	0.35	
317	1419	608	805	-	-	0.57	
320	402	-9	-100	-	-	0.00	
322	339	33	31	-	-	0.10	
324	888	354	374	-	-	0.42	
326	829	230	211	-	-	0.28	
327	1748	471	1643	-	-	0.94	
335	457	280	367	-	-	0.80	
337	440	175	165	-	-	0.40	
338	56	39	65	-	-	1.16	
341	148	32	-14	-	-	0.21	
343	52	37	60	-	-	1.14	
345	374	180	174	-	-	0.48	
348	128	-100	-82	-	-	0.00	
350	1001	510	597	-	-	0.60	
352	205	-8	-21	-	-	0.00	
354	398	101	46	-	-	0.25	
358	94	50	106	-	-	1.13	
363	191	14	-77	-	-	0.07	
365	121	56	108	-	-	0.89	
367	267	38	-58	-	-	0.14	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

< 기초 안전성 검토 결과 (3) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
369	375	229	369	-	-	0.98	
371	136	39	20	-	-	0.29	
374	745	474	646	-	-	0.87	
378	1083	55	29	-	-	0.05	
379	4818	1221	832	-	-	0.25	
380	1581	647	645	-	-	0.41	
382	312	150	269	-	-	0.86	
383	4712	1201	849	-	-	0.25	
385	6010	2439	2051	-	-	0.41	
387	326	156	244	-	-	0.75	
389	1924	579	693	-	-	0.36	
392	235	68	61	-	-	0.29	
397	1809	513	526	-	-	0.29	
398	2175	617	612	-	-	0.28	
399	2186	753	664	-	-	0.34	
400	262	84	77	-	-	0.32	
401	1282	385	431	-	-	0.34	
403	256	145	134	-	-	0.57	
406	2057	629	545	-	-	0.31	
409	3512	1081	1262	-	-	0.36	
410	2501	674	-100	-	-	0.27	
412	2351	955	-100	-	-	0.41	
414	2177	-17	-100	-	-	0.00	
416	1274	21	-100	-	-	0.02	
418	291	19	-100	-	-	0.06	
420	303	86	-100	-	-	0.28	
423	412	275	400	-	-	0.97	
429	1085	673	1055	-	-	0.97	
430	2392	1319	1624	-	-	0.68	
431	2633	1351	1456	-	-	0.55	
432	2742	1472	1686	-	-	0.61	
434	1409	802	1142	-	-	0.81	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

< 기초 안전성 검토 결과 (4) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
437	126	-26	-100	-	-	0.00	
438	371	160	60	-	-	0.43	
440	1707	-10	-100	-	-	0.00	
442	164	55	59	-	-	0.36	
446	826	123	108	-	-	0.15	
450	400	159	173	-	-	0.43	
451	198	145	144	-	-	0.73	
453	741	240	258	-	-	0.35	
455	370	184	190	-	-	0.51	
457	2149	1093	1133	-	-	0.53	
523	308	130	-6	-	-	0.42	
526	846	210	123	-	-	0.25	
529	348	185	212	-	-	0.61	
535	205	125	184	-	-	0.90	
546	855	310	361	-	-	0.42	
554	345	113	76	-	-	0.33	
557	265	171	234	-	-	0.88	
560	395	199	295	-	-	0.75	
563	425	193	209	-	-	0.49	
566	542	264	323	-	-	0.60	
569	627	327	396	-	-	0.63	
572	643	249	258	-	-	0.40	
575	437	273	414	-	-	0.95	
578	614	370	454	-	-	0.74	
581	745	159	220	-	-	0.29	
584	742	246	237	-	-	0.33	
589	434	55	77	-	-	0.18	
590	300	-79	33	-	-	0.11	
593	367	278	285	-	-	0.78	
596	399	219	288	-	-	0.72	
599	224	178	214	-	-	0.95	
602	305	40	42	-	-	0.14	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

< 기초 안전성 검토 결과 (5) >

Node No.	기대지지력 qe [kN]	PX성능점 반력 [kN]	PY성능점 반력 [kN]	압축 보강량 검토 [kN]	인발 보강량 검토 [kN]	압축 Ratio [DCR]	판정
605	247	-100	-100	-	-	0.00	
608	436	63	-29	-	-	0.14	
611	632	64	164	-	-	0.26	
1029	571	-17	-66	-	-	0.00	
1030	2257	921	947	-	-	0.42	
1745	227	144	209	-	-	0.92	
1749	180	76	90	-	-	0.50	
1754	538	328	472	-	-	0.88	
1756	539	189	199	-	-	0.37	
1760	723	155	165	-	-	0.23	
1762	809	383	505	-	-	0.62	
1764	1024	246	298	-	-	0.29	
1766	809	506	576	-	-	0.71	
1768	256	93	126	-	-	0.49	
1769	568	112	107	-	-	0.20	
1770	730	230	273	-	-	0.37	
1772	1208	206	117	-	-	0.17	
1778	2489	649	449	-	-	0.26	
1779	3018	920	870	-	-	0.30	
1781	2234	697	700	-	-	0.31	
1782	365	180	314	-	-	0.86	
1784	330	142	230	-	-	0.70	
1787	185	28	35	-	-	0.19	
1790	409	238	266	-	-	0.65	
1796	959	421	467	-	-	0.49	
1799	323	201	321	-	-	0.99	
1803	2293	1224	1005	-	-	0.53	

※ 기대지지력 = 3.0 × 1.0 × (1.0DL+0.25LL)
※ 소요압축 및 인발력 = 2400년 재현주기 지진력 성능점에서의 반력
※ 기초의 자중 및 상부 토피의 무게를 인발 저항력을 100kN으로 고려하였음.
※ Point Spring 모델을 적용하여 인발저항력을 100kN으로 설정하고 추가 발생하는 인발력은 상부 구조물의 모멘트 재분배 효과를 고려하여 기초 안전성 검토를 수행하였음. (상부 구조물 목표 내진성능 만족)
※ 기초 보강 불필요

제6장 종합결론

6. 종합결론

6.1 구조안전성 검토결과

현장조사 결과를 토대로 구조 안전성을 검토한 결과, 수직하중(고정하중, 활하중)을 고려한 주요 구조부재(보, 기둥, 벽체)는 모두 소요하중에 대하여 구조적 안전성을 확보하고 있는 것으로 나타났다.

6.2 기존 구조물 내진성능평가 결과

대상 건축물에 대해 「기존 시설물(건축물) 내진성능 평가요령(국토안전관리원, 2021)」에 따라 내진성능 예비평가 및 상세평가를 수행하였다. 목표성능은 내진Ⅰ등급에 따른 1400년 재현주기 지진력 인명안전 수준, 2400년 재현주기 지진력 붕괴방지 수준을 적용했으며 이에 대한 검토결과는 다음과 같다.

< 내진성능 예비평가 결과 >

구분		1400 년 재현주기 지진력		2400 년 재현주기 지진력	
		X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표	인명안전		붕괴방지	
	성능수준	검토불가	검토불가	검토불가	검토불가
	검토결과	검토불가		검토불가	
		검토불가		검토불가	
증측부	성능목표	인명안전		붕괴방지	
	성능수준	붕괴방지	붕괴방지	붕괴	붕괴
	검토결과	붕괴방지		붕괴	
		목표성능 불만족		목표성능 불만족	

※ 기존부의 경우 일부 철골조로 이루어져 있어 예비평가 대상에 포함되지 않음.(기존 시설물(건축물) 내진성능 평가요령에서 내진성능 예비평가의 범위는 철골조가 포함되어있지 않음.)

예비평가는 수직부재의 재료강도와 단면치수로부터 개략적인 횡하중 저항능력을 산정하고 이를 지진하중에 의해 건물에 작용하는 밑면전단력과 비교하여 강도측면에서 내진성능을 안전측으로 평가하기에 보수적인 결과의 산정될 수 있다.

따라서, 예비평가는 상세평가의 비교 검증 및 참고용으로 의미가 있으며 본 용역에선 정밀해석인 내진성능 상세평가를 통해 대상 구조물의 내진성능 수준을 판정한다.

< 기존구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	붕괴	붕괴	붕괴	붕괴
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	보강 후 만족			
	검토결과		붕괴		붕괴	
			성능목표 불만족		성능목표 불만족	
증측부	성능목표		인명안전		붕괴방지	
	보유성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	거주가능	거주가능	거주가능	거주가능
		층간변위비	거주가능	거주가능	거주가능	거주가능
		기초 검토	만족			
	검토결과		거주가능		거주가능	
			성능목표 만족		성능목표 만족	

< 기존구조물 내진성능 상세평가 결과 – 선형동적절차(m계수 1.33배) >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
증측부	성능목표		인명안전		붕괴방지	
	보유성능	연직하중 저항능력	거주 가능	거주 가능	거주 가능	거주 가능
		층간변위비	거주 가능	인명 안전	인명 안전	인명 안전
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

기존 구조물 내진성능평가 결과,

기존부는 조적 허리벽으로 인한 기둥 단주효과로 기둥의 전단파괴가 발생하였고, 또한 연직하중 저항능력에 대해서 목표성능에 따른 허용기준을 불만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 불만족하는 것으로 나타나 내진보강이 필요한 것으로 판단된다.

증측부는 고차모드 영향성검토에서 고차모드가 지배적인 구조물로 나타나 비선형정적절차 (Pushover), 선형동적절차 (m계수 1.33배)를 함께 수행하여 불리한 결과값으로 내진성능을 판정하였으며, 두 가지 절차 모두 연직하중 저항능력, 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 별도의 내진보강은 필요하지 않은 것으로 판단된다.

6.3 보강 구조물 내진성능평가 결과

< 보강구조물 내진성능 상세평가 결과 – 비선형정적절차 >

구분			1400 년 재현주기 지진력		2400 년 재현주기 지진력	
			X 방향	Y 방향	X 방향	Y 방향
기존부	성능목표		인명안전		붕괴방지	
	보유 성능	성능점 형성여부	형성	형성	형성	형성
		연직하중 저항능력	인명안전	거주가능	인명안전	거주가능
		층간변위비	인명안전	거주가능	인명안전	거주가능
		기초 검토	만족			
	검토결과		인명안전		인명안전	
			성능목표 만족		성능목표 만족	

보강 구조물 내진성능평가 결과,

기존부는 X,Y방향 모두 연직하중 저항능력 및 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 보강 후 구조물에 대해서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 적절한 내진보강이 이루어진 것으로 판단된다.

6.4 조적멱체 면외 안전성 검토

구조물의 비구조 요소인 조적벽체에 대하여 전도 여부를 검토한 결과, 모든 조적허리벽 및 조적채움벽은 설계지진력에 대하여 면외전도에 대한 안정성을 확보한 것으로 나타났다.

6.5 기초 안전성 검토

기초 안전성 검토 결과, 별도의 기초보강은 필요하지 않은 것으로 나타났다.

6.6 결론

본 용역은 성능기반 평가법에 따라 내진보강 여부를 확인하고 필요한 경우 해당 시설물에 적합한 내진보강공법을 선정하여 내진보강설계를 수행하는데 그 목적이 있다.

기존 구조물 내진성능평가 결과, 기존부의 경우 목표성능을 만족하지 못하는 것으로 검토되어 '허리벽 양단 컷팅' 보강안을 제시하였다. 보강 구조물에 대한 내진성능평가 결과 설계기준 및 지침에서 제시하는 목표성능을 만족하는 것으로 나타나 적절한 내진보강설계가 이루어 진 것으로 판단된다. 증측부는 고차모드 영향성검토에서 고차모드가 지배적인 구조물로 나타나 비선형정적절차 (Pushover), 선형동적절차 (m계수 1.33배)를 함께 수행하여 불리한 결과값으로 내진성능을 판정하였으며, 두 가지 절차 모두 연직하중 저항능력, 층간변위비에 대해서 목표성능에 따른 허용기준을 만족하는 것으로 나타났다. 따라서 '건축물 내진설계기준 (KDS 41 17 00)'에서 제시하는 목표성능을 만족하는 것으로 나타나 별도의 내진보강은 필요하지 않은 것으로 판단된다.

다만, 본 보고서는 2023년 6월 용역을 수행한 구조물에 대한 검토결과이며, 추후 리모델링 혹은 증축이 이루어질 경우 현 구조물의 상태(구조부재, 하중 등)가 바뀌게 되므로 본 보고서 결과는 유효하지 않다. 따라서 리모델링 혹은 증축이 이루어질 경우 정밀안전진단 및 구조 안전성 검토를 재수행하여야 한다.

부 록

A. 과업지시서

B. 체크리스트

C. 구조안전성 검토자료

D. 내진성능평가 결과자료

E. 내진보강 위치도

F. 내진보강 상세도

G. 콘크리트 코어채취 시험성적서

H. 지반조사보고서

A. 과업지시서

내진보강 구조설계 과업지시서

[학생교육원(대천임해) 별관동]

2023. 3.

서울특별시교육청 교육시설관리본부

내 진 보 강 설 계 용 역 과 업 지 시 서

제 1 장 일반사항

1.1 용역명

학생교육원(대천임해) 별관동 내진보강 구조설계용역

1.2 용역목적

본 과업은「학교시설 내진설계기준」(이하 “기준”이라 한다.) 및 「학교시설 내진성능 평가 및 보강 매뉴얼」(이하 “매뉴얼”이라 한다.)에 따라 선형구조해석법에 의한 내진성능평가를 통해 내진보강이 필요하다고 판단된 기관에 대하여「기존 공공시설물(건축물) 내진보강 업무처리 가이드라인(행안부)」및 「기존 시설물(건축물) 내진성능 평가용역(국토부)」기준에 맞춰 내진보강 필요 여부를 확인하고, 필요한 경우 해당 기관에 적합한 내진보강공법으로 내진보강설계(최적화)를 수행하는 데 그 목적이 있다.

1.3 용역내용

1.3.1 대상 시설

기관명	건물명	건축년도	구조	층수	연면적(㎡)	비고
학생교육원 (대천임해)	별관동	1996	철근콘크리트조	1/4	5,992.61	최적화

1.3.2 과업내용

(1) 기초자료 수집 및 분석

① 내진성능평가 보고서 분석 및 관련 법규, 기준 및 매뉴얼 등의 분석

② 대상 시설의 현황조사를 위한 추가 현장조사(필요시)

(2) 성능기반평가법에 의한 내진성능평가

① 대상 시설의 동적 특성에 적절한 내진성능평가법 결정

② 기준 및 매뉴얼에 충실한 성능기반 내진성능평가 수행

③ 내진성능목표 만족 여부의 정확한 판단(내진성능목표 만족 시 사업종료)

(3)내진보강설계

① 내진성능 향상을 위한 일반공법 또는 특수,신기술·특허공법을 적용한 보강설계

② 개략의 공사기간 및 공사비 산출(사용자 협의를 위한 자료)

③ 공법선정을 위한 기초자료 작성, 공법선정위원회 참여 등 특수, 신기술·특허 공법 선정을 위한 지원(필요시)

(4)기본설계

① (3)에 따라 결정된 보강공법을 적용한 기본설계 실시

② 실시설계를 위한 기본설계도서(구조설계도서) 작성

(5)실시설계

① 기본설계를 바탕으로 실시설계 실시

② 실시설계도면, 설계내역서, 시방서 등 보강공사 시 필요한 설계도서 작성

③ 보강공사 발주를 위한 발주서 작성

④ 인·허가 협의 및 협의서류 작성(필요시)

(6)제3자검토

① 책임구조기술자는 (1)~(4)의 과업 전반에 걸친 제3자 검토를 받아야 함

(7)기술감리

① 설계자의 의도에 따라 내진보강공사가 적절히 수행되었는지를 책임구조기술자의 감리를 통해 확인(현장기술자문)

② 책임감리자는 본 용역의 책임구조기술자이고, 특수공법을 적용한 경우에는 책임구조기술자가 직접 기술감리를 수행

1.4 용역금액 및 기간

- 본 용역의 기간은 착수일로부터 90일간으로 한다.

1.5 용어

(1) 발주자 : 내진보강 구조설계를 위탁하는 교육시설관리본부

(2) 계약상대자 : 내진보강설계용역의 수행자

제 2 장 적용기준 및 수행지침

2.1 적용기준

본 내진보강설계 용역은 기본적으로 동 과업지시서와 기준 및 매뉴얼을 따르며 그 밖의 사항은 아래 관련기준 등을 참고한다. 모든 관련 기준 등은 최신의 기준을 적용한다.

(1) 지진재해대책법, 지진재해대책법시행령
(2) 학교시설 내진설계 기준
(3) 학교시설 내진성능평가 및 보강 매뉴얼
(4) 건축법(시행령), 건축물의 구조기준 등에 관한 규칙
(5) 건축법 건축구조기준(KDS 41)
(6) 시설물의 안전 및 유지관리에 관한 특별법
(7) 시설물의 안전점검 및 정밀안전진단 실시 등에 관한 지침
(8) 콘크리트구조 설계(KDS 14 20)
(9) 콘크리트 표준시방서(KSC 14)
(10) 건설기술진흥법 품질시험 규정

2.2 일반사항

2.2.1 착수신고서 및 기타 제출서류

(1) 계약 상대자는 착수신고서 제출 시 다음 제반 서류를 계약일로부터 7일 이내에 제출하여야 한다.
  ① 착수신고서
    - 사업 책임기술자 선임계(이력서, 기술자 면허수첩 사본 첨부)
    - 각 분야별 용역비 산출내역서
    - 과업수행계획서
      · 관련분야별 업무범위와 책임한계
      · 분야별 책임기술자 및 참여기술자 조직표
      · 각 분야별 인력투입계획
      · 예정 공정표
      · 기타 본 과업에 필요하다고 판단되는 사항
  ② 보안각서
(2) 계약 상대자는 필요시 다음 제반 서류를 제출하여 승인을 득하여야 한다.
  ① 용역 기성부분 검사원
  ② 납품 기한 연기원
  ③ 납품 검사원
  ④ 하도급 통지 등 기타 용역 수행에 필요한 사항

2.2.2 업무협의 및 공정보고

(1) 계약상대자는 착수신고서 제출 후 발주자와 협의하여 정기 또는 수시 업무협의회(완료일 기준 전주 1회 이상)를 실시하고, 업무협의 실시내용은 보고서에 기록한다.

(2) 계약상대자는 주 1회 과업수행계획서의 예정 공정표를 기준으로 공정보고서를 작성하여 발주자에 보고한다.

2.2.3 과업의 변경 등

본 과업수행 중 발주자의 사업계획 변경 등에 따라 변경사항이 발생될 경우에는 본 과업의 일부 또는 전부를 중지하고, 발주자의 요구에 의하여 정산처리하거나 과업의 범위를 조정·변경할 수 있다.

2.2.4 기타사항

과업수행은 아래사항을 숙지하고 예정공정표에 따라 성실히 수행하되, 발주자에 제출한 과업수행계획서에 따른다.

(1) **본 과업수행 세부계획수립을 위해 필요한 경우 사전 답사를 실시한다.**

(2) 계약상대자는 본 과업지시내용을 숙지하여 전반적인 과업 업무를 성실히 수행한다.

(3) 계약상대자는 본 과업지시서 및 관계법령, 규칙 및 지침에 따라 제반사항을 성실하게 이행하고 수행한 본 과업의 성과에 대한 모든 책임을 진다.

(4) 본 과업의 부분성과 및 최종성과가 그 내용상 미비, 기술상 과오, 부실설계 등 결격사유가 발견된 경우에는 용역완료 전·후를 막론하고 발주자 지시에 따라 지체 없이 계약 상대자의 비용부담으로 보완조치하여야 한다.

(5) 발주자가 인정하는 특별한 사유가 없는 한 공정 지연으로 인하여 발생되는 손해책임은 계약 상대자에게 있다.

(6) 기타 필요한 사항은 발주자와 협의하여 처리한다.

2.3 특기사항

(1) **현장조사를 통해 해당 학교 여건에 맞는 보강안과 보강위치 선정을 위해 노력하고, 건축설계자(별도)와 위치검토 및 협의 등 협력하여야 한다.**

※ 종로도서관 건축설계는 2023.2. 계약 예정으로 용역기간 연장 필요할 수도 있음

(2) 추후 인·허가 및 대상 시설의 내진보강공사 등을 위한 발주자의 자료 요구 및 협의에 협조하여야 한다.

2.4 일반 수행 지침

2.4.1 적용 요령

(1) 과업수행은 본 과업지시서에 의하되 세부적인 사항은 계약 상대자가 보다 합리적인 방안으로 연구 발전시킨다.

(2) 본 과업지시서에서 제시된 사항은 계약 상대자가 임의로 해석할 수 없으며, 내용이 불분명하거나 명시되지 아니한 사항에 대하여는 발주자와 협의하여 정한다.

(3) 본 과업지시서에 대한 대안은 제시될 수 있으며 이에 따른 객관성 있는 자료를 제출, 발주자의 승인을 얻은 후 채택될 수 있다.

(4) 발주자 및 관계 부서와 긴밀한 협조 체제를 유지하고 분야별 전문가의 참여를 유도, 보다 광범위한 의견을 집약시킨다.

(5) 각종 계산 기준은 외국 기준을 적용할 수 있으나, 발주자와 협의하여야 한다.

2.4.2 발주자와 계약 상대자의 책임 및 업무

(1) 용역 목표와 추진 절차

① 계약 상대자는 전문적 기술 능력과 경험을 가지고 주어진 과업내용을 파악하여 최상의 진단이 되도록 해야 하고, 단계별 성과품을 작성하여 그에 대해 총체적 책임을 진다.

② 계약 상대자는 합리적으로 용역을 추진하기 위해 용역 착수 시 발주자가 요구하는 모든 조건과 기준을 충분히 검토하여야 한다.

③ 계약 상대자는 발주자 승인 없이 과업의 범위에 어떤 변경도 행할 수 없다.

④ 용역의 시행 과정에서 변경 요인이 발생했을 경우 계약 상대자는 발주자에 보고할 책임이 있으며, 관계법규 및 계약서 검토, 발주자와 협의 등을 통하여 그에 대한 적절한 해결책을 모색하여야 한다.

⑤ 계약 상대자는 동 용역과 관련하여 필요한 자료를 이용할 수 있으며, 계약 조건 또는 제공된 자료의 문제점이나 상이점에 대하여 즉시 발주자에 알려야 한다.

⑥ 계약 상대자는 계약의 범위 내에서 용역을 수행하는 동안 건축물의 실제 상황을 반영하여야 하며, 보고서에 실제 조건을 정확하게 표시 반영하여야 한다.

⑦ 용역 수행 중 계약 당사자간에 발생하는 분쟁은 협의에 의하여 해결한다. 만일 협의가 원만히 이행되지 아니할 때에는 관계법령이 정하는 바에 따라 조정위원회 등의 조정, 중재 또는 법원의 판결을 따르되 분쟁기간 중이라 할지라도 계약상대자는 본 용역의 수행을 중지하여서는 안 된다.

(2) 일정계획 및 보고

① 계약 상대자는 착수신고서 제출 시 용역 수행에 관한 세부공정 계획서 및 진단 참여자 조직표·비상연락망 등을 제출하여 감독관과 협의하여야 하며, 공정은 모든 일정이 서술되어야 한다.

② 계약 상대자는 본 과업 착수 후 수행일정 및 계획에 따라 일정보고서를 작성 제출하여야 하며, 공정보고는 협의에 따라 정기적으로 발주자에 제출한다. 만약 일정이 지연되면 그 사유를 명시하고 적절한 만회대책을 수립하여야 한다.

(3) 보안

① 업무 내용의 비공개 : 계약 상대자는 발주자와 업무 수행 중 알게 된 내용과 각 단계별 성과품, 기타 자료에 대하여 발주자의 승인 없이 공개해서는 안 된다.

② 검토 및 협의 창구 단일화 : 계약 상대자와 발주자의 관계에서 성과품, 보고서 등에 대한 검토 및 협의 창구는 단일화하여 보안 유지가 용이하도록 하여야 한다.

(4) 과업변경(발주자 승인에 의한 업무내용 변경 시 계약변경)

① 발주자는 용역 계약의 관리에 책임이 있고, 계약 상대자는 발주자의 승인이 없는 한 계약서를 위반할 수 없다.

② 업무 내용 변경은 발주자와 계약 상대자가 문서화를 통하여 상호 승인을 하여야 하고, 이는 계약 변경의 근거 서류가 된다.

③ 계약서 및 본 과업지시서에 명기되지 아니한 사항은 발주자와 계약 상대자가 상호 협의하여 결정하기로 한다.

④ 기타 계약내용의 변경으로 인한 계약금액의 조정은「지방자치단체 입찰 및 계약 집행기준 제14장 용역계약일반조건」 규정에 따른다.

⑤ 천재지변 등 불가피한 사항이 발생하여 과업의 정상적인 수행이 불가능한 경우에는 도급금액의 범위 내에서 용역의 내용 또는 기간을 쌍방 합의하여 변경할 수 있다.

⑥ 과업물량의 증감이 필요한 경우에는 예산의 범위 내에서 설계변경 할 수 있다.

⑦ 본 과업 수행 중 정책의 변경이나 발주자의 기본 방침이 변경, 과업 내용 중 일부 또는 전부의 변경이 필요할 때에는 발주자의 방침과 결정에 따라야 한다.

⑧ 과업의 항목 및 주요내용이 누락, 변경 또는 불분명한 경우, 발주자와 계약상대자 상호 간의 협의를 원칙으로 하되, 상호 이견이 있을 때에는 과업의 목적이 부합되는 범위 내에서 발주자의 요구 및 해석에 따라 수행한다.

⑨ 계약 상대자는 본 과업지시서에 명시되지 않은 사항이라도 과업수행에 필요하다고 판단되어 발주자에 요청할 경우에는 이를 성실하게 이행하여야 한다.

⑩ 본 과업의 부분성과 및 최종성과가 그 내용상 미비, 과오 등의 결격사항이 발견된 경우에는 용역완료 전·후를 막론하고 발주자 지시에 따라 지체없이 수급인의 비용부담으로 보완조치 하여야 한다.

⑪ 본 과업의 발주자는 과업수행을 위하여 공공기관과 협의가 필요한 경우, 이를 적극 지원 조치한다.

2.5 설계 기술 지침

2.5.1 일반

(1) 본 과업지시서에 명시된 사항은 계약 상대자 임의로 해석할 수 없으며, 지침의 내용이 불분명하거나 누락 및 오기된 경우 발주자와 협의하여 처리하되, 의견이 불일치 될 경우 과업지시서와 관련규정상 그 규제내용이 강화된 것을 따른다.

(2) 본 설계 기술 지침은 최소한도의 기준을 명시한 것으로 설치 및 시공된 후에 동등 이상의 성능을 확보할 수 있는 것이어야 한다.

(3) 주요자재 및 품질관리 지침은 다음과 같다.

① 본 설계에 사용되는 모든 자재는 품질수준을 나타내는 규격 등을 설계도면에 명기해야 한다.

② 외국산을 사용하는 경우에는 사전에 발주자의 승인을 득하여야 하며, 자재 품질은 관련자재의 KS에서 정하는 품질 기준 이상의 것으로서 사후관리의 편리와 보수, 교체가 용이한 것으로 하여야 한다.

③ 인체에 석면 등 유해한 물질이 함유된 자재를 사용하여서는 안 된다.

(4) 본 내진보강설계는 다음의 성능 이상이 확보되어야 한다.

① 모든 시설은 법령 및 정부 등에서 정한 설계기준을 만족하여야 하며, 구조체 및 그에 부착되는 부착물은 필요한 방진, 내진, 내풍, 내설, 내충격 성능을 가져야 한다.

② 부식성 자재는 사용하지 않는 것을 원칙으로 하되 부득이 사용해야 할 경우 방청처리를 통해 최대한 부식되지 않도록 하여야 한다.

③ 자재 등은 부위별, 용도별로 일반적인 기준으로서 가장 내구성이 높은 등급의 것을 사용하여야 한다.

④ 향후 설비시설의 원활한 교체를 위한 설계가 되도록 한다.

2.5.3 구조설계 지침

2.5.3.1 기본사항

(1) 구조설계는 합리적인 구조계획과 구조계산에 의하여 어떠한 경우에도 구조물이 안전하여야 하며, 사용상이나 미관상 지장을 초래하는 처짐, 진동 등이 발생하지 않도록 하여야 한다.

(2) 구조물의 균열발생을 최소화할 수 있도록 계획하여야 한다.

(3) 구조형식 및 단면의 크기 등은 시공성을 고려하여 정하여야 한다.

(4) 구조의 안전성능은 본 과업지시서 2.1절의 적용기준 및 기타 법령 및 정부 등에서 정한 설계기준을 만족하여야 한다.

(5) 설계자는 동 설계가 건축법상 대수선에 해당될 경우 대수선 승인 관련 서류를 제출하여야 한다.

(6) 구조계산서는 그 내용 구성과 선후 관계가 분명하게 작성하여 이해하기 쉽게 한다.

2.5.3.2 구조계획

(1) 모든 구조부재의 배치는 합리적이어야 한다.

(2) 구조부재 배치 및 구조형식은 어떠한 경우라도 일반적인 구조해석을 통하여 그 내력을 확인할 수 있는 것이어야 한다.

(3) 가급적 2차 응력이 발생하지 않는 구조로 한다.

(4) 처짐 등의 변형 및 진동을 최소화시킬 수 있는 구조로 한다.

(5) 비정형구조물의 경우 응력 집중현상 등을 피할 수 있는 구조방식을 채택 또는 이를 보완하는 방법을 제시해야 한다.

2.5.3.3 구조설계

(1) 모든 부재의 설계에 적용된 해당기준을 명시한다.

(2) 참고기준은 구조설계 시 특별히 참고하여 적용할 경우 기준 및 지침을 명시한다.

(3) 설계기준 적용에 있어서 같은 계열의 참고규준을 포함한 단일기준을 일관성 있게 적용하도록 한다.

2.5.3.4 구조해석

(1) 구조해석용 프로그램은 보편적으로 공인된 것을 사용하고, 그렇지 않은 프로그램을 사용하는 경우에는 해석내용이 보편적인 프로그램과 비교하여 차이가 없음을 증명하는 자료를 첨부한다. 단, 그 자료는 공인된 기관에서 인증을 받은 것이어야 한다.

(2) 구조해석용 프로그램의 입력 자료는 구조해석 모델의 약도와 같이 제시하여야 하고, 출력 자료는 부재별, 층별로 선후 관계를 명확히 파악할 수 있도록 정리한다.

2.5.3.5 시방서 작성

(1) 구조설계의 시방서는 실제공사에 요구되는 시방을 구체적으로 작성하여야 한다.

(2) 특수공법을 적용한 경우에는 기준 8.9에 따라 시공매뉴얼을 제출하여야 한다.

2.5.4 철거공법 지침

이 절은 내진보강공사를 위하여 구조체 등의 철거 시에 적용한다. 다만, 이장에 표기되지 않은 사항은 「건설기술진흥법」의 ‘건축공사표준시방서’에 따른다.

2.5.4.1 철거공법의 선정

철거작업은 다음 조건을 고려하여 적절한 공법으로 선정한다.

(1) 대상 구조물의 구조규모, 주변 입지조건, 공법의 특성

(2) 철거작업 시 구조체의 안전도

(3) 소음, 진동, 분진 등 주변 환경보전과 건설공해 예방

2.5.4.2 철거작업계획 설계 반영사항

철거작업계획 설계는 다음 사항에 유의하여 안전하고 경제적인 공사시행이 되도록 설계도서에 표기한다.

(1) 철거 대상 부위와 주변 입지조건 등을 사전 조사하여 공법의 선정, 작업의 안전

확보, 주변공해방지 등 공사계획 수립한다.

(2) 철거에 앞서 사전 조사하여 관련 제반법규에 따라 작업의 안전 확보, 주변공해 방지 등 건설재해를 예방한다.

(3) 사전조사 결과에 따라 각종 인허가 신청 및 승인절차를 확인

(4) 철거작업에 앞서 구체적인 시행방법을 명시한 공사계획서를 작성

(5) 구조체 철거 시에는 철거공사 중의 구조안전이 검토되어야 하며, 철거 시 구조안전을 위하여 임시 또는 영구보강이 필요한 경우에는 구조 설계도면 및 시방서를 작성하고 이에 따라 공사를 시행하여야 한다.

(6) 철거작업은 기존 건물의 손상을 최소화하고 안전시공이 되도록 관련 지침을 명기하여야 한다.

(7) 보수가 필요한 콘크리트 열화 부위는 건전 부위 직전까지 철거하는 것으로 한다. 단, 구조적 결함을 발생시키지 않도록 소형충격 및 진동공법으로 철거토록 하여야 하며, 필요시 가설 지지대를 설치하여 구조 안전성을 유지토록 설계한다.

제 3 장 과업세부내용

3.1 구조설계 과업세부내용

3.1.1 기초자료 수집 및 분석

경제적이고 효과적인 내진보강설계를 수행하기 위하여 기 실시된 내진성능평가 보고서 등을 면밀히 검토하여야 하며, 관련 법규, 기준 및 지침서 등을 분석하여 설계에 반영하여야 한다.

책임기술자가 필요하다고 판단하는 경우 대상 시설의 제반 현황조사를 위하여 발주자와의 협의 하에 추가로 현장조사 등을 실시할 수 있다.

3.1.2 성능기반평가법에 의한 내진성능평가

내진보강설계를 위하여 성능기반평가법에 의한 보다 정밀한 내진성능평가를 실시한다. 성능기반평가법의 세부사항은 매뉴얼 제2편을 따른다.

(1) 매뉴얼에 제시된 성능기반평가법은 m계수법, 비선형정적절차법, 비선형동적절차법이 있으며 계약상대자는 대상 시설의 동적특성에 따라 적절한 방법을 선정해야 한다.

(2) 성능기반평가법을 위한 해석 모델은 선형구조해석에 의한 내진성능평가 보고서를 바탕으로 매뉴얼에서 제시하는 비선형 특성을 반영하여 구축한다.

(3) 해석 모델링 시 부재의 연성능력을 고려해야 하며 특히 구조물의 동적특성과 내진성능에 영향을 주는 조적채움벽 및 허리벽은 모델링에 반영하는 것을 원칙으로 하나 자세한 사항은 매뉴얼에 따른다.

(4) 기초는 지중보를 고려하여 기초판에 과도한 휨모멘트가 전달되지 않도록 하는 것이 바람직하나, 책임구조기술자의 판단 하에 기존 구조물의 특성을 반영하여 적절히 모델링해야 한다.

(5) 건물 전체 시스템의 내진성능뿐만 아니라 각각의 부재에 대해서도 내진성능 만족 여부를 검토해야 하며, 붕괴 수준의 부재에 대해서는 반드시 보강설계를 실시한다.

(6) 성능기반평가법에 의한 내진성능평가를 수행한 결과 내진성능이 확보된 경우에는 이를 발주자에게 보고하고 용역을 종료한다.

3.1.3 내진보강설계

성능기반평가법에 의한 내진성능평가 결과 내진성능을 만족하지 못하는 경우 일반공법 또는 특수공법을 적용한 보강설계를 실시한다.

(1) 일반공법과 특수공법의 정의는 매뉴얼 18장에 따르며, 신기술·특허공법은 관계법령 * 에따라지정된것을의미한다.

*「특허법」,「자연재해대책법」,「건설기술진흥법」,「환경기술및환경산업지원법」,「전력기술관리법」등

(2) 계약 상대자는 특수, 신기술·특허공법을 적용하여 설계하는 경우에는 아래의 사항을준수하고 본과업지시서에 명시되지않은사항은 매뉴얼을따라야한다.

① 특수, 신기술·특허공법의 적용여부는 발주자와 제3자 검토자와의 협의하여야 하고 발주자가 특수, 신기술·특허공법의 적용여부 결정을 위하여 외부전문가 또는 전문기관에 자문을 의뢰하는 경우에도 적극 협조하여야 한다.

② 공법선정의 기준을 마련할 수 있도록 매뉴얼 2.4.6.2 (3)의 각 항목에 대한 내용을 자세히 제시하여야 한다.

③ 발주자가 공법 제안서의 사전검토와 공법선정위원회로서의 참여를 요청하는 경우에는 협조하여야 한다.

④ 공법선정위원회에서 추가적인 검토나 자료를 요청하는 경우 계약상대자는 이에 성실히 응해야 한다.

⑤ 특수, 신기술·특허공법을 적용한 보강설계에 대한 최종책임은 책임구조기술자에게 있다.

(3) 발주자가 내진보강설계의 적정성 검토를 외부 전문가 또는 전문기관에 의뢰한 경우 계약 상대자는 검토를 위한 자료를 제출하고 적극 협조하여야 한다.

3.1.4 기본설계도서 작성(구조설계)

(1) 본 지시서의 3.1.3에 따라 적용공법이 결정되면 계약 상대자는 이를 바탕으로 내진보강 기본설계도서를 작성한다.

(2) 기본설계도서는 적용공법에 대한 설명 및 보강 위치 및 개소, 보강부위 및 접합부에 대한 구조계산서·도면 등을 포함하는 것으로 실시설계(건축설계)를 위한 충분한 정보를 포함하고 있어야 한다.

(3) 확정된 내진보강설계를 반영하여 공사비를 산출한다. 공사비는 건축마감재를 포함한 복구비는 제외한다.

3.1.5 구조 실시설계

(1) 건축설계 용역수행자와 협의를 통하여 최종 보강위치를 결정하고, 이를 바탕으로 구조 실시설계를 실시한다.

(2) 구조설계 분야의 실시설계도면, 수량산출서, 시방서 등 보강공사 가능하도록 설계도서를 작성한다.

(3) 구조분야의 공사비 계산을 위하여 견적가격을 적용할 필요가 있는 경우에는 단가 적용의 타당성과 적절성을 검토하여 단가대비표를 작성하여 건축설계 용역수행자에게 제공하여야 한다.

(4) 실시설계도서 작성 시에는 건축설계 용역수행자와 긴밀히 협조하여 내진보강공사에 필요한 모든 도서가 제출되도록 하여야 한다.

3.3 제3자 검토

본 용역의 보강설계(구조설계)는 성능기반설계의 일종으로 「건축법」에 따라 제3자 검토를 득해야 한다.

(1) 제3자 검토자는 내진보강 및 비선형해석 등에 대한 전문적인 지식과 경험이 많은 구조전문가에게 받아야 하며 자세한 사항은 매뉴얼 1.7에 따른다.

(2) 제3자 검토자는 발주자가 제공한 인력풀(POOL) 중 2인 이상을 계약상대가자 선정하거나, 발주자가 인력풀을 제공할 수 없을 때에는 계약상대자가 제3자 검토자를 지정할 수 있다. 이 경우에는 계약상대자는 제3자 검토자의 이력을 발주자에게 제공하고 발주자의 승인을 득해야 한다.

제 4 장 성과품 제출

4.1 성과품의 작성

(1) 모든 성과품은 인쇄 전 미리 제출하여 발주자 또는 발주자가 지정한 감독원의 지시에 따라 초안검사가 완료된 후 인쇄를 하도록 한다.

(2) 설계도서는 일반적인 운영프로그램과 완벽한 호환이 가능하도록 작성하여야 하며, 용역준공 후 전산자료를 함께 납품하여야 한다.

(3) 공종별 단가는 정부 및 공인된 관련기관에서 제정한 표준품셈에 의하여 산출하거나 견적서를 근거로 하고 노임은 설계일 기준으로 최근 적용 정부 노임단가를 적용한다.

(4) 도면 성과품에는 설계자 및 책임구조기술자의 날인이 있는 것을 제출해야 한다.

4.2 성과품의 내용(제출도서)

도 서 명	부 수	규 격	제출기일
(1) 착수신고서 · 사업 책임기술자 선임계 · 각 분야별 용역비 산출내역서 · 과업수행계획서	1부	A4	계약 후 7일 이내
(2) 보안각서	1부	A4	계약 후 7일 이내
(3) 내진보강설계(구조설계) 보고서 · 성능기반내진성능평가 보고서 · 설계 보고서 · 제3자 검토 보고서 · 체크리스트(기준 [별표 3])	3부	A4	납품 시
(4) 기술감리 계획서	3부	A4	납품 시
(5) 설계설명서	3부	A4	납품 시
(6) 실시설계도서 · 시방서(공통, 특기) · 추정가격내역서(설계내역서) - 수량산출서 - 단가산출서, 단가비교검토서(필요시) - 일위대가표 · 설계도면(A3)	3부	A4 A3(도면)	납품 시
(7) 기타 필요한 자료 및 서류 · 인허가 도서(필요 시) · 구조안전확인서(건축법에 따른 대수선의 경우) · 내진능력산출 확인서 및 산출근서(「건축물 구조기준 등에 관한 규칙」에 따른 내진능력 공개의 경우) · 성과품CD(구조해석파일 포함한 전체 성과품)	1부 2장	A4 전자파일	납품 시

B. 체크리스트

학생교육원 대천임해 별관동	시설별 추진실적 자체점검 체크리스트(내진성능평가)

■ 건축물 일반사항	
건물명: 대천임해 학생교육원 별관동(기존부)	용도: 수련시설
위치: 충청남도 보령시 해수욕장2길 19	
층수(높이): 지상 4층 (13.10m)	연면적: 5,992.61㎡
준공년도: 1996년, 경과년수 약27년	증축 여부: 有
지진력저항시스템: (X방향) RC모멘트 골조 (Y방향) 조적채움벽이 있는 RC모멘트골조	
지진구역계수: 0.176g	내진등급 (중요도계수): 내진1등급(1.2)
지반종류: S4	기초형식: 확인불가

■ 내진성능평가 내용	
내진설계 기준: 건축물 내진설계기준 (KDS 41 17 00)	내진성능평가 기준: 기존 시설물(건축물) 내진성능평가요령 (국토안전관리원, 2021.05)
성능수준 1: (목표성능) 인명보호 (지진위험도) 1400년 재현주기 지진력	
성능수준 2: (목표성능) 붕괴방지 (지진위험도) 2400년 재현주기 지진력	

■ 내진성능평가 결과

구분	사전(예비)평가		1단계 상세평가		2단계 상세평가		최종판정
	X방향	Y방향	X방향	Y방향	X방향	Y방향	
성능수준 1	검토불가	검토불가	-	-	붕괴	붕괴	붕괴
성능수준 2	검토불가	검토불가	-	-	붕괴	붕괴	붕괴
기타 의견	해당 구조물은 일부 철골구조물이 포함되어있어 예비평가가 불가능함.						

■ 필수 검토항목	예	아니오
구조도면이 보관되어 있는가? 없는 경우 실측을 통해 작성되었는가?	O	
지반조사 수행 여부 및 미수행 시, 지반종류 설정 근거가 명확히 제시되었는가?	O	
내진성능평가 보고서 및 기초자료의 전자 문서화 여부?	O	
해석모델 입력파일을 제출하였는가?	O	
보고서에 자격조건을 충족한 책임구조기술사의 날인이 포함되어 있는가?	O	
비정형성에 대한 검토가 수행되었는가?	O	
재료에 대한 공칭강도와 평균강도가 구분되어 올바로 적용되었는가?	O	
해석모델 작성 시 상세내용 및 실례가 포함되었는가? (횡하중의 수직분포, 부재의 유효강성, 비선형 재료모델, 부재 비선형 모델 등)	O	
고유치 해석결과가 제시되었는가?	O	
조적채움벽 및 허리벽이 있는 경우 해석모델에 반영하였고, 층간변위 검토시에도 조적채움벽이 있는 시스템으로 검토하였는가?	O	
기초에 대한 안전성이 검토되었는가?	O	

위 건축물에 대하여 적법한 절차에 따라 내진성능평가를 수행하였음을 확인합니다.

2023년 6월 20일

내진성능평가 수행자	내진성능평가 검증자	내진성능평가 발주자
소속: ㈜제이텍구조엔지니어링	소속: ㈜제이유안전진단연구원	소속:
기술자격: 건축구조기술사	기술자격: 건축구조기술사	담당자: (인 또는 서명)
성명: 김진영 (인 또는 서명)	성명: 임영근 (인 또는 서명)	부서책임자: (인 또는 서명)

학생교육원 대천임해 별관동	시설별 추진실적 자체점검 체크리스트(내진성능평가)

■ 건축물 일반사항	
건물명: 대천임해 학생교육원 별관동(증측부)	용도: 수련시설
위치: 충청남도 보령시 해수욕장2길 19	
층수(높이): 지상 4층 (15.50m)	연면적: 5,992.61㎡
준공년도: 2004년, 경과년수 약19년	증축 여부: 有
지진력저항시스템: (X방향) 전단지배형 RC전단벽 시스템 (Y방향) 전단지배형 RC전단벽 시스템	
지진구역계수: 0.176g	내진등급 (중요도계수): 내진1등급(1.2)
지반종류: S4	기초형식: 확인불가

■ 내진성능평가 내용	
내진설계 기준: 건축물 내진설계기준 (KDS 41 17 00)	내진성능평가 기준: 기존 시설물(건축물) 내진성능평가요령 (국토안전관리원, 2021.05)
성능수준 1: (목표성능) 인명보호 (지진위험도) 1400년 재현주기 지진력	
성능수준 2: (목표성능) 붕괴방지 (지진위험도) 2400년 재현주기 지진력	

■ 내진성능평가 결과

구분	사전(예비)평가		1단계 상세평가		2단계 상세평가		최종판정
	X방향	Y방향	X방향	Y방향	X방향	Y방향	
성능수준 1	붕괴방지	붕괴방지	-	-	거주가능	인명안전	인명안전
성능수준 2	붕괴	붕괴	-	-	인명안전	인명안전	인명안전
기타 의견	해당 구조물은 고차모드지배로 검토되어 비선형 정적해석과 선형동적절차(m계수 1.33배)를 함께 수행하여 불리한값으로 내진성능을 판정함.						

■ 필수 검토항목	예	아니오
구조도면이 보관되어 있는가? 없는 경우 실측을 통해 작성되었는가?	O	
지반조사 수행 여부 및 미수행 시, 지반종류 설정 근거가 명확히 제시되었는가?	O	
내진성능평가 보고서 및 기초자료의 전자 문서화 여부?	O	
해석모델 입력파일을 제출하였는가?	O	
보고서에 자격조건을 충족한 책임구조기술사의 날인이 포함되어 있는가?	O	
비정형성에 대한 검토가 수행되었는가?	O	
재료에 대한 공칭강도와 평균강도가 구분되어 올바로 적용되었는가?	O	
해석모델 작성 시 상세내용 및 실례가 포함되었는가? (횡하중의 수직분포, 부재의 유효강성, 비선형 재료모델, 부재 비선형 모델 등)	O	
고유치 해석결과가 제시되었는가?	O	
조적채움벽 및 허리벽이 있는 경우 해석모델에 반영하였고, 층간변위 검토시에도 조적채움벽이 있는 시스템으로 검토하였는가?	해당 없음	
기초에 대한 안전성이 검토되었는가?	O	

위 건축물에 대하여 적법한 절차에 따라 내진성능평가를 수행하였음을 확인합니다.

2023년 6월 20일

내진성능평가 수행자	내진성능평가 검증자	내진성능평가 발주자	
소속: ㈜제이텍구조엔지니어링	소속: ㈜제이유안전진단연구원	소속:	
기술자격: 건축구조기술사	기술자격: 건축구조기술사	담당자:	(인 또는 서명)
성명: 김진영 (인 또는 서명)	성명: 임영근 (인 또는 서명)	부서책임자:	(인 또는 서명)

C. 구조안전성 검토자료

C-1. 기존부

RC Beam Strength Checking Result

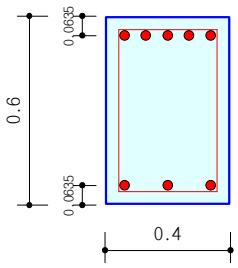
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

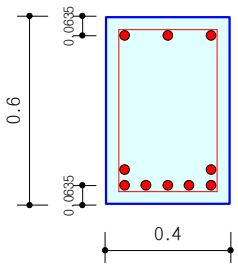
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G1 (No : 21)	Beam Span	7.6m

[END-I]



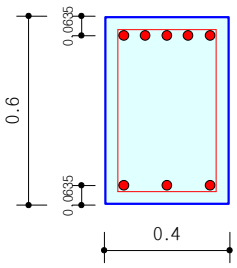
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	176.97	25.74	157.23
Factored Strength (φMn)	221.65	143.87	221.65
Check Ratio (Mu/φMn)	0.7984	0.1789	0.7094
(+) Load Combination No.	1	1	1
Moment (Mu)	69.31	148.89	98.97
Factored Strength (φMn)	139.56	296.39	139.56
Check Ratio (Mu/φMn)	0.4966	0.5024	0.7091
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	150.27	85.83	150.25
Shear Strength by Conc.(φVc)	152.86	149.27	152.86
Shear Strength by Rebar.(φVs)	91.84	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6141	0.3883	0.6140

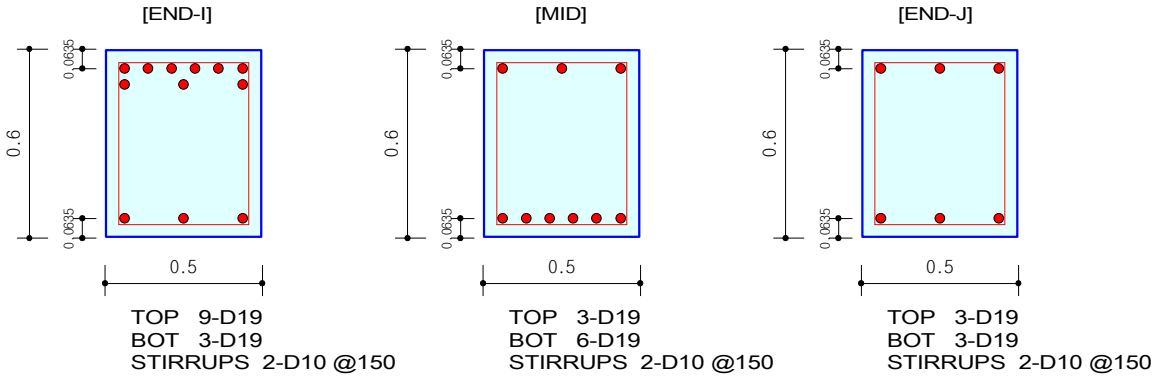
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G4 (No : 22)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	160.72	0.00	106.53
Factored Strength (φMn)	378.85	143.53	142.36
Check Ratio (Mu/φMn)	0.4242	0.0000	0.7483
(+) Load Combination No.	1	1	1
Moment (Mu)	17.14	130.07	38.93
Factored Strength (φMn)	150.93	266.66	142.36
Check Ratio (Mu/φMn)	0.1136	0.4878	0.2735
Using Rebar Top (As_top)	0.0026	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	120.05	91.20	105.48
Shear Strength by Conc.(φVc)	185.84	191.08	191.08
Shear Strength by Rebar.(φVs)	119.10	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3937	0.2909	0.3364

RC Beam Strength Checking Result

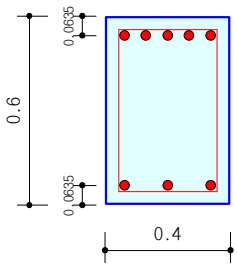
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

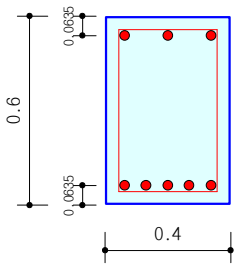
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G2 (No : 23)	Beam Span	6.8m

[END-I]



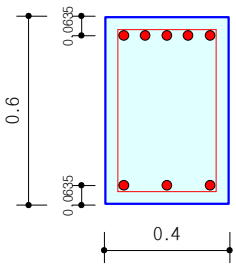
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

[MID]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @150

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	105.07	13.06	87.95
Factored Strength (φMn)	221.65	139.56	221.65
Check Ratio (Mu/φMn)	0.4740	0.0936	0.3968
(+) Load Combination No.	1	1	1
Moment (Mu)	22.04	74.47	29.83
Factored Strength (φMn)	139.56	221.65	139.56
Check Ratio (Mu/φMn)	0.1579	0.3360	0.2138
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0014	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	92.37	57.51	85.23
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	122.46	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3355	0.2089	0.3095

RC Beam Strength Checking Result

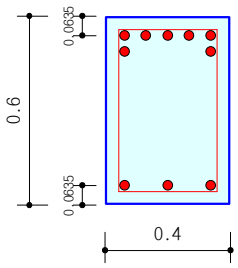
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

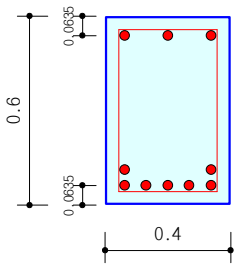
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2B1 (No : 24)	Beam Span	7.6m

[END-I]



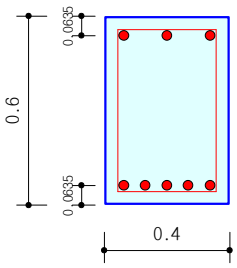
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	171.19	0.00	118.31
Factored Strength (φMn)	296.39	143.87	139.56
Check Ratio (Mu/φMn)	0.5776	0.0000	0.8478
(+) Load Combination No.	1	1	1
Moment (Mu)	100.46	170.28	101.13
Factored Strength (φMn)	143.87	296.39	221.65
Check Ratio (Mu/φMn)	0.6983	0.5745	0.4563
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	160.24	82.46	149.40
Shear Strength by Conc.(φVc)	149.27	149.27	152.86
Shear Strength by Rebar.(φVs)	89.69	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6706	0.3731	0.6105

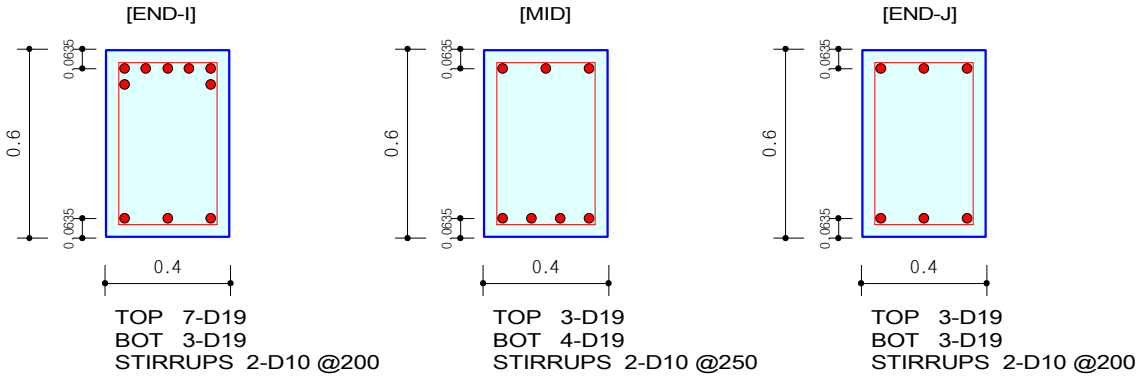
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2B2 (No : 25)	Beam Span	5m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	116.49	34.70	18.71
Factored Strength (φMn)	296.39	139.34	139.03
Check Ratio (Mu/φMn)	0.3930	0.2490	0.1346
(+) Load Combination No.	1	1	1
Moment (Mu)	0.00	35.57	26.96
Factored Strength (φMn)	143.87	180.37	139.03
Check Ratio (Mu/φMn)	0.0000	0.1972	0.1939
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	74.23	55.88	44.01
Shear Strength by Conc.(φVc)	149.27	152.86	152.86
Shear Strength by Rebar.(φVs)	89.69	73.48	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3107	0.2469	0.1798

RC Beam Strength Checking Result

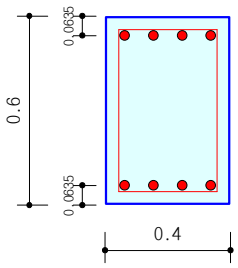
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

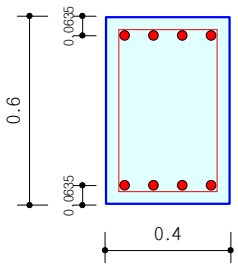
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G4A (No : 27)	Beam Span	6.8m

[END-I]



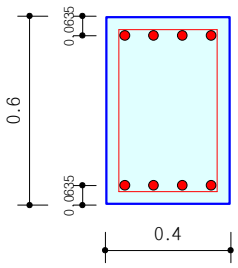
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	38.34	52.75	90.13
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.2123	0.2922	0.4992
(+) Load Combination No.	1	1	1
Moment (Mu)	1.61	1.61	0.00
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.0089	0.0089	0.0000
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	31.83	45.80	51.99
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	91.84	91.84	91.84
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.1301	0.1872	0.2125

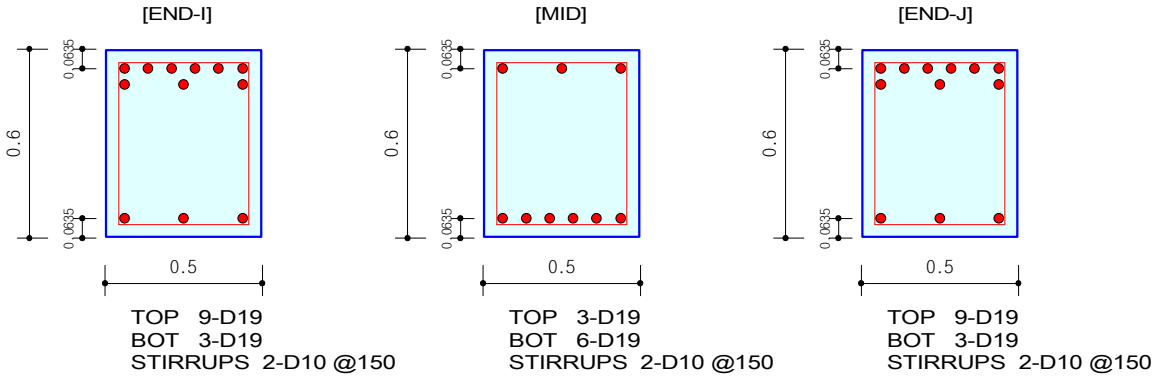
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G4-1 (No : 28)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	216.21	2.09	226.50
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.5707	0.0146	0.5979
(+) Load Combination No.	1	1	1
Moment (Mu)	39.67	213.84	36.50
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.2628	0.8019	0.2418
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	183.04	137.10	180.14
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.6003	0.4373	0.5907

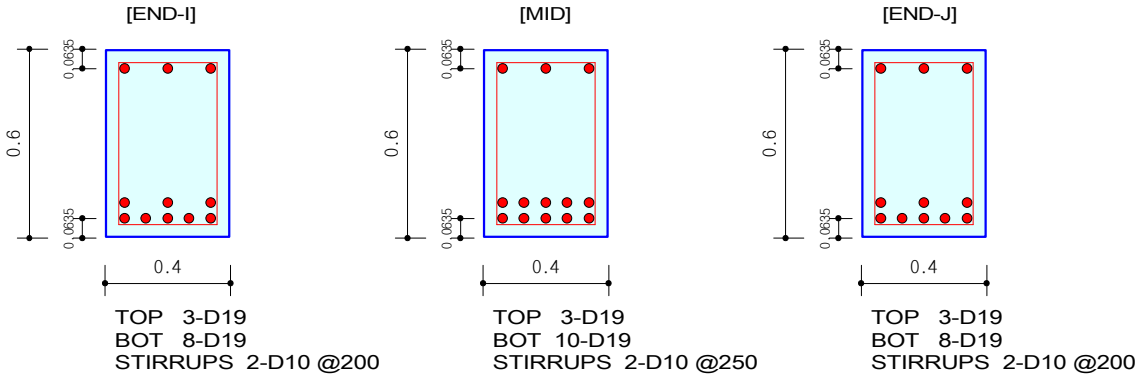
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2B3 (No : 29)	Beam Span	7.6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	122.54	0.00	105.80
Factored Strength (φMn)	145.58	148.30	145.58
Check Ratio (Mu/φMn)	0.8418	0.0000	0.7268
(+) Load Combination No.	1	1	1
Moment (Mu)	114.31	200.86	136.15
Factored Strength (φMn)	333.41	406.73	333.41
Check Ratio (Mu/φMn)	0.3428	0.4938	0.4084
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	158.56	91.62	144.63
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6480	0.4222	0.5910

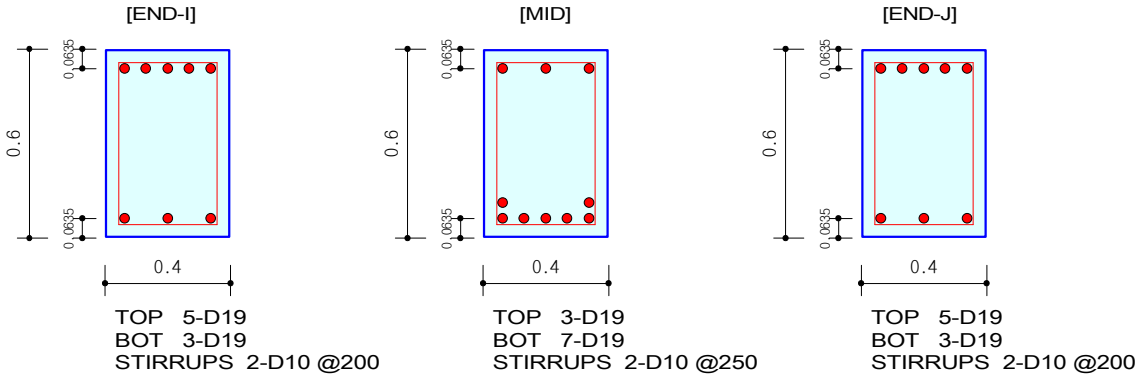
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G1 (No : 31)	Beam Span	7.6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	170.66	12.89	152.73
Factored Strength (φMn)	221.65	143.87	221.65
Check Ratio (Mu/φMn)	0.7700	0.0896	0.6891
(+) Load Combination No.	1	1	1
Moment (Mu)	104.89	146.10	83.00
Factored Strength (φMn)	139.56	296.39	139.56
Check Ratio (Mu/φMn)	0.7516	0.4929	0.5947
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	145.09	88.38	151.39
Shear Strength by Conc.(φVc)	152.86	149.27	152.86
Shear Strength by Rebar.(φVs)	91.84	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5929	0.3999	0.6187

RC Beam Strength Checking Result

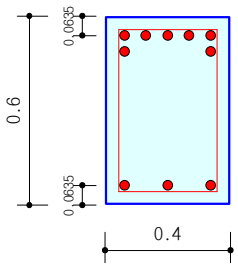
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

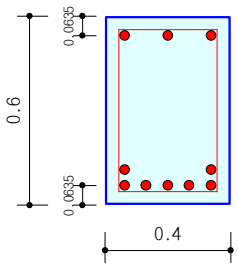
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3B1 (No : 32)	Beam Span	7.6m

[END-I]



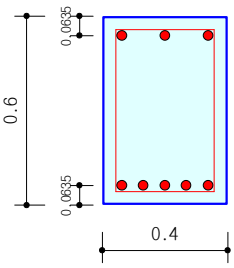
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	169.68	5.16	111.11
Factored Strength (φMn)	296.39	143.87	139.56
Check Ratio (Mu/φMn)	0.5725	0.0359	0.7961
(+) Load Combination No.	1	1	1
Moment (Mu)	89.98	168.48	101.15
Factored Strength (φMn)	143.87	296.39	221.65
Check Ratio (Mu/φMn)	0.6254	0.5684	0.4563
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	153.51	79.76	144.75
Shear Strength by Conc.(φVc)	149.27	149.27	152.86
Shear Strength by Rebar.(φVs)	89.69	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6424	0.3609	0.5915

RC Beam Strength Checking Result

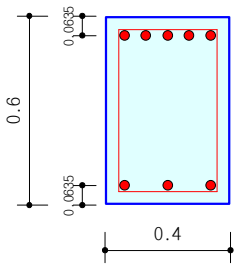
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G2 (No : 33)	Beam Span	6.8m

[END-I]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

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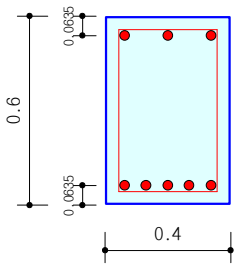
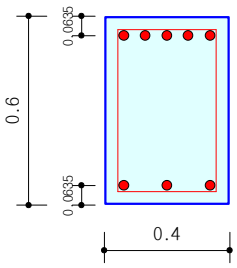


TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @150

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	86.99	2.23	86.16
Factored Strength (φMn)	221.65	139.56	221.65
Check Ratio (Mu/φMn)	0.3925	0.0159	0.3887
(+) Load Combination No.	1	1	1
Moment (Mu)	26.46	72.74	24.80
Factored Strength (φMn)	139.56	221.65	139.56
Check Ratio (Mu/φMn)	0.1896	0.3282	0.1777
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0014	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	87.71	58.89	93.19
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	122.46	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3186	0.2139	0.3385

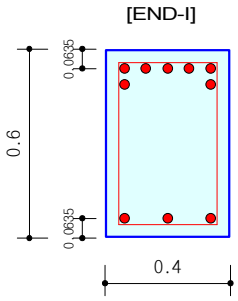
RC Beam Strength Checking Result

Certified by :

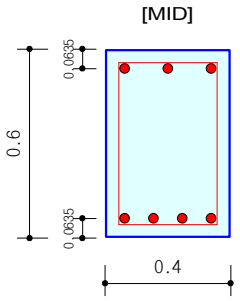
Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

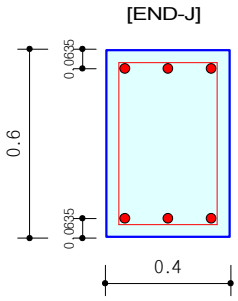
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3B2 (No : 34)	Beam Span	5m



TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	110.27	28.20	106.12
Factored Strength (φMn)	296.39	139.34	139.03
Check Ratio (Mu/φMn)	0.3720	0.2024	0.7632
(+) Load Combination No.	1	1	1
Moment (Mu)	25.57	34.39	25.25
Factored Strength (φMn)	143.87	180.37	139.03
Check Ratio (Mu/φMn)	0.1777	0.1907	0.1816
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	72.93	54.62	72.12
Shear Strength by Conc.(φVc)	149.27	152.86	152.86
Shear Strength by Rebar.(φVs)	89.69	73.48	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3052	0.2413	0.2947

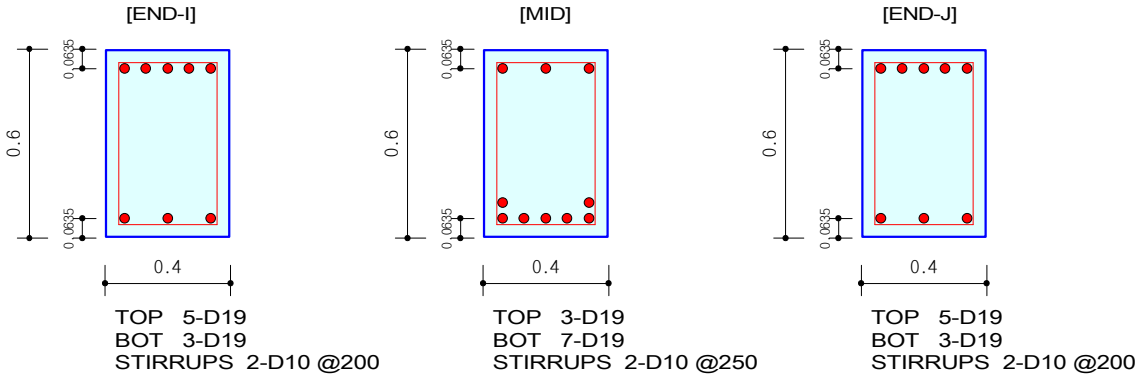
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G1A (No : 35)	Beam Span	7.6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	135.02	0.00	154.07
Factored Strength (φMn)	221.65	143.87	221.65
Check Ratio (Mu/φMn)	0.6091	0.0000	0.6951
(+) Load Combination No.	1	1	1
Moment (Mu)	83.78	131.58	53.22
Factored Strength (φMn)	139.56	296.39	139.56
Check Ratio (Mu/φMn)	0.6003	0.4439	0.3813
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	141.93	83.11	146.11
Shear Strength by Conc.(φVc)	152.86	149.27	152.86
Shear Strength by Rebar.(φVs)	91.84	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5800	0.3760	0.5971

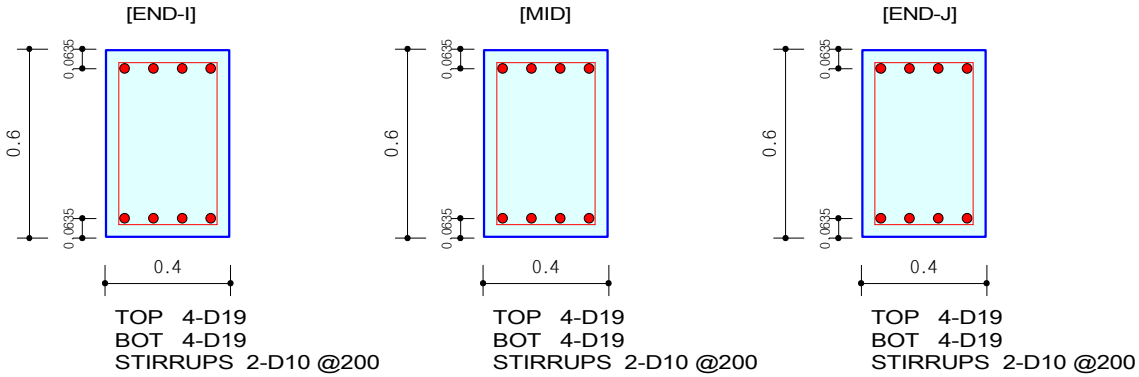
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G4A (No : 36)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	23.43	83.16	82.85
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.1298	0.4606	0.4589
(+) Load Combination No.	1	1	1
Moment (Mu)	29.43	8.70	0.00
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.1630	0.0482	0.0000
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	77.36	87.42	44.09
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	91.84	91.84	91.84
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.3161	0.3572	0.1802

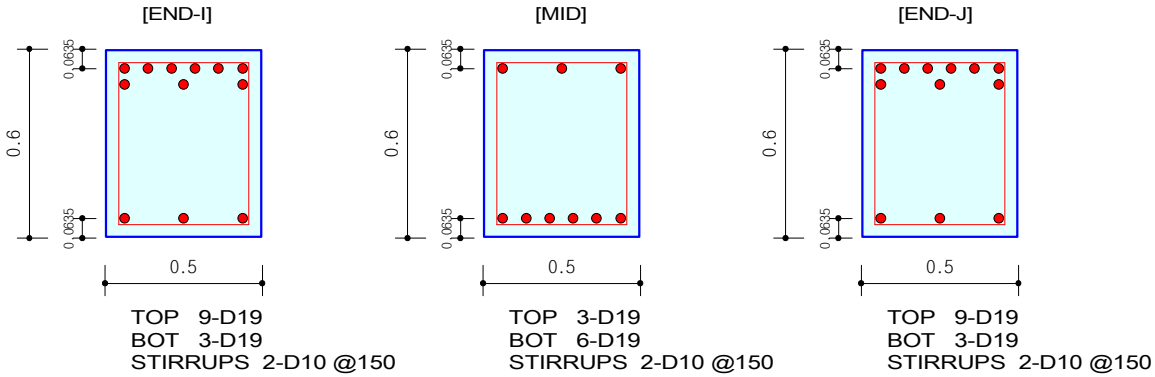
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G4 (No : 37)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	127.12	0.00	125.26
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.3355	0.0000	0.3306
(+) Load Combination No.	1	1	1
Moment (Mu)	39.06	135.36	33.72
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.2588	0.5076	0.2234
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	106.74	80.69	112.29
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3500	0.2574	0.3682

RC Beam Strength Checking Result

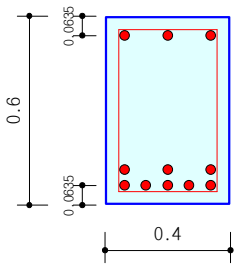
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

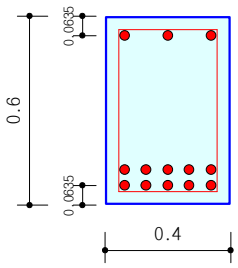
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3B3 (No : 38)	Beam Span	7.6m

[END-I]



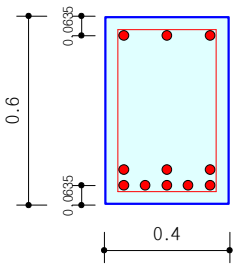
TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 10-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	111.89	0.00	107.66
Factored Strength (φMn)	145.58	148.30	145.58
Check Ratio (Mu/φMn)	0.7686	0.0000	0.7395
(+) Load Combination No.	1	1	1
Moment (Mu)	119.25	205.47	145.87
Factored Strength (φMn)	333.41	406.73	333.41
Check Ratio (Mu/φMn)	0.3577	0.5052	0.4375
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	154.69	89.70	150.66
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6322	0.4133	0.6157

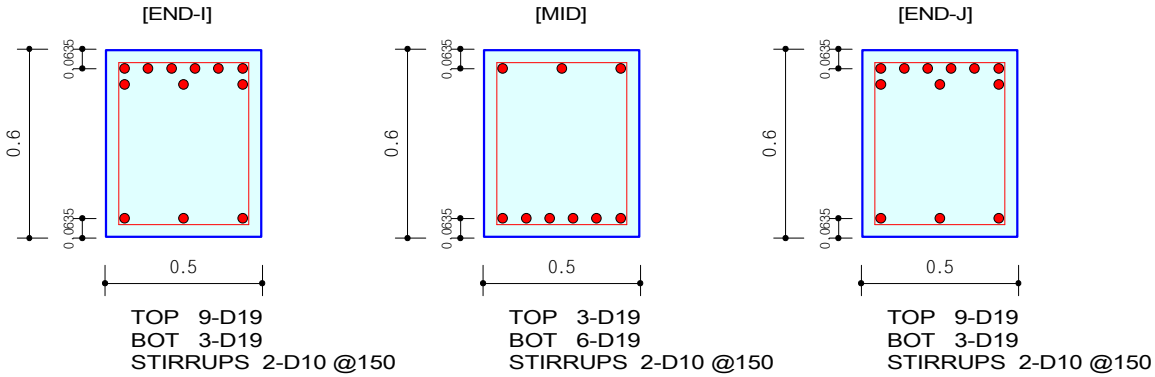
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G4-1 (No : 39)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	186.30	0.00	201.66
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.4917	0.0000	0.5323
(+) Load Combination No.	1	1	1
Moment (Mu)	22.46	178.99	31.89
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.1488	0.6712	0.2113
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	146.90	117.10	157.80
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.4817	0.3735	0.5175

RC Beam Strength Checking Result

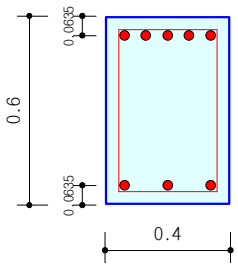
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

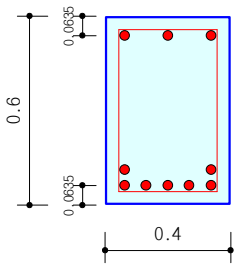
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G1 (No : 41)	Beam Span	7.6m

[END-I]



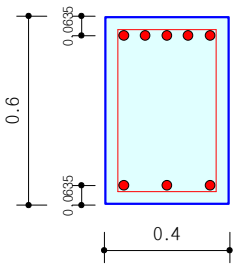
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	164.91	12.66	102.83
Factored Strength (φMn)	221.65	143.87	221.65
Check Ratio (Mu/φMn)	0.7440	0.0880	0.4639
(+) Load Combination No.	1	1	1
Moment (Mu)	64.79	151.82	124.65
Factored Strength (φMn)	139.56	296.39	139.56
Check Ratio (Mu/φMn)	0.4643	0.5123	0.8932
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	154.99	93.43	144.60
Shear Strength by Conc.(φVc)	152.86	149.27	152.86
Shear Strength by Rebar.(φVs)	91.84	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6334	0.4227	0.5909

RC Beam Strength Checking Result

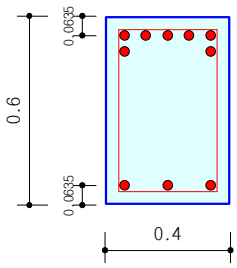
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

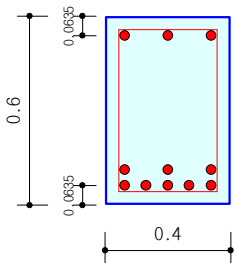
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4B1 (No : 42)	Beam Span	7.6m

[END-I]



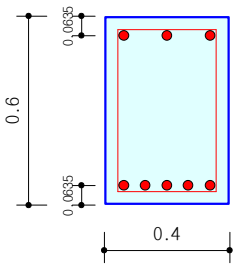
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	157.82	6.19	112.80
Factored Strength (φMn)	296.39	145.58	139.56
Check Ratio (Mu/φMn)	0.5325	0.0425	0.8083
(+) Load Combination No.	1	1	1
Moment (Mu)	106.68	163.83	97.08
Factored Strength (φMn)	143.87	333.41	221.65
Check Ratio (Mu/φMn)	0.7415	0.4914	0.4380
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0023	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	145.07	78.88	143.21
Shear Strength by Conc.(φVc)	149.27	148.15	152.86
Shear Strength by Rebar.(φVs)	89.69	71.21	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6071	0.3596	0.5853

RC Beam Strength Checking Result

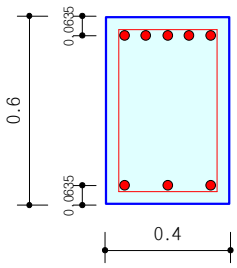
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

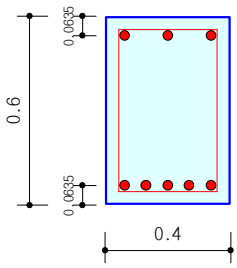
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G2 (No : 43)	Beam Span	6.8m

[END-I]



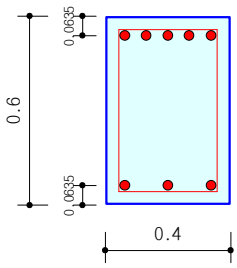
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

[MID]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @150

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	79.67	2.19	93.25
Factored Strength (φMn)	221.65	139.56	221.65
Check Ratio (Mu/φMn)	0.3594	0.0157	0.4207
(+) Load Combination No.	1	1	1
Moment (Mu)	28.80	71.50	21.50
Factored Strength (φMn)	139.56	221.65	139.56
Check Ratio (Mu/φMn)	0.2063	0.3226	0.1540
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0014	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	83.56	60.85	94.51
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	122.46	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3035	0.2210	0.3433

RC Beam Strength Checking Result

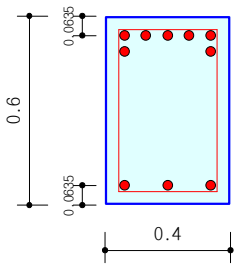
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

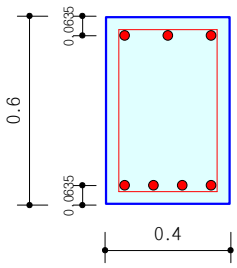
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4B2 (No : 44)	Beam Span	5m

[END-I]



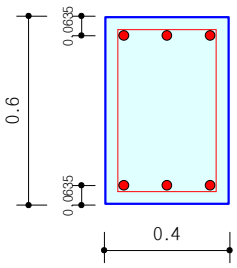
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	102.36	25.09	22.74
Factored Strength (φMn)	296.39	139.34	139.03
Check Ratio (Mu/φMn)	0.3454	0.1801	0.1635
(+) Load Combination No.	1	1	1
Moment (Mu)	0.00	33.66	22.93
Factored Strength (φMn)	143.87	180.37	139.03
Check Ratio (Mu/φMn)	0.0000	0.1866	0.1649
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	69.23	51.48	43.40
Shear Strength by Conc.(φVc)	149.27	152.86	152.86
Shear Strength by Rebar.(φVs)	89.69	73.48	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.2897	0.2274	0.1774

RC Beam Strength Checking Result

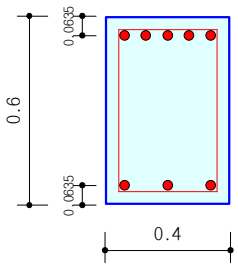
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

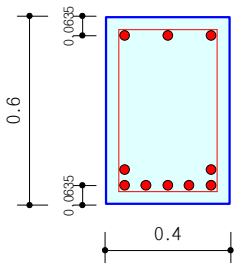
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G1A (No : 45)	Beam Span	7.6m

[END-I]



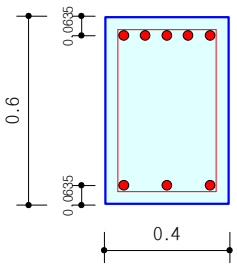
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	118.09	0.00	148.73
Factored Strength (φMn)	221.65	143.87	221.65
Check Ratio (Mu/φMn)	0.5328	0.0000	0.6710
(+) Load Combination No.	1	1	1
Moment (Mu)	119.69	153.91	65.31
Factored Strength (φMn)	139.56	296.39	139.56
Check Ratio (Mu/φMn)	0.8576	0.5193	0.4680
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	157.93	88.21	149.77
Shear Strength by Conc.(φVc)	152.86	149.27	152.86
Shear Strength by Rebar.(φVs)	91.84	71.75	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6454	0.3991	0.6121

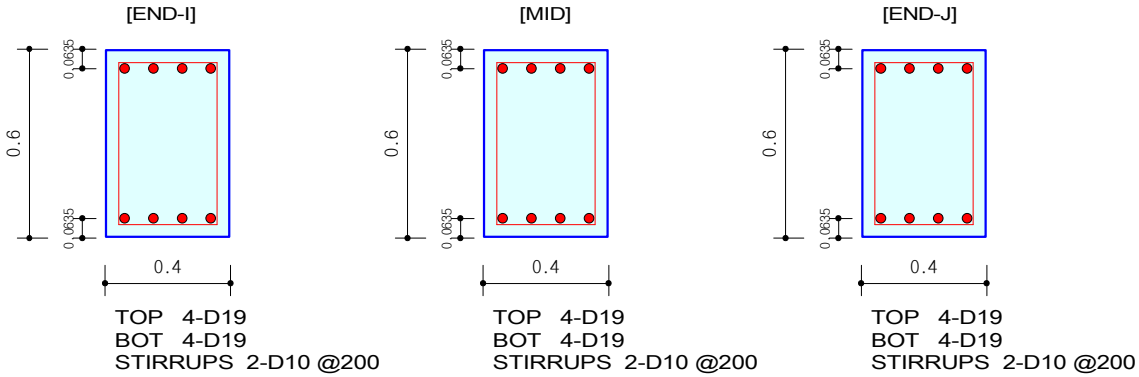
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G4A (No : 46)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	23.31	104.87	84.23
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.1291	0.5808	0.4665
(+) Load Combination No.	1	1	1
Moment (Mu)	51.37	0.59	0.00
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.2845	0.0032	0.0000
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	107.46	117.52	54.28
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	91.84	91.84	91.84
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.4392	0.4803	0.2218

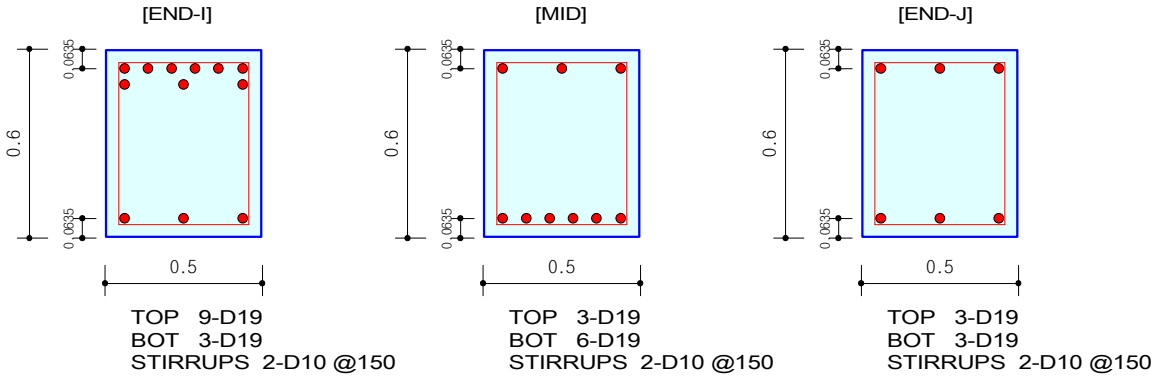
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G4 (No : 47)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	115.19	0.00	113.81
Factored Strength (φMn)	378.85	143.53	142.36
Check Ratio (Mu/φMn)	0.3040	0.0000	0.7995
(+) Load Combination No.	1	1	1
Moment (Mu)	45.04	150.65	34.36
Factored Strength (φMn)	150.93	266.66	142.36
Check Ratio (Mu/φMn)	0.2984	0.5650	0.2414
Using Rebar Top (As_top)	0.0026	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	109.90	82.75	107.77
Shear Strength by Conc.(φVc)	185.84	191.08	191.08
Shear Strength by Rebar.(φVs)	119.10	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3604	0.2639	0.3437

RC Beam Strength Checking Result

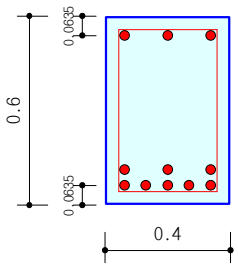
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

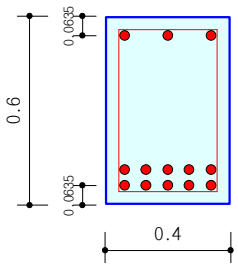
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4B3 (No : 48)	Beam Span	7.6m

[END-I]



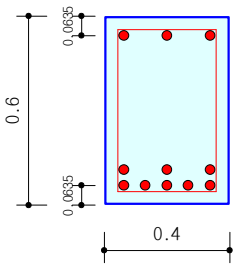
TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 10-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	98.73	0.00	93.98
Factored Strength (φMn)	145.58	148.30	145.58
Check Ratio (Mu/φMn)	0.6782	0.0000	0.6456
(+) Load Combination No.	1	1	1
Moment (Mu)	106.76	180.57	121.94
Factored Strength (φMn)	333.41	406.73	333.41
Check Ratio (Mu/φMn)	0.3202	0.4440	0.3657
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	139.06	78.88	129.87
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5683	0.3634	0.5307

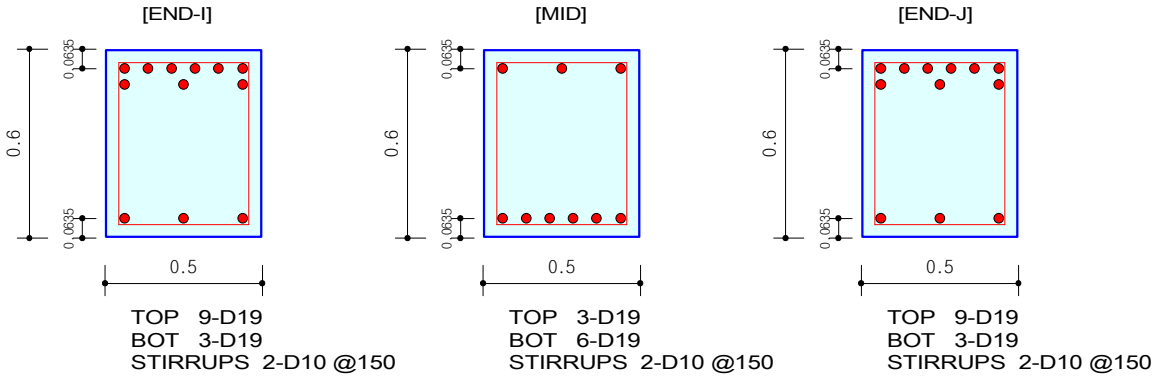
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G4-1 (No : 49)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	173.74	0.00	178.53
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.4586	0.0000	0.4712
(+) Load Combination No.	1	1	1
Moment (Mu)	23.90	165.45	33.09
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.1583	0.6205	0.2193
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	138.07	107.06	143.05
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.4528	0.3415	0.4691

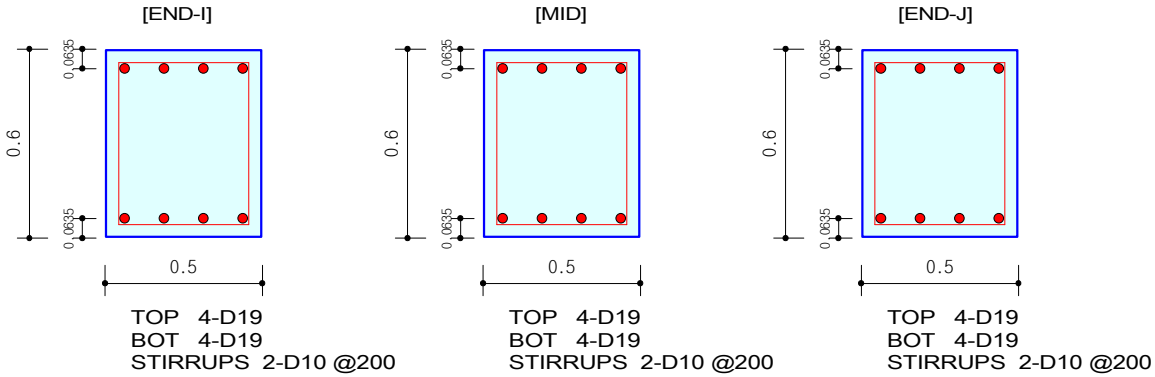
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG1A (No : 51)	Beam Span	7.6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	30.53	0.00	71.96
Factored Strength (φMn)	184.21	184.21	184.21
Check Ratio (Mu/φMn)	0.1657	0.0000	0.3906
(+) Load Combination No.	1	1	1
Moment (Mu)	71.96	101.13	51.25
Factored Strength (φMn)	184.21	184.21	184.21
Check Ratio (Mu/φMn)	0.3906	0.5490	0.2782
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	70.61	49.68	82.12
Shear Strength by Conc.(φVc)	191.08	191.08	191.08
Shear Strength by Rebar.(φVs)	91.84	91.84	91.84
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.2496	0.1756	0.2903

RC Beam Strength Checking Result

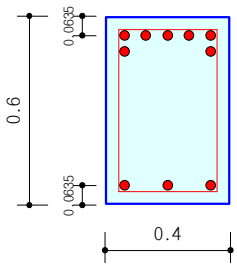
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

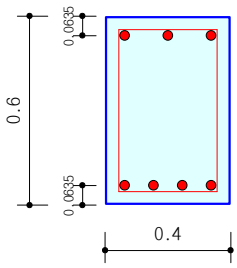
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RB2 (No : 52)	Beam Span	5m

[END-I]



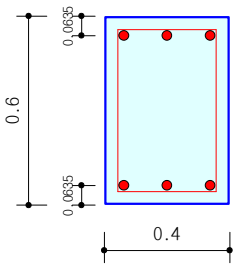
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	108.39	10.75	34.11
Factored Strength (φMn)	296.39	139.34	139.03
Check Ratio (Mu/φMn)	0.3657	0.0771	0.2453
(+) Load Combination No.	1	1	1
Moment (Mu)	0.00	44.96	30.03
Factored Strength (φMn)	143.87	180.37	139.03
Check Ratio (Mu/φMn)	0.0000	0.2492	0.2160
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	87.42	64.42	58.94
Shear Strength by Conc.(φVc)	149.27	152.86	152.86
Shear Strength by Rebar.(φVs)	89.69	73.48	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3658	0.2846	0.2408

RC Beam Strength Checking Result

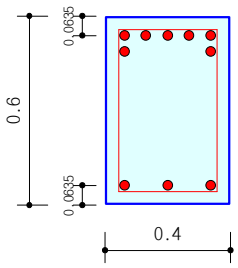
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

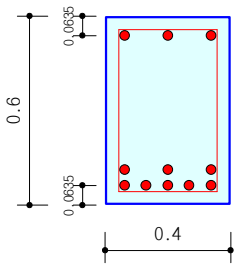
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG1 (No : 53)	Beam Span	7.6m

[END-I]



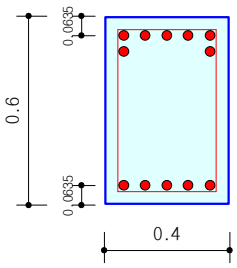
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 7-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	209.27	0.00	146.78
Factored Strength (φMn)	296.39	145.58	296.30
Check Ratio (Mu/φMn)	0.7061	0.0000	0.4954
(+) Load Combination No.	1	1	1
Moment (Mu)	72.99	137.10	84.59
Factored Strength (φMn)	143.87	333.41	224.00
Check Ratio (Mu/φMn)	0.5073	0.4112	0.3776
Using Rebar Top (As_top)	0.0020	0.0009	0.0020
Using Rebar Bot (As_bot)	0.0009	0.0023	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	142.48	92.84	128.43
Shear Strength by Conc.(φVc)	149.27	148.15	149.27
Shear Strength by Rebar.(φVs)	89.69	71.21	89.69
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5963	0.4232	0.5375

RC Beam Strength Checking Result

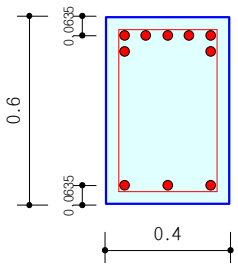
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

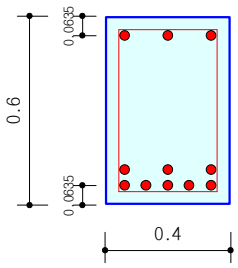
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RB1 (No : 54)	Beam Span	7.6m

[END-I]



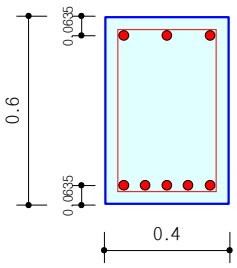
TOP 7-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	144.98	0.00	80.53
Factored Strength (φMn)	296.39	145.58	139.56
Check Ratio (Mu/φMn)	0.4892	0.0000	0.5770
(+) Load Combination No.	1	1	1
Moment (Mu)	92.43	174.79	112.76
Factored Strength (φMn)	143.87	333.41	221.65
Check Ratio (Mu/φMn)	0.6424	0.5243	0.5087
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0023	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	132.54	85.40	118.73
Shear Strength by Conc.(φVc)	149.27	148.15	152.86
Shear Strength by Rebar.(φVs)	89.69	71.21	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5547	0.3893	0.4852

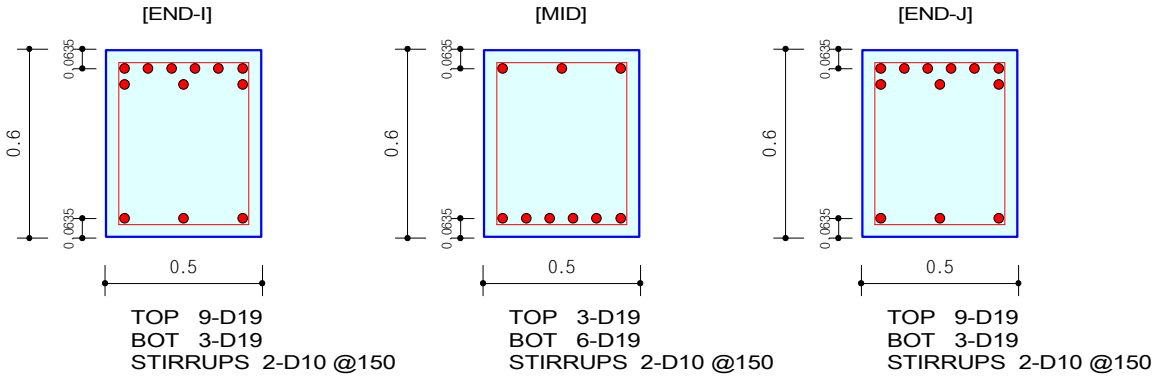
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG4 (No : 55)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	170.24	0.00	150.44
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.4494	0.0000	0.3971
(+) Load Combination No.	1	1	1
Moment (Mu)	48.86	149.74	48.24
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.3238	0.5615	0.3196
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	122.80	95.17	122.00
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.4027	0.3035	0.4001

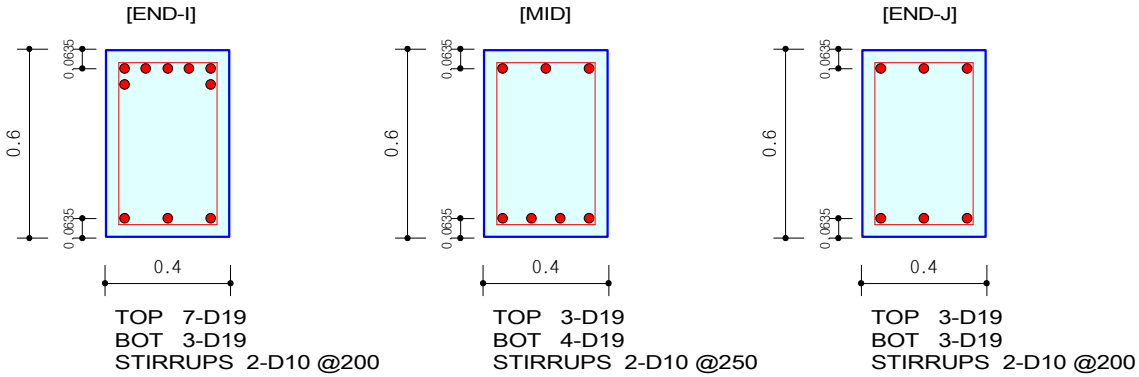
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG2 (No : 56)	Beam Span	5m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	102.52	29.44	90.40
Factored Strength (φMn)	296.39	139.34	139.03
Check Ratio (Mu/φMn)	0.3459	0.2113	0.6502
(+) Load Combination No.	1	1	1
Moment (Mu)	12.60	40.49	21.41
Factored Strength (φMn)	143.87	180.37	139.03
Check Ratio (Mu/φMn)	0.0876	0.2245	0.1540
Using Rebar Top (As_top)	0.0020	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	85.78	61.11	65.71
Shear Strength by Conc.(φVc)	149.27	152.86	152.86
Shear Strength by Rebar.(φVs)	89.69	73.48	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3590	0.2700	0.2685

RC Beam Strength Checking Result

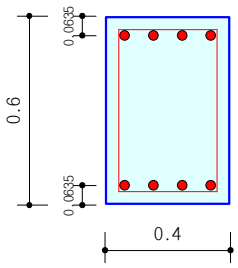
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

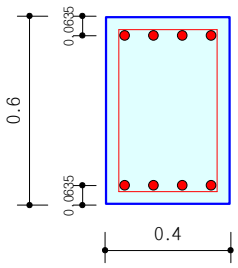
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG4A (No : 57)	Beam Span	6.8m

[END-I]



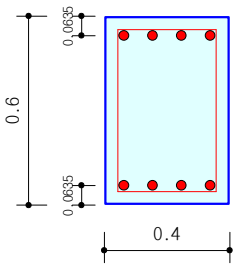
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	50.34	99.11	128.60
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.2788	0.5489	0.7123
(+) Load Combination No.	1	1	1
Moment (Mu)	0.00	0.00	0.00
Factored Strength (φMn)	180.55	180.55	180.55
Check Ratio (Mu/φMn)	0.0000	0.0000	0.0000
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	58.94	75.58	63.17
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	91.84	91.84	91.84
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.2409	0.3089	0.2581

RC Beam Strength Checking Result

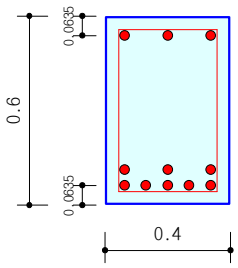
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

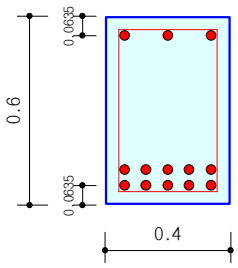
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RB3 (No : 58)	Beam Span	7.6m

[END-I]



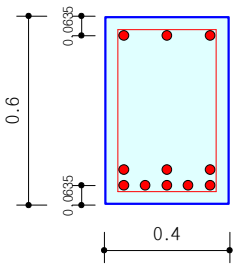
TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 10-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	84.11	0.00	89.09
Factored Strength (φMn)	145.58	148.30	145.58
Check Ratio (Mu/φMn)	0.5777	0.0000	0.6120
(+) Load Combination No.	1	1	1
Moment (Mu)	128.89	196.25	118.02
Factored Strength (φMn)	333.41	406.73	333.41
Check Ratio (Mu/φMn)	0.3866	0.4825	0.3540
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	123.74	79.49	126.63
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5057	0.3662	0.5175

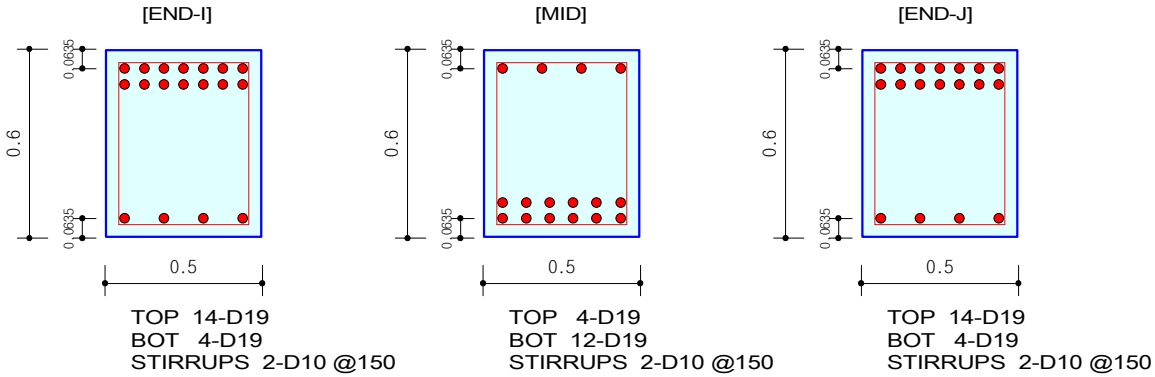
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG3 (No : 59)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	265.96	0.00	218.75
Factored Strength (φMn)	565.62	195.09	565.62
Check Ratio (Mu/φMn)	0.4702	0.0000	0.3867
(+) Load Combination No.	1	1	1
Moment (Mu)	55.44	257.82	72.77
Factored Strength (φMn)	195.40	489.30	195.40
Check Ratio (Mu/φMn)	0.2837	0.5269	0.3724
Using Rebar Top (As_top)	0.0040	0.0011	0.0040
Using Rebar Bot (As_bot)	0.0011	0.0034	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	203.42	159.69	186.81
Shear Strength by Conc.(φVc)	183.22	183.22	183.22
Shear Strength by Rebar.(φVs)	117.43	117.43	117.43
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.6766	0.5311	0.6214

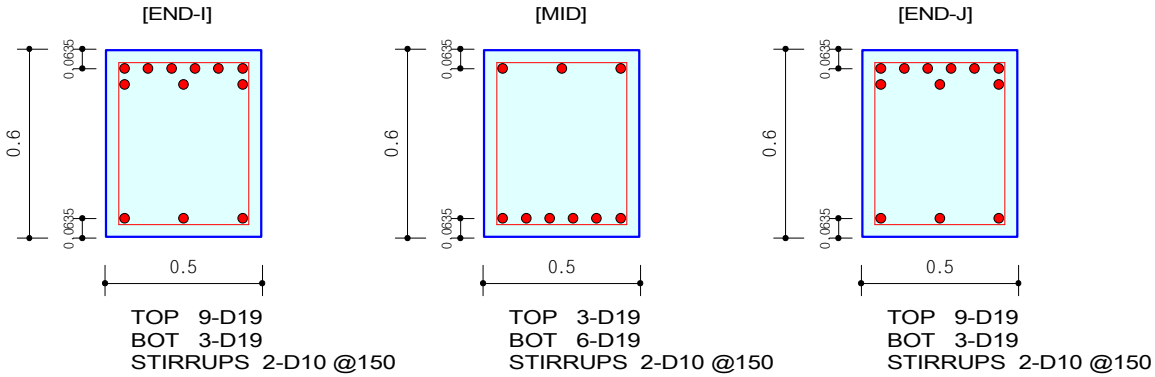
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RG4 (중앙) (No : 60)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	158.39	0.00	164.30
Factored Strength (φMn)	378.85	143.53	378.85
Check Ratio (Mu/φMn)	0.4181	0.0000	0.4337
(+) Load Combination No.	1	1	1
Moment (Mu)	30.66	150.67	41.04
Factored Strength (φMn)	150.93	266.66	150.93
Check Ratio (Mu/φMn)	0.2031	0.5650	0.2719
Using Rebar Top (As_top)	0.0026	0.0009	0.0026
Using Rebar Bot (As_bot)	0.0009	0.0017	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	137.98	99.06	126.69
Shear Strength by Conc.(φVc)	185.84	191.08	185.84
Shear Strength by Rebar.(φVs)	119.10	122.46	119.10
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.4525	0.3160	0.4155

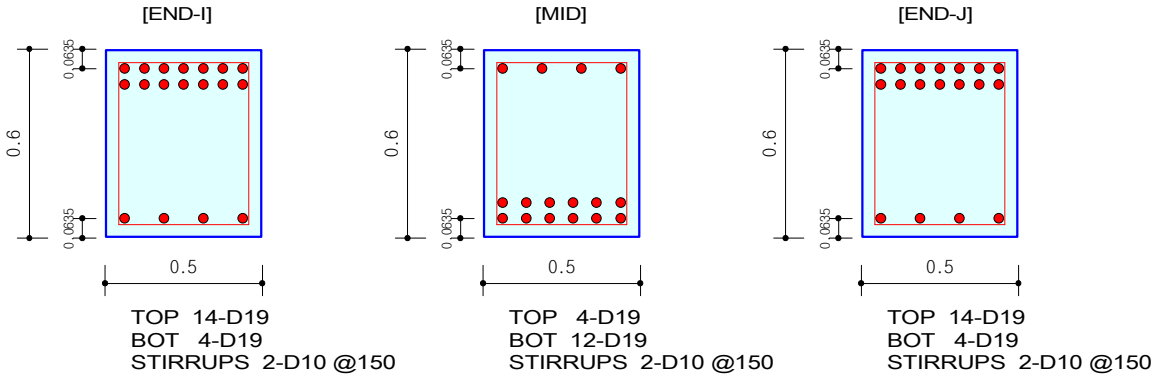
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	2G3 (No : 62)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	247.50	0.00	193.28
Factored Strength (φMn)	565.62	195.09	565.62
Check Ratio (Mu/φMn)	0.4376	0.0000	0.3417
(+) Load Combination No.	1	1	1
Moment (Mu)	93.53	299.83	85.97
Factored Strength (φMn)	195.40	489.30	195.40
Check Ratio (Mu/φMn)	0.4786	0.6128	0.4400
Using Rebar Top (As_top)	0.0040	0.0011	0.0040
Using Rebar Bot (As_bot)	0.0011	0.0034	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	200.94	157.10	197.21
Shear Strength by Conc.(φVc)	183.22	183.22	183.22
Shear Strength by Rebar.(φVs)	117.43	117.43	117.43
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.6684	0.5225	0.6560

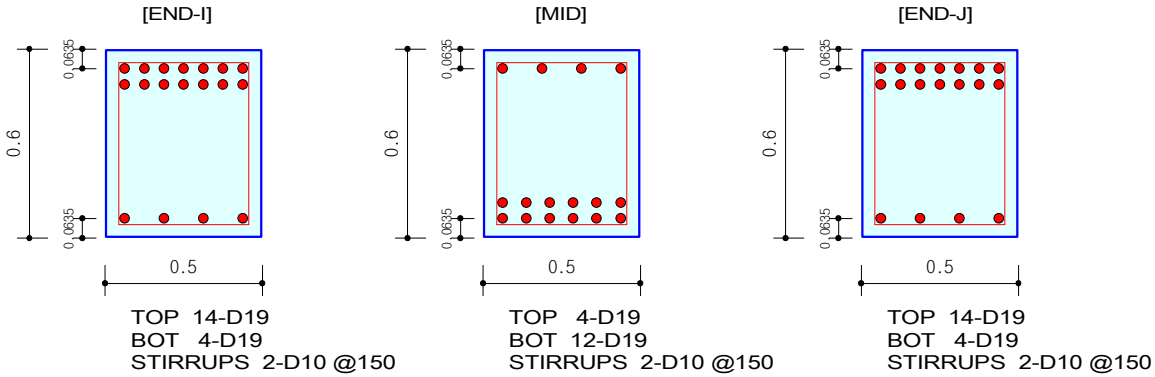
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G3 (No : 63)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	279.45	0.00	235.96
Factored Strength (φMn)	565.62	195.09	565.62
Check Ratio (Mu/φMn)	0.4941	0.0000	0.4172
(+) Load Combination No.	1	1	1
Moment (Mu)	49.58	248.67	57.53
Factored Strength (φMn)	195.40	489.30	195.40
Check Ratio (Mu/φMn)	0.2537	0.5082	0.2944
Using Rebar Top (As_top)	0.0040	0.0011	0.0040
Using Rebar Bot (As_bot)	0.0011	0.0034	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	206.15	163.75	192.63
Shear Strength by Conc.(φVc)	183.22	183.22	183.22
Shear Strength by Rebar.(φVs)	117.43	117.43	117.43
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.6857	0.5447	0.6407

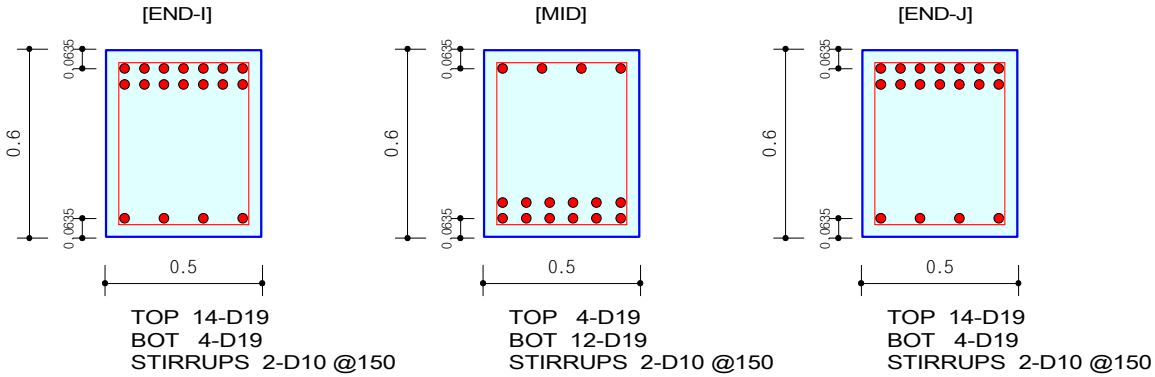
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G3 (No : 64)	Beam Span	6.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	290.91	0.00	247.18
Factored Strength (φMn)	565.62	195.09	565.62
Check Ratio (Mu/φMn)	0.5143	0.0000	0.4370
(+) Load Combination No.	1	1	1
Moment (Mu)	65.51	272.12	53.70
Factored Strength (φMn)	195.40	489.30	195.40
Check Ratio (Mu/φMn)	0.3353	0.5562	0.2748
Using Rebar Top (As_top)	0.0040	0.0011	0.0040
Using Rebar Bot (As_bot)	0.0011	0.0034	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	219.50	165.57	197.23
Shear Strength by Conc.(φVc)	183.22	183.22	183.22
Shear Strength by Rebar.(φVs)	117.43	117.43	117.43
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.7301	0.5507	0.6560

RC Beam Strength Checking Result

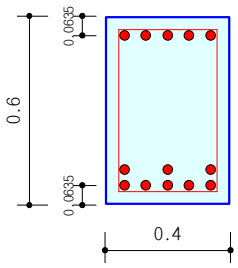
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

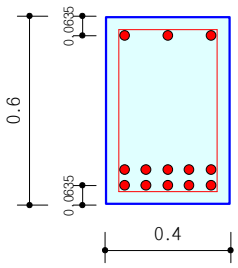
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3B1A (No : 65)	Beam Span	7.6m

[END-I]



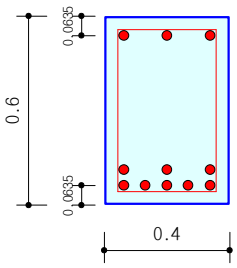
TOP 5-D19
BOT 8-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 10-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	160.41	0.00	109.16
Factored Strength (φMn)	225.02	148.30	145.58
Check Ratio (Mu/φMn)	0.7129	0.0000	0.7498
(+) Load Combination No.	1	1	1
Moment (Mu)	106.99	165.81	95.96
Factored Strength (φMn)	333.35	406.73	333.41
Check Ratio (Mu/φMn)	0.3210	0.4077	0.2878
Using Rebar Top (As_top)	0.0014	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	154.12	77.96	139.44
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6298	0.3592	0.5698

RC Beam Strength Checking Result

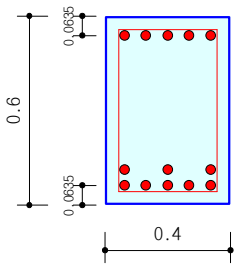
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

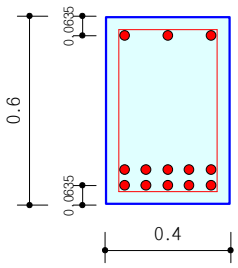
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4B1A (No : 66)	Beam Span	7.6m

[END-I]



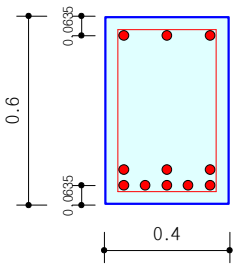
TOP 5-D19
BOT 8-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 10-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	164.97	0.00	120.98
Factored Strength (φMn)	225.02	148.30	145.58
Check Ratio (Mu/φMn)	0.7331	0.0000	0.8310
(+) Load Combination No.	1	1	1
Moment (Mu)	122.90	173.80	92.25
Factored Strength (φMn)	333.35	406.73	333.41
Check Ratio (Mu/φMn)	0.3687	0.4273	0.2767
Using Rebar Top (As_top)	0.0014	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0023	0.0029	0.0023

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	170.07	82.95	143.13
Shear Strength by Conc.(φVc)	152.86	146.58	152.86
Shear Strength by Rebar.(φVs)	91.84	70.46	91.84
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.6950	0.3822	0.5849

RC Beam Strength Checking Result

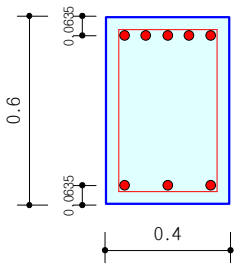
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	3G2A (No : 67)	Beam Span	6.8m

[END-I]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

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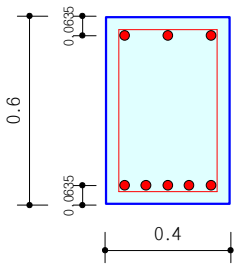
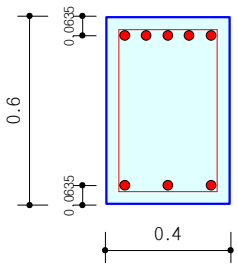


TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @150

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	100.76	9.41	76.01
Factored Strength (φMn)	221.65	139.56	221.65
Check Ratio (Mu/φMn)	0.4546	0.0674	0.3429
(+) Load Combination No.	1	1	1
Moment (Mu)	13.06	74.02	26.48
Factored Strength (φMn)	139.56	221.65	139.56
Check Ratio (Mu/φMn)	0.0936	0.3339	0.1897
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0014	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	83.52	54.08	74.93
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	122.46	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.3034	0.1964	0.2722

RC Beam Strength Checking Result

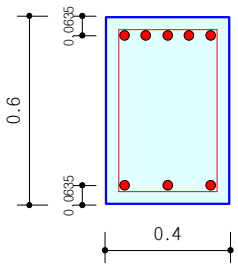
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

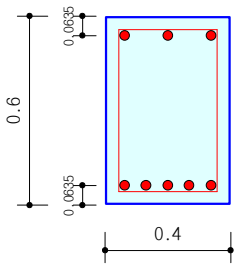
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	4G2A (No : 68)	Beam Span	6.8m

[END-I]



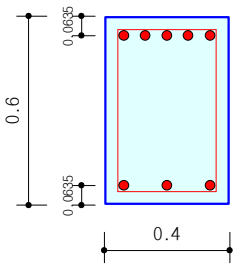
TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

[MID]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @150

[END-J]



TOP 5-D19
BOT 3-D19
STIRRUPS 2-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	101.94	12.09	67.76
Factored Strength (φMn)	221.65	139.56	221.65
Check Ratio (Mu/φMn)	0.4599	0.0866	0.3057
(+) Load Combination No.	1	1	1
Moment (Mu)	13.15	75.06	27.02
Factored Strength (φMn)	139.56	221.65	139.56
Check Ratio (Mu/φMn)	0.0942	0.3387	0.1936
Using Rebar Top (As_top)	0.0014	0.0009	0.0014
Using Rebar Bot (As_bot)	0.0009	0.0014	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	82.41	53.53	72.25
Shear Strength by Conc.(φVc)	152.86	152.86	152.86
Shear Strength by Rebar.(φVs)	122.46	122.46	122.46
Using Shear Reinf. (AsV)	0.0010	0.0010	0.0010
Using Stirrups Spacing	2-D10 @150	2-D10 @150	2-D10 @150
Check Ratio	0.2993	0.1944	0.2624

RC Beam Strength Checking Result

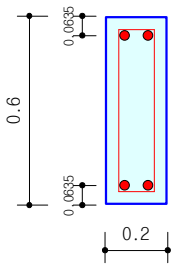
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

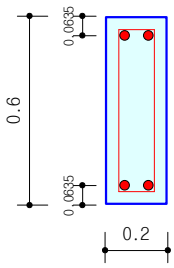
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	WG1 (0.2) (No : 403)	Beam Span	7.6m

[END-I]



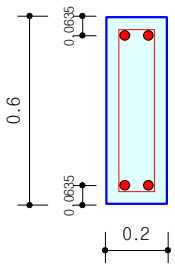
TOP 2-D19
BOT 2-D19
STIRRUPS 2-D10 @300

[MID]



TOP 2-D19
BOT 2-D19
STIRRUPS 2-D10 @300

[END-J]



TOP 2-D19
BOT 2-D19
STIRRUPS 2-D10 @300

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	30.33	38.77	55.67
Factored Strength (φMn)	90.27	90.27	90.27
Check Ratio (Mu/φMn)	0.3359	0.4295	0.6167
(+) Load Combination No.	1	1	1
Moment (Mu)	7.83	28.33	8.90
Factored Strength (φMn)	90.27	90.27	90.27
Check Ratio (Mu/φMn)	0.0867	0.3138	0.0986
Using Rebar Top (As_top)	0.0006	0.0006	0.0006
Using Rebar Bot (As_bot)	0.0006	0.0006	0.0006

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	52.51	60.76	68.13
Shear Strength by Conc.(φVc)	76.43	76.43	76.43
Shear Strength by Rebar.(φVs)	61.23	61.23	61.23
Using Shear Reinf. (AsV)	0.0005	0.0005	0.0005
Using Stirrups Spacing	2-D10 @300	2-D10 @300	2-D10 @300
Check Ratio	0.3815	0.4413	0.4949

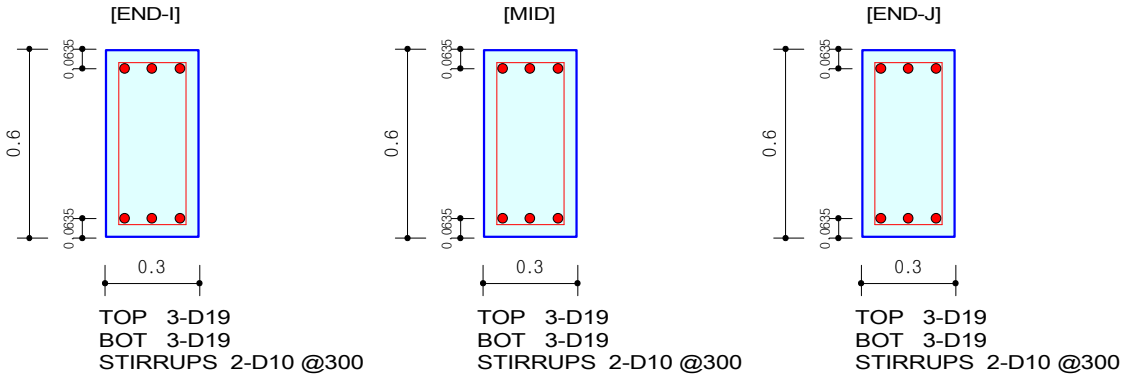
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	RWG1 (No : 404)	Beam Span	7.6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	33.78	46.00	65.57
Factored Strength (φMn)	135.41	135.41	135.41
Check Ratio (Mu/φMn)	0.2494	0.3397	0.4842
(+) Load Combination No.	1	1	1
Moment (Mu)	7.27	33.76	1.74
Factored Strength (φMn)	135.41	135.41	135.41
Check Ratio (Mu/φMn)	0.0537	0.2493	0.0129
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	68.63	70.38	78.72
Shear Strength by Conc.(φVc)	114.65	114.65	114.65
Shear Strength by Rebar.(φVs)	61.23	61.23	61.23
Using Shear Reinf. (AsV)	0.0005	0.0005	0.0005
Using Stirrups Spacing	2-D10 @300	2-D10 @300	2-D10 @300
Check Ratio	0.3902	0.4002	0.4476

RC Beam Strength Checking Result

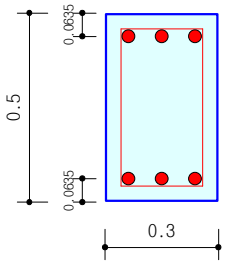
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

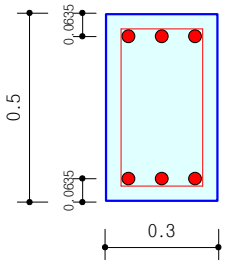
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 28540, fy = 300000, fys = 300000 KPa		
Section Property	PHWG1 (No : 405)	Beam Span	7.6m

[END-I]



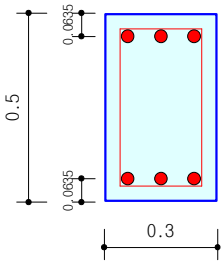
TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @300

[MID]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @300

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @300

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	39.17	35.14	21.83
Factored Strength (φMn)	109.63	109.63	109.63
Check Ratio (Mu/φMn)	0.3573	0.3205	0.1992
(+) Load Combination No.	1	1	1
Moment (Mu)	10.52	17.64	17.64
Factored Strength (φMn)	109.63	109.63	109.63
Check Ratio (Mu/φMn)	0.0959	0.1609	0.1609
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	40.83	39.10	23.99
Shear Strength by Conc.(φVc)	93.28	93.28	93.28
Shear Strength by Rebar.(φVs)	49.82	49.82	49.82
Using Shear Reinf. (AsV)	0.0005	0.0005	0.0005
Using Stirrups Spacing	2-D10 @300	2-D10 @300	2-D10 @300
Check Ratio	0.2853	0.2732	0.1677

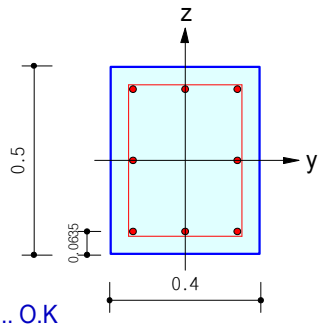
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 331 (PM), 331, 338 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 3.4 m
Section Property : 4C5 (No : 104)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.015)

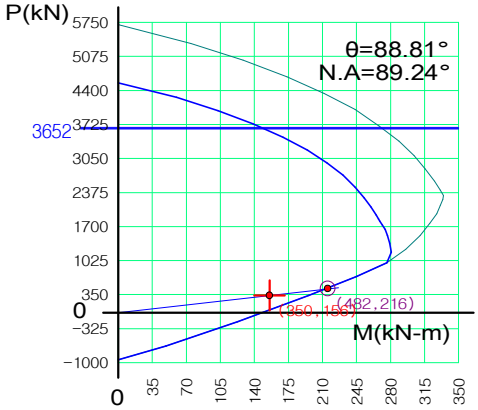


2. Axial and Moments Capacity

Load Combination : 1 (Pos : J)

Concentric Max. Axial Load	φPn-max	= 3651.66 kN	
Axial Load Ratio	Pu / φPn	= 349.754 / 481.602	= 0.726 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 156.070 / 215.503	= 0.724 < 1.000 ..... O.K
	Mcy / φMny	= 3.25396 / 4.49311	= 0.724 < 1.000 ..... O.K
	Mcz / φMnz	= -156.04 / 215.456	= 0.724 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
4564.57	0.00
4005.85	102.73
3481.68	169.67
2964.79	215.05
2489.39	243.48
2090.03	260.28
1854.73	267.99
1744.89	272.14
1528.35	277.65
1196.13	281.06
712.36	245.57
-182.56	123.36
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	112.323 kN	119.217 kN
Design Shear Strength (φVc+φVs)	134.815 + 57.6061 = 192.421 kN	139.771 + 74.7253 = 214.496 kN
Shear Ratio	0.584 < 1.000 ..... O.K	0.556 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	112.323 kN	119.217 kN
Design Shear Strength (φVc+φVs)	134.987 + 57.6061 = 192.593 kN	140.127 + 74.7253 = 214.852 kN
Shear Ratio	0.583 < 1.000 ..... O.K	0.555 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

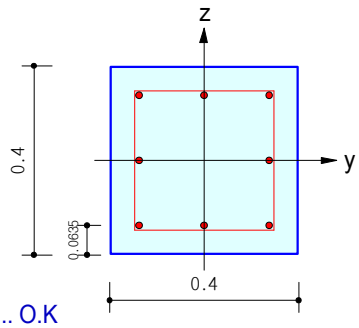
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 70 (PM), 1328, 65 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 1 m
Section Property : 1C6 (No : 105)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

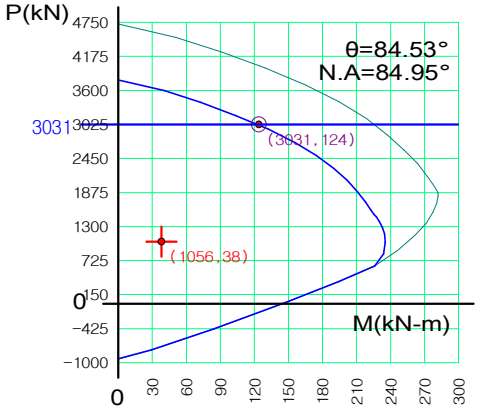


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 1055.78 / 3030.63	= 0.348 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 38.4793 / 124.122	= 0.310 < 1.000 ..... O.K
	Mcy / φMny	= -3.6700 / 11.8382	= 0.310 < 1.000 ..... O.K
	Mcz / φMnz	= -38.304 / 123.556	= 0.310 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3406.16	72.92
2958.85	132.61
2503.67	175.15
2079.88	202.06
1720.13	218.24
1507.07	225.85
1394.86	230.51
1177.61	235.20
850.66	234.20
370.22	194.62
-413.38	84.88
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	25.1484 kN	33.7673 kN
Design Shear Strength (φVc+φVs)	140.501 + 57.6061 = 198.107 kN	117.691 + 57.6061 = 175.297 kN
Shear Ratio	0.127 < 1.000 ..... O.K	0.193 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	25.1484 kN	33.7673 kN
Design Shear Strength (φVc+φVs)	140.703 + 57.6061 = 198.309 kN	117.973 + 57.6061 = 175.579 kN
Shear Ratio	0.127 < 1.000 ..... O.K	0.192 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

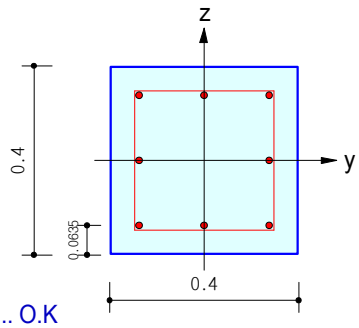
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 160 (PM), 1310, 155 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 0.9 m
Section Property : 2C6 (No : 106)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

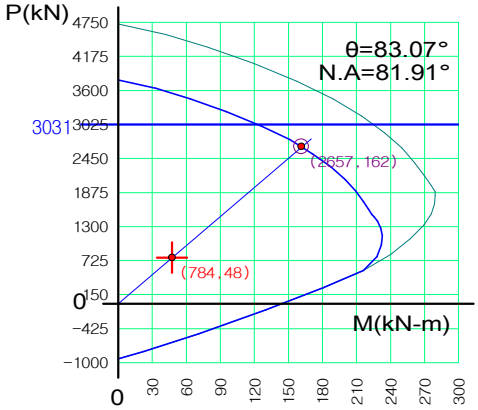


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 783.658 / 2656.85	= 0.295 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 47.8320 / 161.652	= 0.296 < 1.000 ..... O.K
	Mcy / φMny	= -5.7742 / 19.5144	= 0.296 < 1.000 ..... O.K
	Mcz / φMnz	= -47.482 / 160.469	= 0.296 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3464.11	63.85
3008.74	126.39
2539.40	171.90
2103.54	200.01
1734.20	216.28
1516.10	223.64
1390.07	228.90
1149.74	233.20
797.28	228.47
266.34	181.17
-503.65	71.08
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	34.7161 kN	47.6020 kN
Design Shear Strength (φVc+φVs)	128.919 + 57.6061 = 186.525 kN	112.030 + 57.6061 = 169.636 kN
Shear Ratio	0.186 < 1.000 ..... O.K	0.281 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	34.7161 kN	47.6020 kN
Design Shear Strength (φVc+φVs)	129.096 + 57.6061 = 186.702 kN	112.280 + 57.6061 = 169.886 kN
Shear Ratio	0.186 < 1.000 ..... O.K	0.280 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

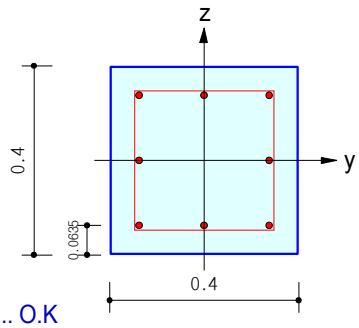
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 245 (PM), 252, 245 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 3.1 m
Section Property : 3C6 (No : 107)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

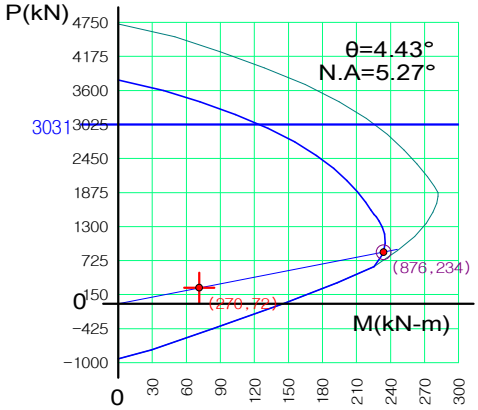


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 270.102 / 876.224	= 0.308 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 71.6921 / 234.087	= 0.306 < 1.000 ..... O.K
	Mcy / φMny	= -71.478 / 233.389	= 0.306 < 1.000 ..... O.K
	Mcz / φMnz	= -5.5322 / 18.0635	= 0.306 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3410.31	72.23
2962.42	132.15
2506.23	174.95
2081.57	201.98
1721.14	218.18
1507.72	225.78
1394.52	230.50
1175.62	235.16
846.84	233.82
362.77	193.60
-419.85	83.82
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	39.2080 kN	51.3383 kN
Design Shear Strength (φVc+φVs)	117.248 + 57.6061 = 174.854 kN	106.937 + 57.6061 = 164.544 kN
Shear Ratio	0.224 < 1.000 ..... O.K	0.312 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	39.2080 kN	51.3383 kN
Design Shear Strength (φVc+φVs)	117.373 + 57.6061 = 174.979 kN	107.187 + 57.6061 = 164.793 kN
Shear Ratio	0.224 < 1.000 ..... O.K	0.312 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

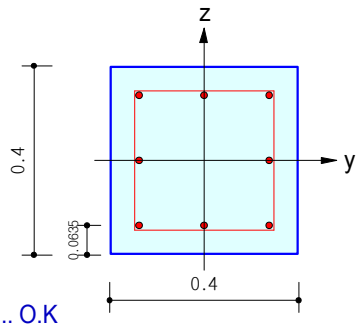
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 335 (PM), 342, 335 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 3.4 m
Section Property : 4C6 (No : 108)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

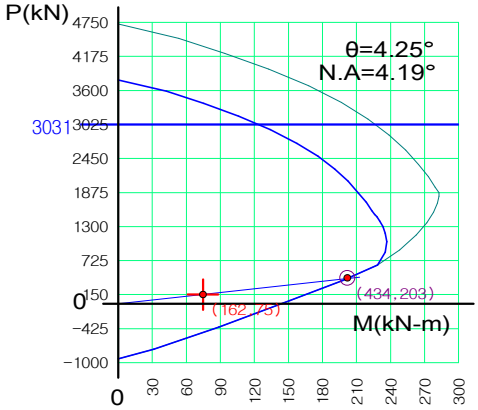


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 161.509 / 434.270	= 0.372 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 75.1094 / 202.569	= 0.371 < 1.000 ..... O.K
	Mcy / φMny	= -74.903 / 202.012	= 0.371 < 1.000 ..... O.K
	Mcz / φMnz	= -5.5624 / 15.0016	= 0.371 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3389.89	75.50
2944.84	134.43
2493.64	176.17
2073.24	202.77
1716.18	218.93
1504.54	226.62
1396.20	231.11
1185.44	235.92
865.65	235.95
399.39	198.50
-388.03	88.79
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	39.6405 kN	50.7253 kN
Design Shear Strength (φVc+φVs)	106.138 + 57.6061 = 163.744 kN	102.241 + 57.6061 = 159.847 kN
Shear Ratio	0.242 < 1.000 ..... O.K	0.317 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	39.6405 kN	50.7253 kN
Design Shear Strength (φVc+φVs)	106.275 + 57.6061 = 163.881 kN	102.515 + 57.6061 = 160.121 kN
Shear Ratio	0.242 < 1.000 ..... O.K	0.317 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

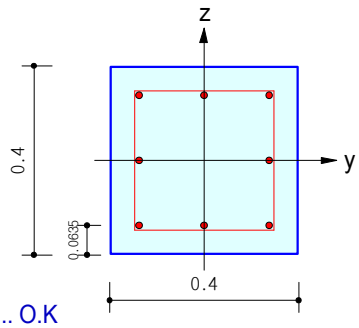
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 1327 (PM), 1331, 1327 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 2.5 m
Section Property : 1C6A (No : 110)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

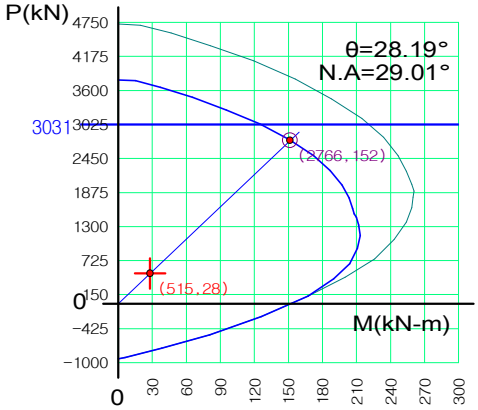


2. Axial and Moments Capacity

Load Combination : 1 (Pos : J)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 514.570 / 2765.64	= 0.186 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 28.2238 / 151.698	= 0.186 < 1.000 ..... O.K
	Mcy / φMny	= 24.8761 / 133.705	= 0.186 < 1.000 ..... O.K
	Mcz / φMnz	= 13.3327 / 71.6611	= 0.186 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3656.94	37.49
3278.71	95.81
2776.93	150.81
2246.93	187.32
1789.52	203.59
1521.31	208.64
1331.99	212.25
939.28	210.94
428.22	190.46
-220.41	126.42
-746.74	38.44
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	18.8638 kN	14.9931 kN
Design Shear Strength (φVc+φVs)	106.771 + 57.6061 = 164.378 kN	117.901 + 57.6061 = 175.507 kN
Shear Ratio	0.115 < 1.000 ..... O.K	0.085 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	18.8638 kN	14.9931 kN
Design Shear Strength (φVc+φVs)	106.973 + 57.6061 = 164.579 kN	118.102 + 57.6061 = 175.708 kN
Shear Ratio	0.115 < 1.000 ..... O.K	0.085 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

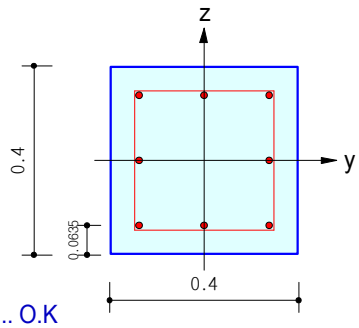
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 159 (PM), 1313, 1309 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 0.9 m
Section Property : 2C6A (No : 111)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

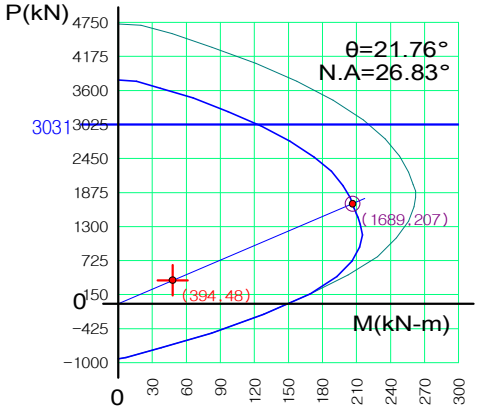


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 393.816 / 1689.05	= 0.233 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 48.4971 / 206.979	= 0.234 < 1.000 ..... O.K
	Mcy / φMny	= -45.042 / 192.232	= 0.234 < 1.000 ..... O.K
	Mcz / φMnz	= -17.978 / 76.7260	= 0.234 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3647.40	37.96
3254.34	97.20
2752.60	151.99
2232.98	188.47
1785.88	204.89
1523.68	210.08
1339.33	214.00
962.17	212.83
466.76	192.82
-181.37	128.57
-740.78	38.26
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	17.5905 kN	31.2882 kN
Design Shear Strength (φVc+φVs)	103.384 + 57.6061 = 160.990 kN	112.233 + 57.6061 = 169.839 kN
Shear Ratio	0.109 < 1.000 ..... O.K	0.184 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	17.5905 kN	31.2882 kN
Design Shear Strength (φVc+φVs)	103.561 + 57.6061 = 161.167 kN	112.410 + 57.6061 = 170.016 kN
Shear Ratio	0.109 < 1.000 ..... O.K	0.184 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

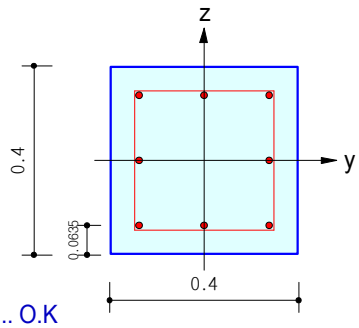
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 253 (PM), 1301, 249 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 0.9 m
Section Property : 3C6A (No : 112)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

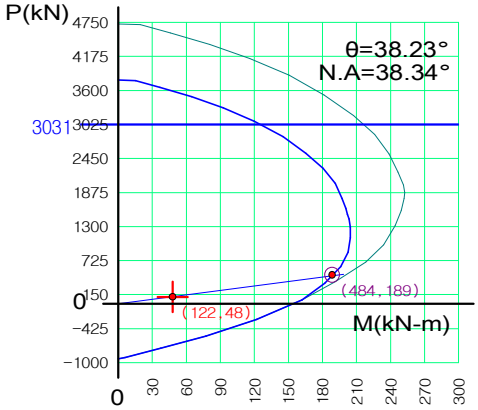


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 121.716 / 483.685	= 0.252 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 48.1311 / 188.801	= 0.255 < 1.000 ..... O.K
	Mcy / φMny	= 37.8098 / 148.314	= 0.255 < 1.000 ..... O.K
	Mcz / φMnz	= -29.783 / 116.828	= 0.255 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3663.75	37.03
3314.86	92.83
2826.96	145.40
2287.38	180.91
1780.49	197.82
1506.55	202.48
1293.82	204.69
867.91	202.82
354.30	182.15
-259.85	122.07
-757.19	37.41
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	21.6392 kN	30.0235 kN
Design Shear Strength (φVc+φVs)	100.586 + 57.6061 = 158.192 kN	106.143 + 57.6061 = 163.749 kN
Shear Ratio	0.137 < 1.000 ..... O.K	0.183 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	21.6392 kN	30.0235 kN
Design Shear Strength (φVc+φVs)	100.764 + 57.6061 = 158.370 kN	106.268 + 57.6061 = 163.874 kN
Shear Ratio	0.137 < 1.000 ..... O.K	0.183 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

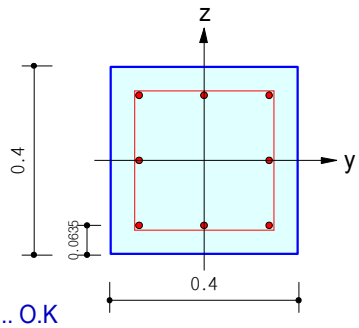
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 343 (PM), 1289, 339 (Shear-y,z)
Material Data : fck = 28540, fy = 300000, fys = 300000 KPa
Column Height : 0.9 m
Section Property : 4C6A (No : 113)
Rebar Pattern : 8 - 3 - D22 Ast = 0.0030968 m² (ρst = 0.019)

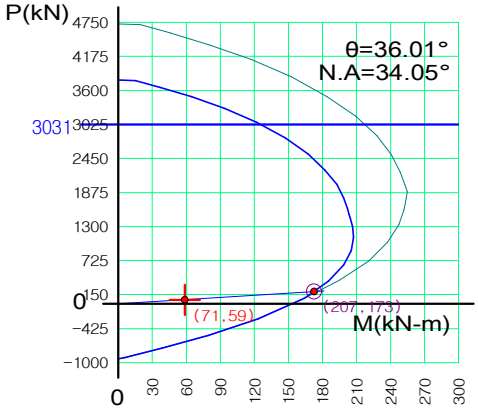


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 3030.63 kN	
Axial Load Ratio	Pu / φPn	= 71.2298 / 207.472	= 0.343 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 58.6909 / 172.714	= 0.340 < 1.000 ..... O.K
	Mcy / φMny	= 47.4733 / 139.703	= 0.340 < 1.000 ..... O.K
	Mcz / φMnz	= -34.509 / 101.553	= 0.340 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
3788.28	0.00
3662.49	37.24
3301.96	94.04
2806.90	147.33
2269.82	182.66
1786.00	199.03
1513.60	203.87
1311.76	206.77
899.30	205.46
383.32	185.36
-248.70	123.94
-753.21	38.11
-929.04	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	24.0138 kN	34.7864 kN
Design Shear Strength (φVc+φVs)	98.3769 + 57.6061 = 155.983 kN	99.9669 + 57.6061 = 157.573 kN
Shear Ratio	0.154 < 1.000 ..... O.K	0.221 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	24.0138 kN	34.7864 kN
Design Shear Strength (φVc+φVs)	98.5784 + 57.6061 = 156.185 kN	100.104 + 57.6061 = 157.710 kN
Shear Ratio	0.154 < 1.000 ..... O.K	0.221 < 1.000 ..... O.K
As-H_use	0.00071 m²/m, 2-D10 @200	0.00071 m²/m, 2-D10 @200

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

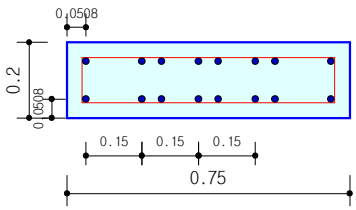
Wall ID : 2121 (Wall Mark : CW3)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

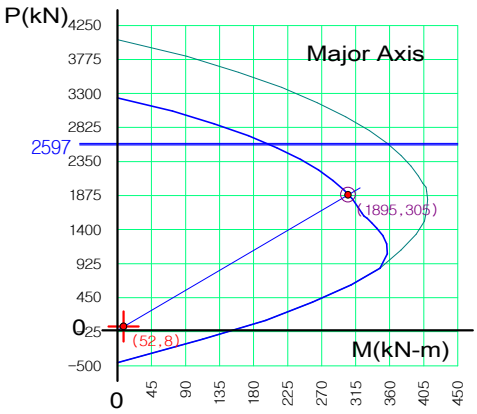
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

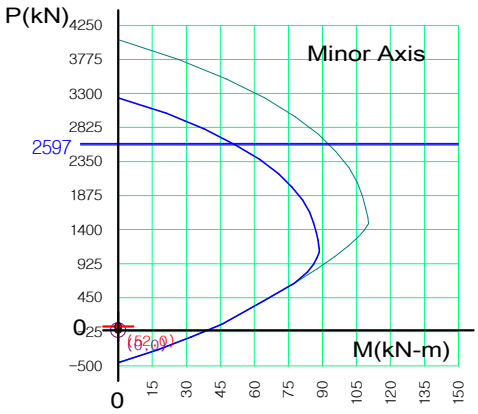


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	51.5566	51.5566
φPn (kN)	1894.97	0.00000
Pu / φPn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	8.30721	0.00000
φMn (kN-m)	305.333	0.00000
Mc / φMn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.37752 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 54.1541 + 182.448 = 236.602 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

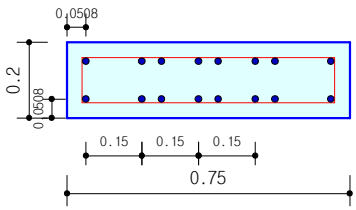
Wall ID : 2122 (Wall Mark : CW4)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

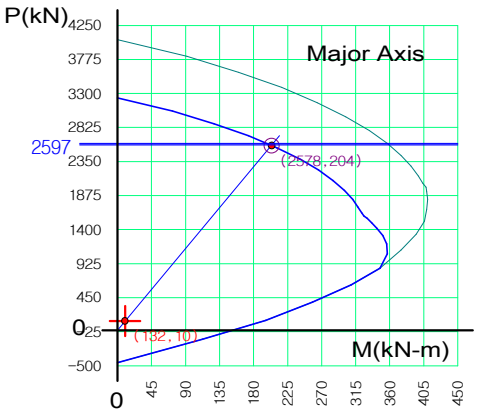
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

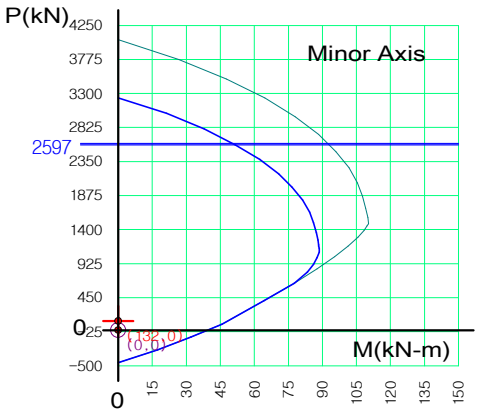


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	132.237	132.237
φPn (kN)	2578.00	0.00000
Pu / φPn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-10.466	0.00000
φMn (kN-m)	204.046	0.00000
Mc / φMn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 5.19165 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 56.8182 + 182.448 = 239.266 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.022 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

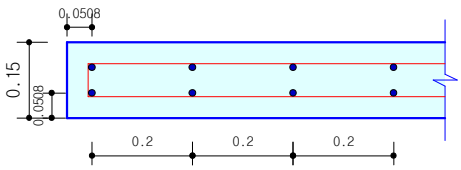
Wall ID : 2123 (Wall Mark : CW6)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

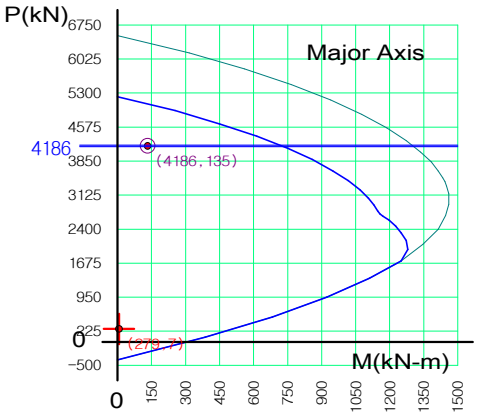
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

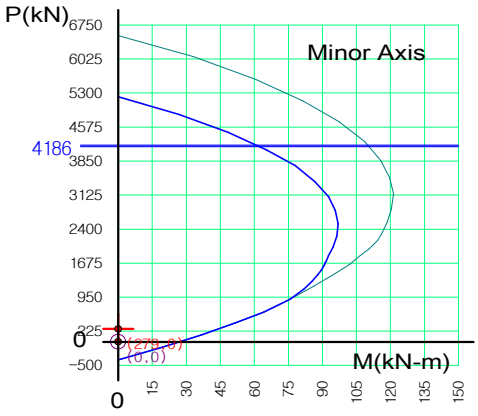


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4185.65 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	278.866	278.866
φPn (kN)	4185.65	0.00000
Pu / φPn	0.067 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-7.4399	0.00000
φMn (kN-m)	135.345	0.00000
Mc / φMn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 3.52980 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 86.5423 + 186.257 = 272.799 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.013 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

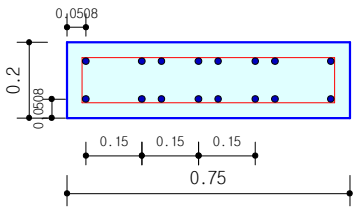
Wall ID : 2131 (Wall Mark : CW9)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

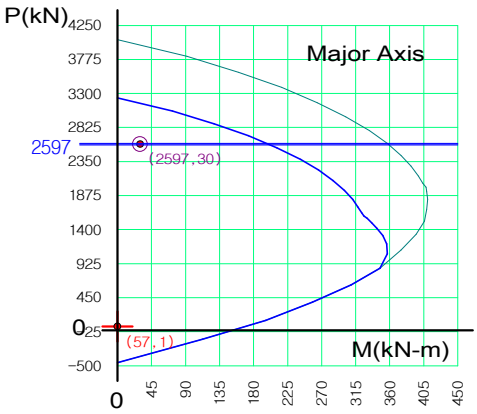
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

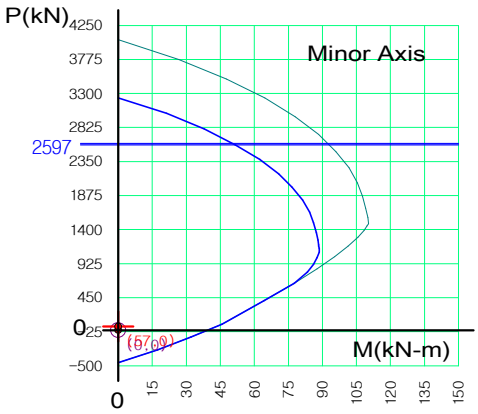


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	56.7837	56.7837
φPn (kN)	2597.18	0.00000
Pu / φPn	0.022 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.5402	0.00000
φMn (kN-m)	30.1559	0.00000
Mc / φMn	0.018 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.44162 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 48.1328 + 182.448 = 230.581 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.002 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

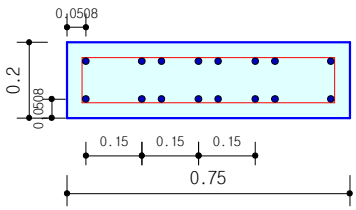
Wall ID : 2132 (Wall Mark : CW10)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

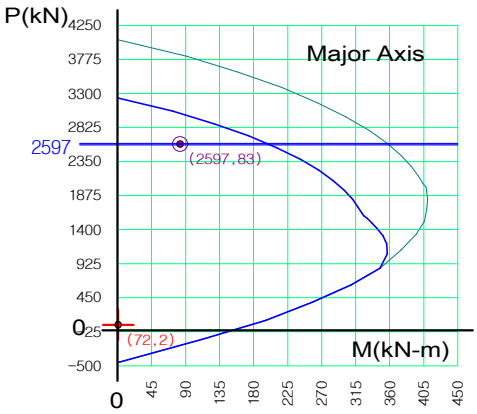
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

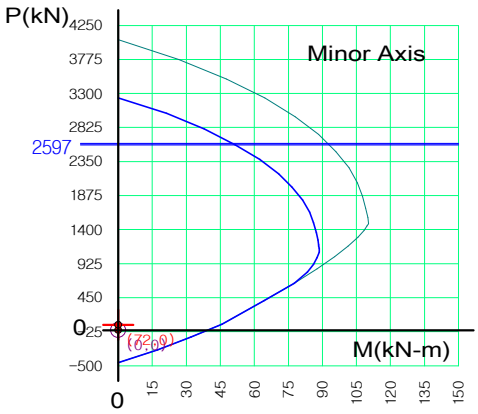


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	71.7975	71.7975
φPn (kN)	2597.18	0.00000
Pu / φPn	0.028 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.9780	0.00000
φMn (kN-m)	83.4015	0.00000
Mc / φMn	0.024 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.03970 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 55.3372 + 182.448 = 237.785 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.004 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

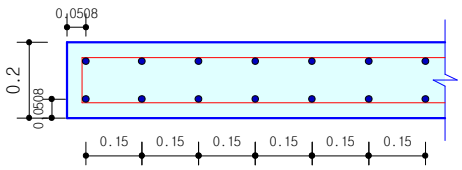
Wall ID : 2211 (Wall Mark : CW1)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

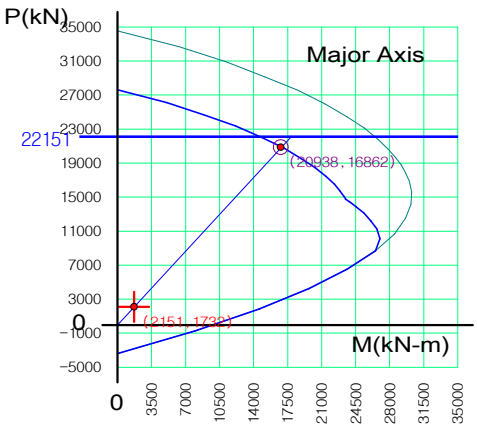
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

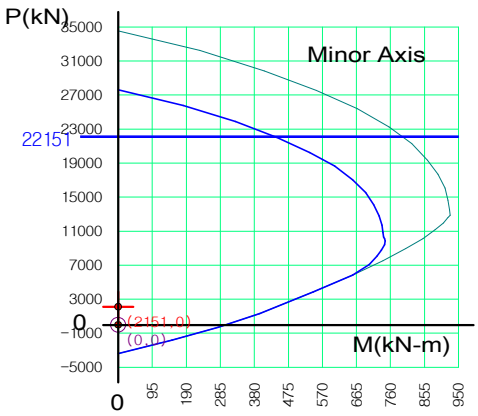


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22151.1 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	2150.76	2150.76
φPn (kN)	20938.3	0.00000
Pu / φPn	0.103 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1732.06	0.00000
φMn (kN-m)	16862.1	0.00000
Mc / φMn	0.103 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 70.3097 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 441.019 + 1581.22 = 2022.23 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.035 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

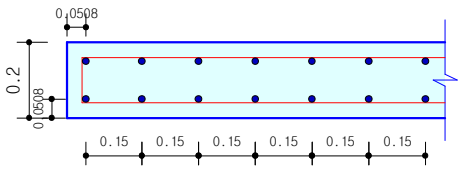
Wall ID : 2231 (Wall Mark : CW2)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

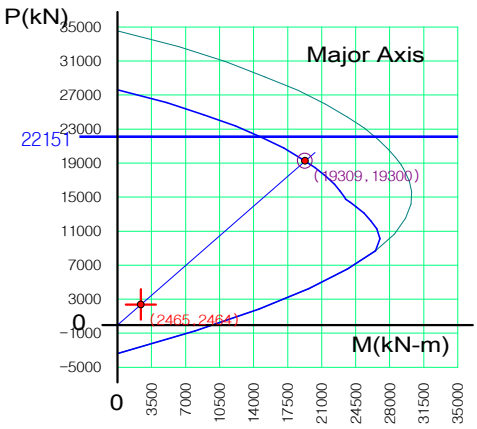
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

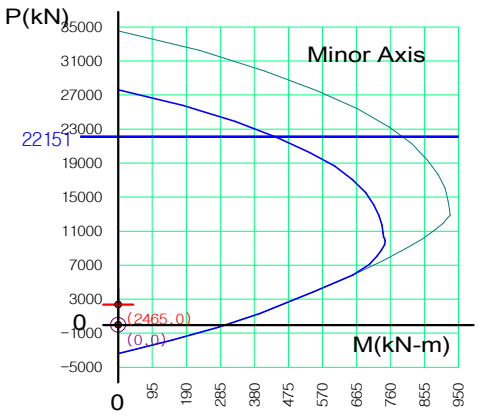


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22151.1 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	2465.04	2465.04
φPn (kN)	19308.7	0.00000
Pu / φPn	0.128 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2463.89	0.00000
φMn (kN-m)	19299.7	0.00000
Mc / φMn	0.128 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 113.516 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 489.914 + 1581.22 = 2071.13 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.055 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

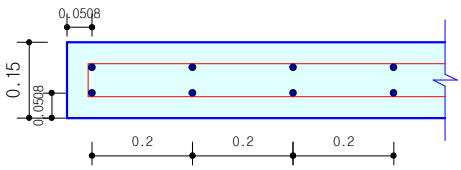
Wall ID : 2251 (Wall Mark : CW5)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5*0.15 m

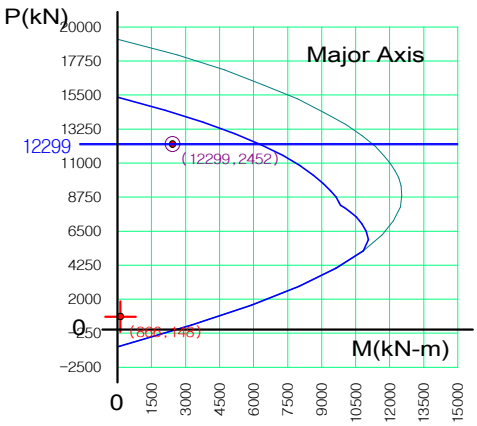
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

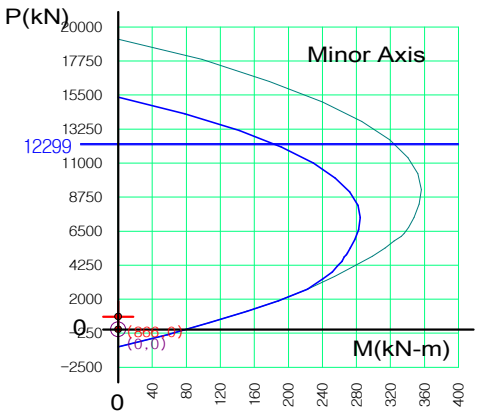


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12298.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	866.487	866.487
φPn (kN)	12298.9	0.00000
Pu / φPn	0.070 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-147.89	0.00000
φMn (kN-m)	2452.28	0.00000
Mc / φMn	0.060 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 9.46677 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 268.188 + 547.814 = 816.002 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

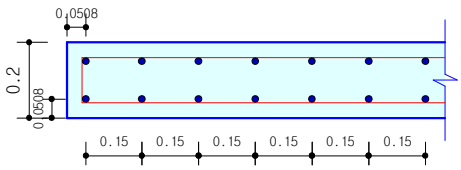
Wall ID : 2261 (Wall Mark : CW7)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

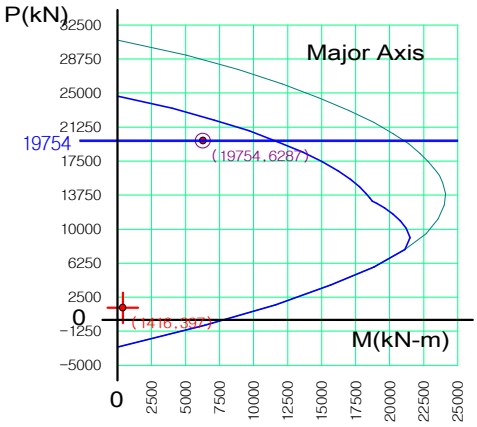
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

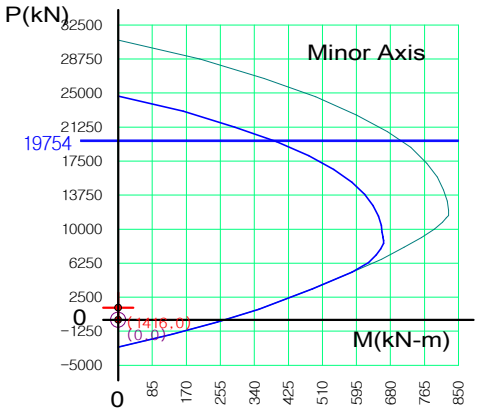


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 19753.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1415.80	1415.80
φPn (kN)	19753.9	0.00000
Pu / φPn	0.072 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-397.08	0.00000
φMn (kN-m)	6287.18	0.00000
Mc / φMn	0.063 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 69.4110 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1321.75 + 1410.93 = 2732.68 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.025 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

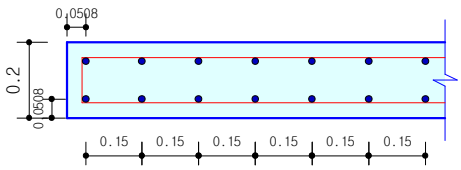
Wall ID : 2271 (Wall Mark : CW8)

Story : 1F (Height = 3.5 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

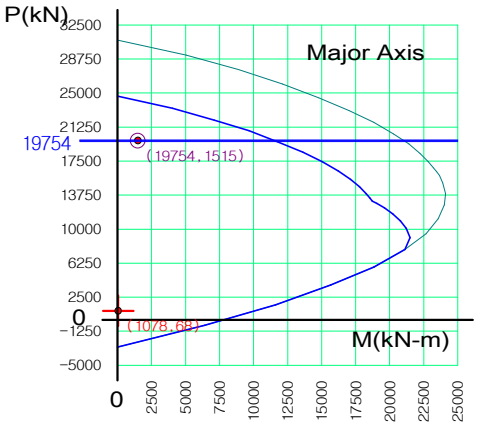
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

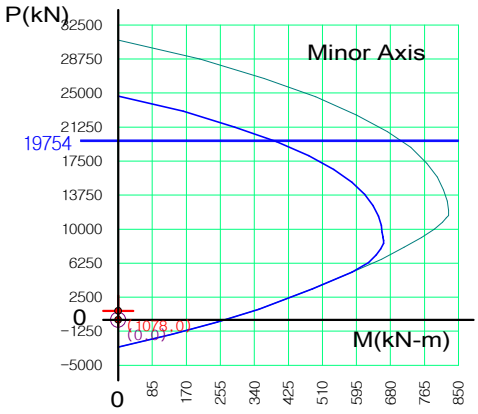


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 19753.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1077.83	1077.83
φPn (kN)	19753.9	0.00000
Pu / φPn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-67.521	0.00000
φMn (kN-m)	1515.44	0.00000
Mc / φMn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 10.8443 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 642.139 + 1410.93 = 2053.07 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.005 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

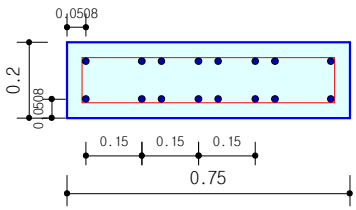
Wall ID : 3121 (Wall Mark : CW3)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

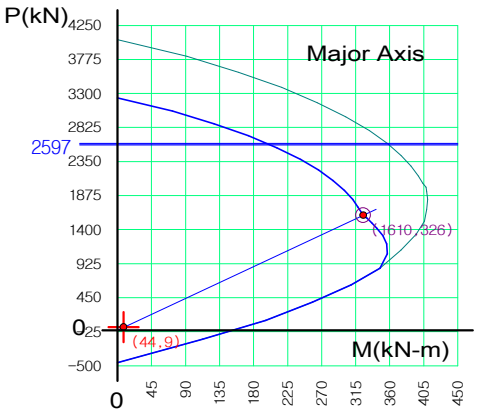
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

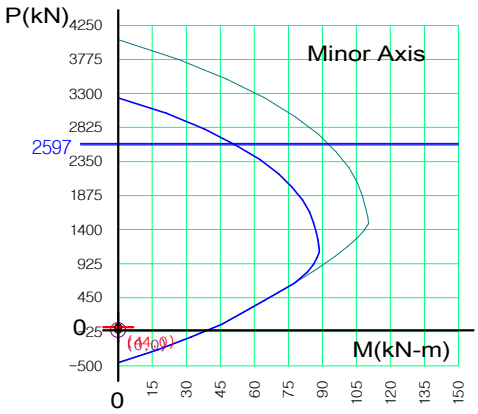


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	44.0436	44.0436
φPn (kN)	1610.02	0.00000
Pu / φPn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	8.90475	0.00000
φMn (kN-m)	325.514	0.00000
Mc / φMn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 5.50715 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 60.0186 + 182.448 = 242.467 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.023 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

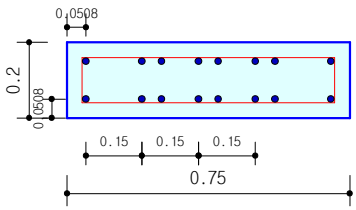
Wall ID : 3122 (Wall Mark : CW4)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

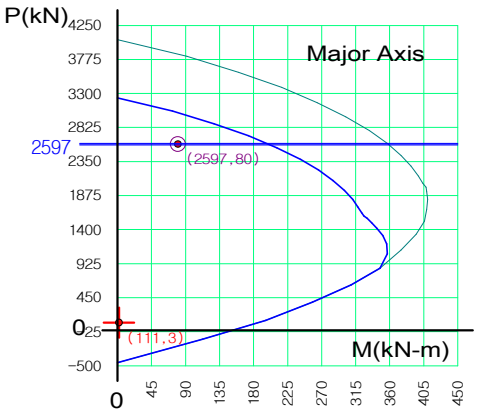
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

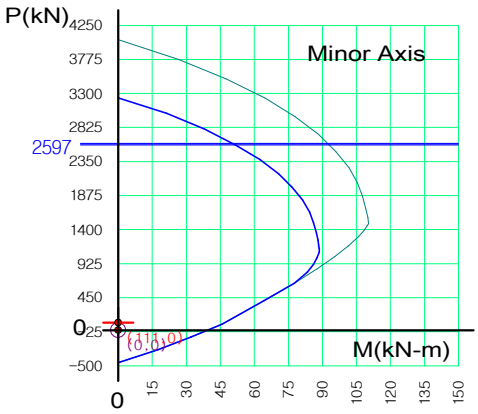


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	110.595	110.595
φPn (kN)	2597.18	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-2.9162	0.00000
φMn (kN-m)	80.1097	0.00000
Mc / φMn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.99955 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 63.5622 + 182.448 = 246.010 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.008 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 3131 (Wall Mark : CW6)

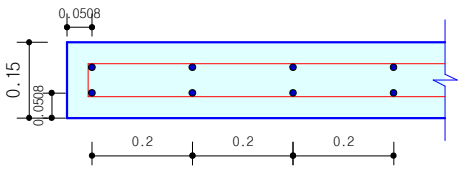
Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

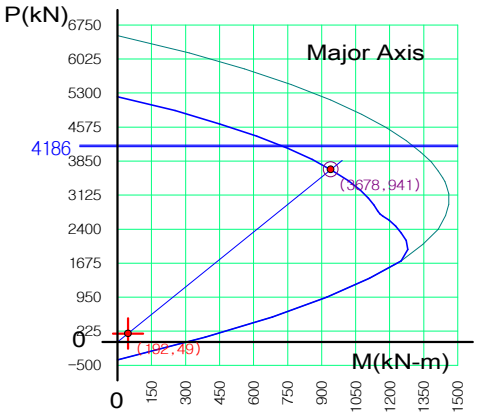
Unit System : kN, m

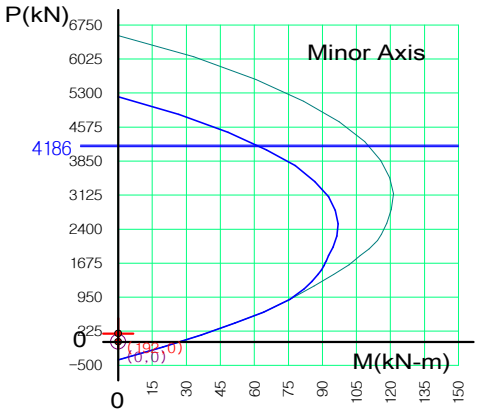


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4185.65 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	192.247	192.247
φPn (kN)	3678.31	0.00000
Pu / φPn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-49.190	0.00000
φMn (kN-m)	941.167	0.00000
Mc / φMn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 26.7465 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 235.733 + 186.257 = 421.989 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.063 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

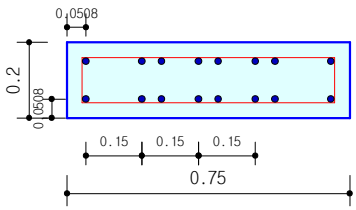
Wall ID : 3141 (Wall Mark : CW9)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

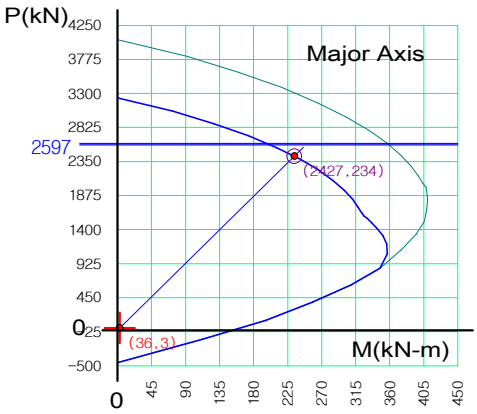
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

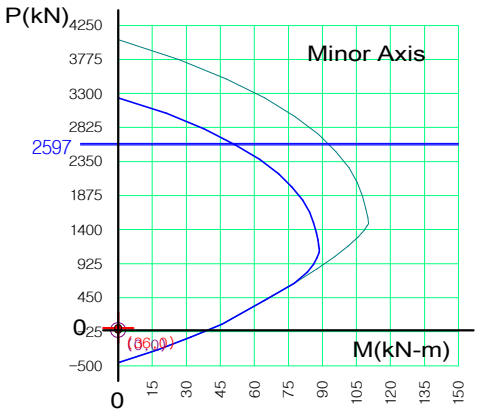


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	35.8469	35.8469
φPn (kN)	2427.37	0.00000
Pu / φPn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.4578	0.00000
φMn (kN-m)	234.147	0.00000
Mc / φMn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.20459 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 60.7555 + 182.448 = 243.204 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

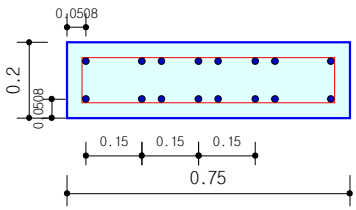
Wall ID : 3142 (Wall Mark : CW10)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

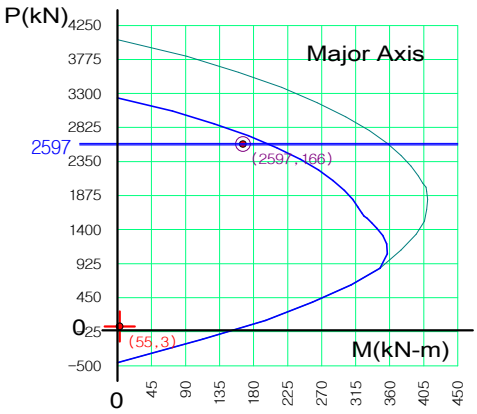
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

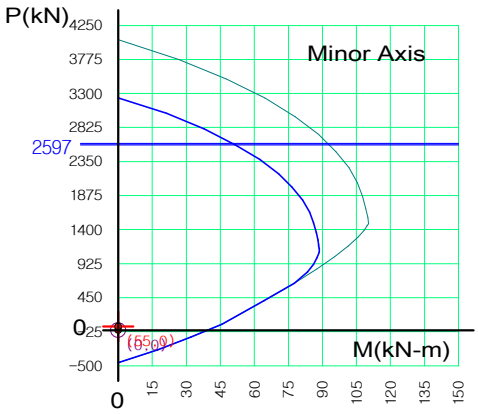


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2597.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	55.2837	55.2837
φPn (kN)	2597.18	0.00000
Pu / φPn	0.021 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.3531	0.00000
φMn (kN-m)	166.094	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 2.13276 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 62.2054 + 182.448 = 244.653 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

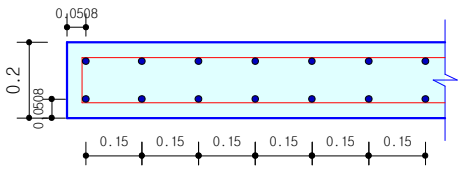
Wall ID : 3211 (Wall Mark : CW1)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

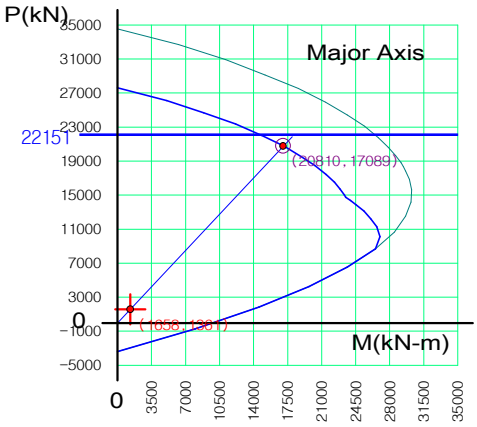
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

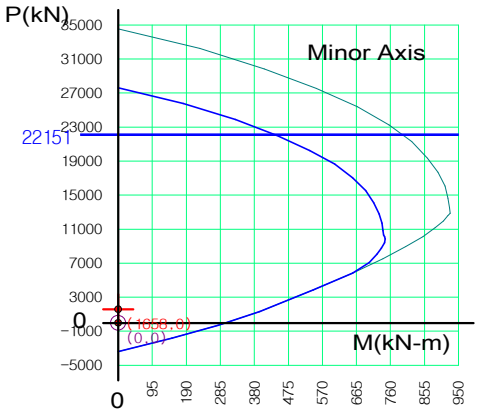


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22151.1 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	1657.72	1657.72
φPn (kN)	20810.3	0.00000
Pu / φPn	0.080 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1361.28	0.00000
φMn (kN-m)	17088.9	0.00000
Mc / φMn	0.080 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 77.6636 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 521.186 + 1581.22 = 2102.40 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.037 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

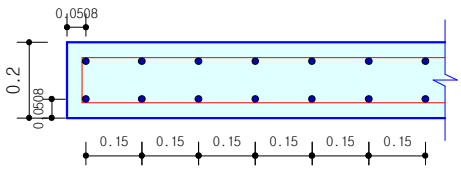
Wall ID : 3221 (Wall Mark : CW2)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

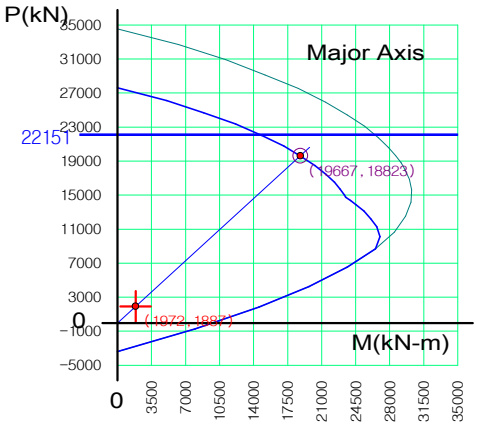
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

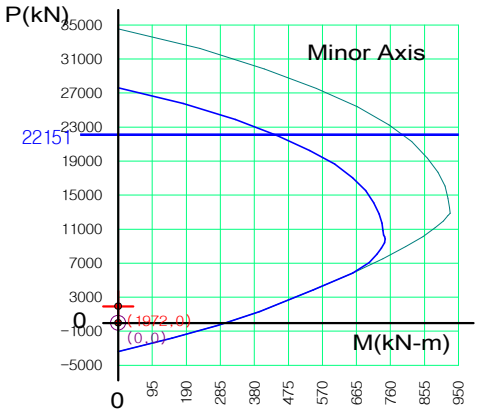


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22151.1 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1971.95	1971.95
φPn (kN)	19667.4	0.00000
Pu / φPn	0.100 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1887.32	0.00000
φMn (kN-m)	18823.3	0.00000
Mc / φMn	0.100 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 167.950 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 757.598 + 1581.22 = 2338.81 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.072 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

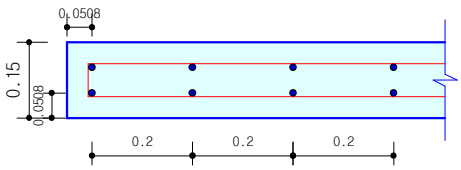
Wall ID : 3241 (Wall Mark : CW5)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5*0.15 m

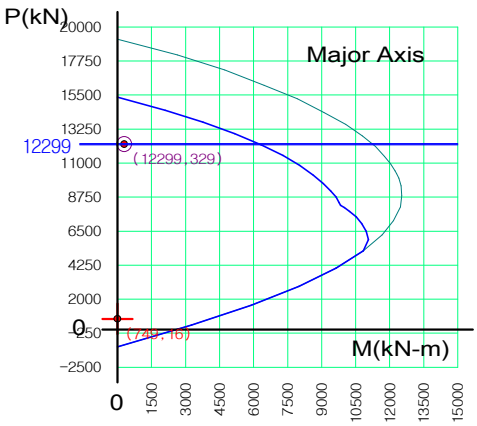
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

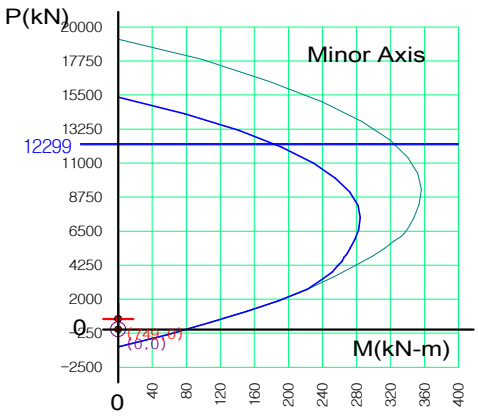


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12298.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	749.325	749.325
φPn (kN)	12298.9	0.00000
Pu / φPn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-16.196	0.00000
φMn (kN-m)	329.456	0.00000
Mc / φMn	0.049 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 57.0434 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 829.138 + 547.814 = 1376.95 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.041 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

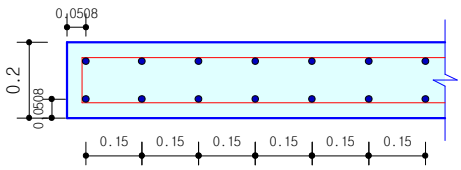
Wall ID : 3251 (Wall Mark : CW7)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

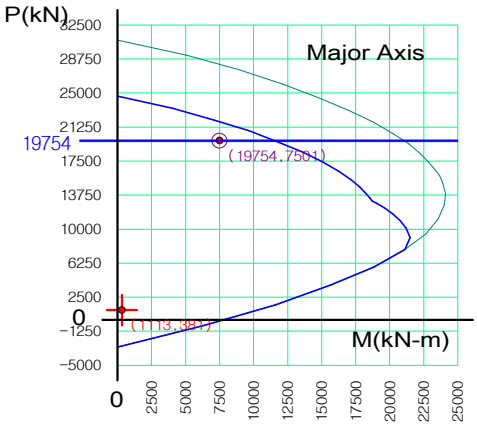
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

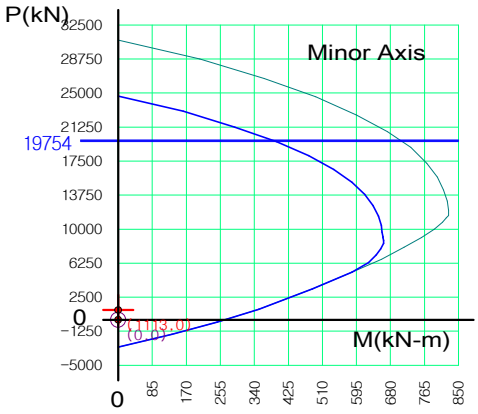


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 19753.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1112.51	1112.51
φPn (kN)	19753.9	0.00000
Pu / φPn	0.056 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-381.26	0.00000
φMn (kN-m)	7500.84	0.00000
Mc / φMn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 99.5042 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1274.97 + 1410.93 = 2685.90 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.037 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

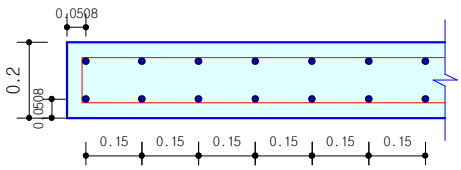
Wall ID : 3261 (Wall Mark : CW8)

Story : 2F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

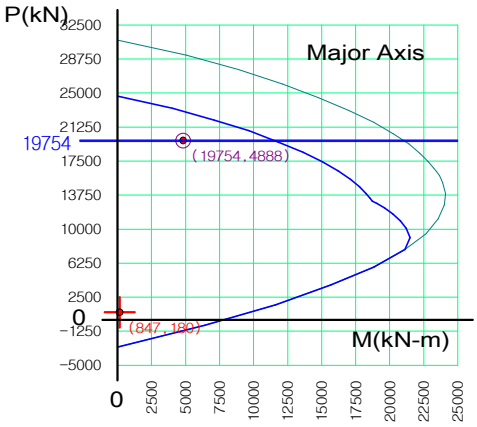
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

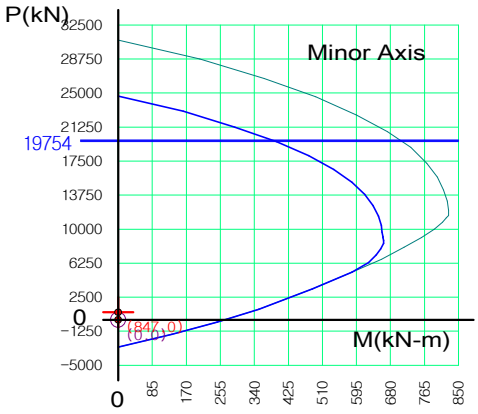


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 19753.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	846.540	846.540
φPn (kN)	19753.9	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-179.88	0.00000
φMn (kN-m)	4887.65	0.00000
Mc / φMn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 29.0744 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1089.40 + 1410.93 = 2500.33 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

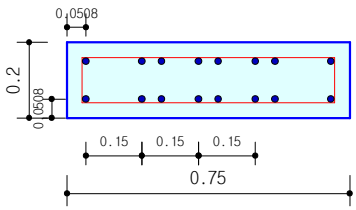
Wall ID : 4121 (Wall Mark : CW3)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

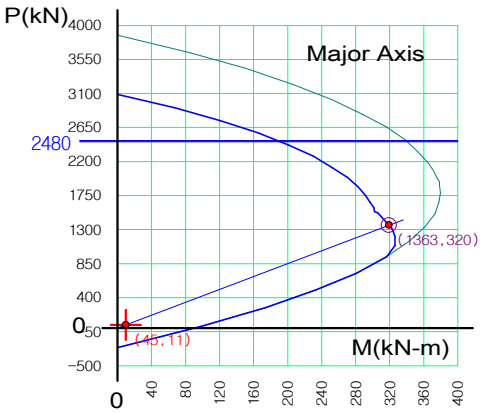
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

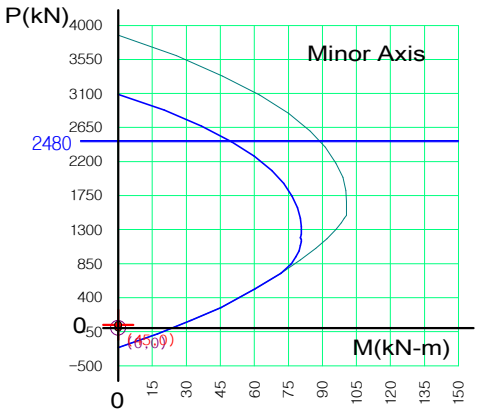


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	45.3242	45.3242
φPn (kN)	1362.78	0.00000
Pu / φPn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	10.5194	0.00000
φMn (kN-m)	319.784	0.00000
Mc / φMn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.74396 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 61.4889 + 82.1722 = 143.661 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.047 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

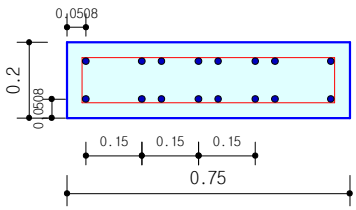
Wall ID : 4122 (Wall Mark : CW4)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

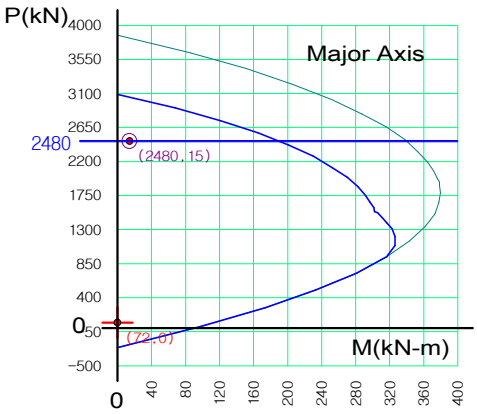
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

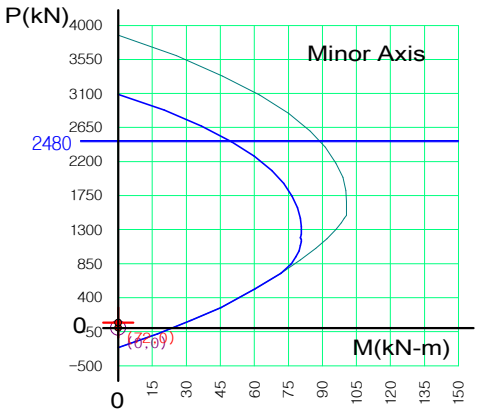


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	71.7103	71.7103
φPn (kN)	2479.92	0.00000
Pu / φPn	0.029 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.3423	0.00000
φMn (kN-m)	14.6128	0.00000
Mc / φMn	0.023 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.17970 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 55.2826 + 82.1722 = 137.455 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

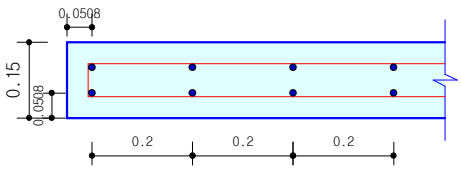
Wall ID : 4131 (Wall Mark : CW6)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

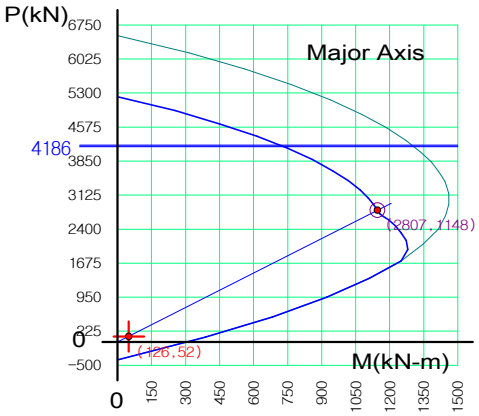
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

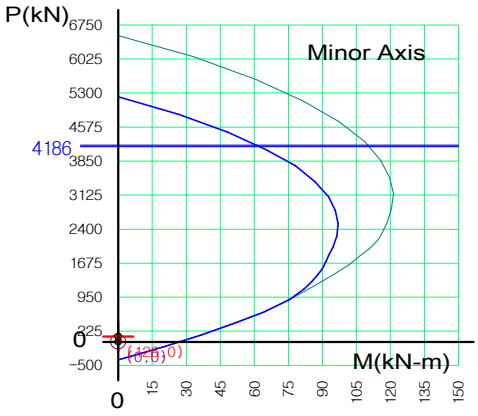


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4185.65 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	126.308	126.308
φPn (kN)	2807.37	0.00000
Pu / φPn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-51.671	0.00000
φMn (kN-m)	1148.46	0.00000
Mc / φMn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 30.7934 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 255.797 + 186.257 = 442.054 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.070 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

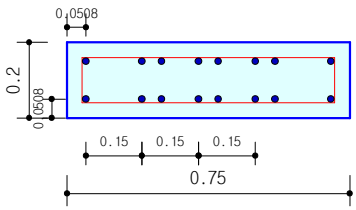
Wall ID : 4141 (Wall Mark : CW9)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

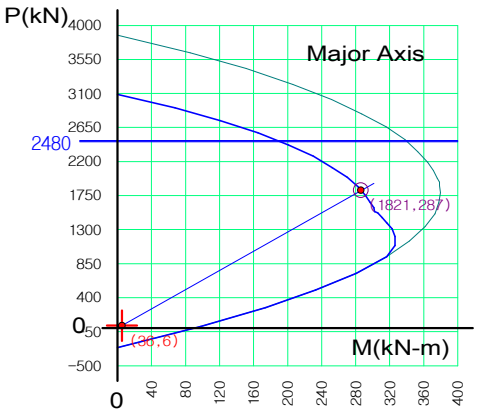
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

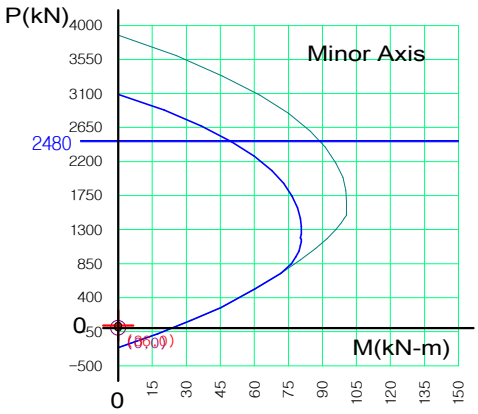


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	35.9454	35.9454
φPn (kN)	1821.06	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.6630	0.00000
φMn (kN-m)	286.900	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.65937 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 60.3503 + 82.1722 = 142.522 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.026 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

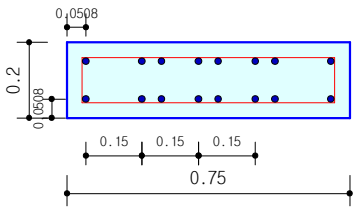
Wall ID : 4142 (Wall Mark : CW10)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

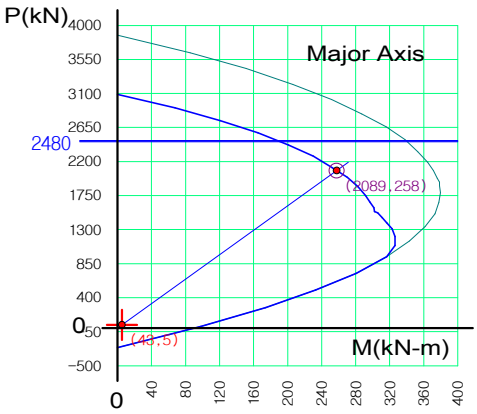
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

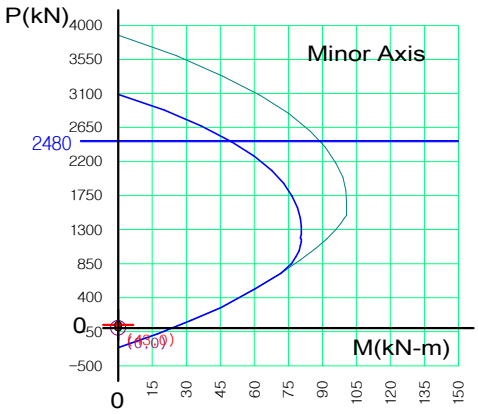


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	43.3980	43.3980
φPn (kN)	2088.99	0.00000
Pu / φPn	0.021 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.3637	0.00000
φMn (kN-m)	258.186	0.00000
Mc / φMn	0.021 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.40760 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 61.1967 + 82.1722 = 143.369 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.024 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

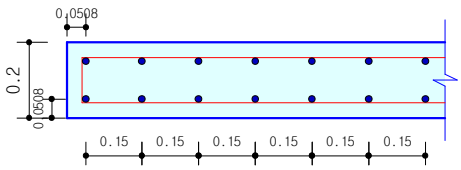
Wall ID : 4211 (Wall Mark : CW1)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

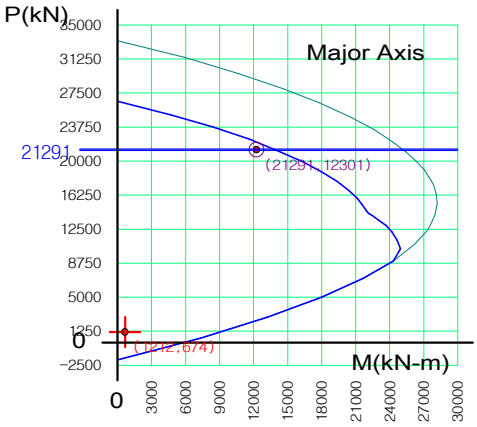
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

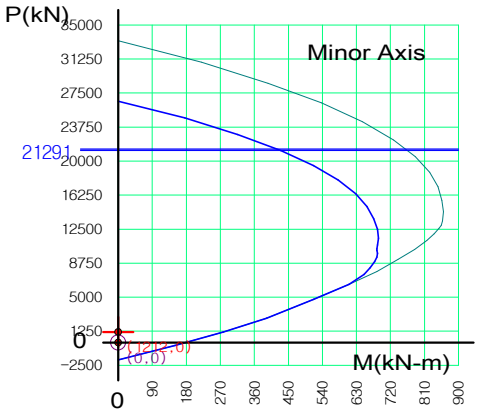


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1212.38	1212.38
φPn (kN)	21291.2	0.00000
Pu / φPn	0.057 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	674.409	0.00000
φMn (kN-m)	12301.4	0.00000
Mc / φMn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 62.2583 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 579.607 + 712.159 = 1291.77 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.048 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

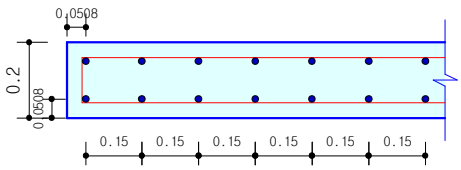
Wall ID : 4231 (Wall Mark : CW2)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

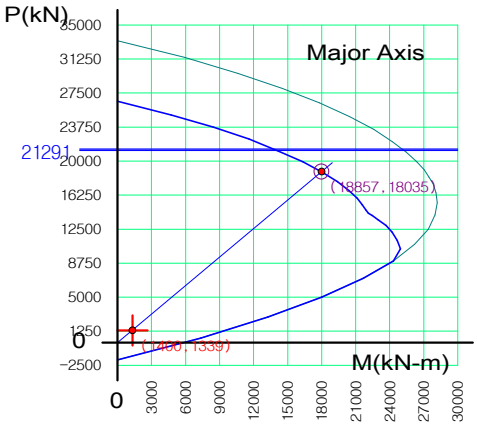
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

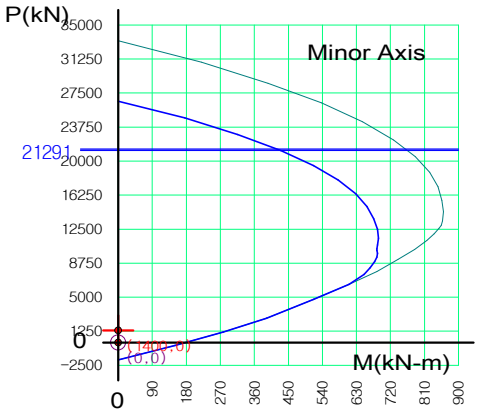


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1399.67	1399.67
φPn (kN)	18857.0	0.00000
Pu / φPn	0.074 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1338.68	0.00000
φMn (kN-m)	18035.3	0.00000
Mc / φMn	0.074 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 169.159 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1020.00 + 712.159 = 1732.15 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.098 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

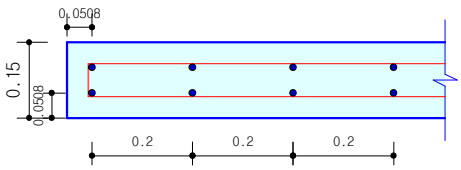
Wall ID : 4251 (Wall Mark : CW5)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5*0.15 m

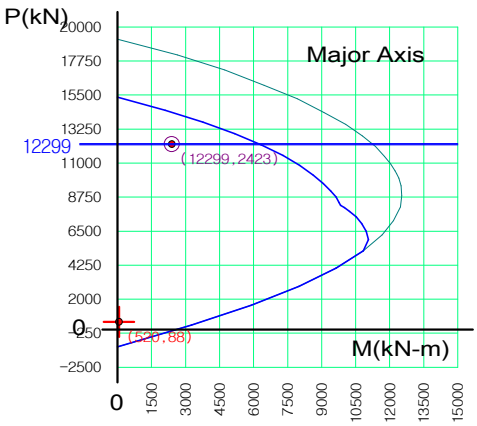
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

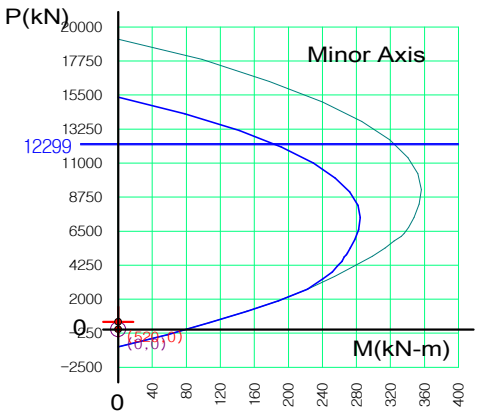


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12298.9 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	520.284	520.284
φPn (kN)	12298.9	0.00000
Pu / φPn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	87.6435	0.00000
φMn (kN-m)	2422.75	0.00000
Mc / φMn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 96.2705 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 792.491 + 547.814 = 1340.31 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.072 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

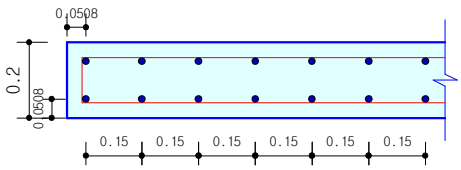
Wall ID : 4261 (Wall Mark : CW7)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

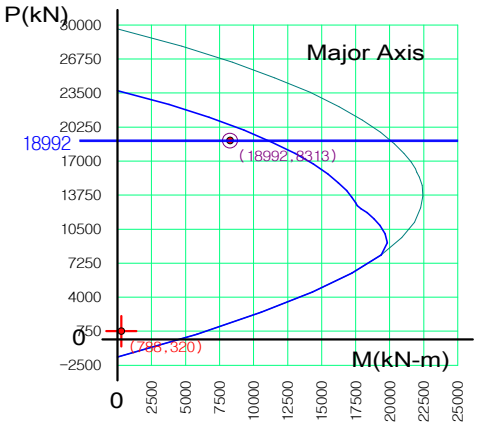
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

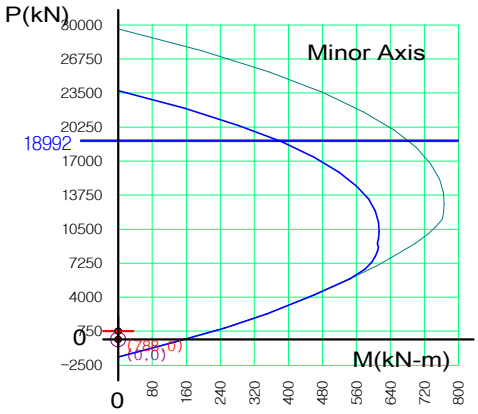


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	788.366	788.366
φPn (kN)	18991.7	0.00000
Pu / φPn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-320.29	0.00000
φMn (kN-m)	8313.40	0.00000
Mc / φMn	0.039 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 122.994 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1223.11 + 635.465 = 1858.57 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.066 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

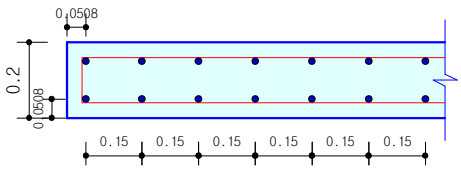
Wall ID : 4271 (Wall Mark : CW8)

Story : 3F (Height = 3.1 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

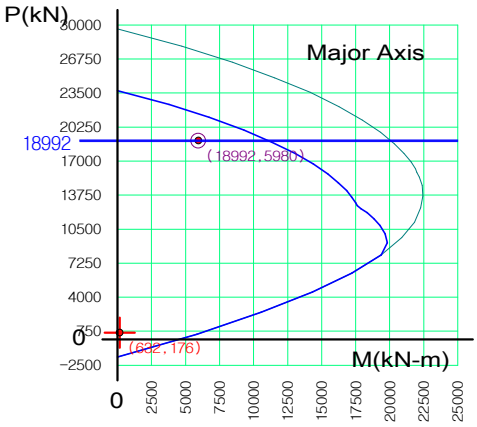
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

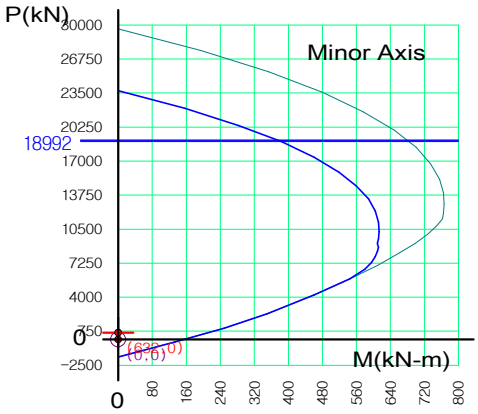


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	631.722	631.722
φPn (kN)	18991.7	0.00000
Pu / φPn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-175.52	0.00000
φMn (kN-m)	5979.87	0.00000
Mc / φMn	0.029 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 47.3558 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1198.05 + 635.465 = 1833.51 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.026 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

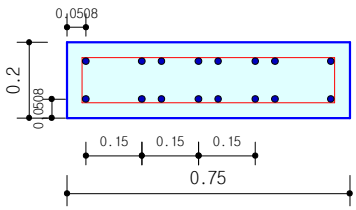
Wall ID : 5121 (Wall Mark : CW3)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

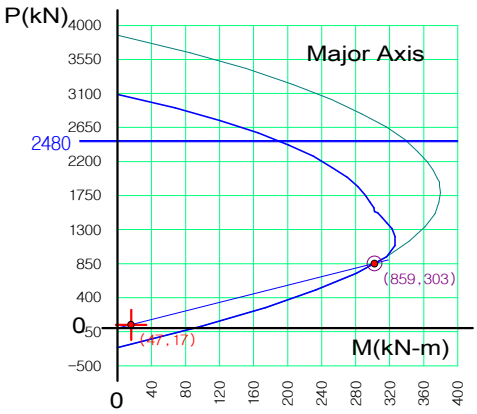
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

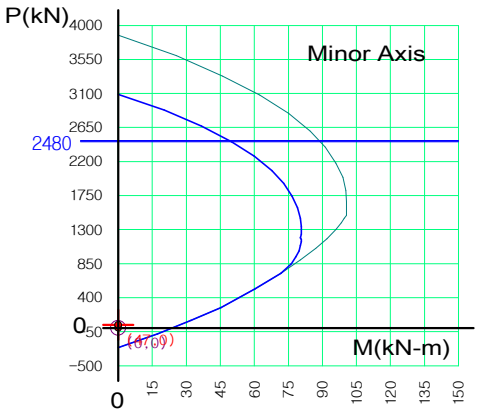


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	47.3569	47.3569
φPn (kN)	858.844	0.00000
Pu / φPn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-16.705	0.00000
φMn (kN-m)	302.959	0.00000
Mc / φMn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 8.75599 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 53.7020 + 82.1722 = 135.874 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.064 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

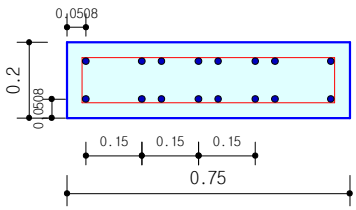
Wall ID : 5122 (Wall Mark : CW4)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

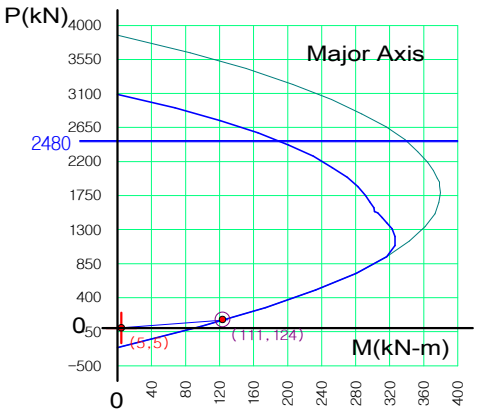
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

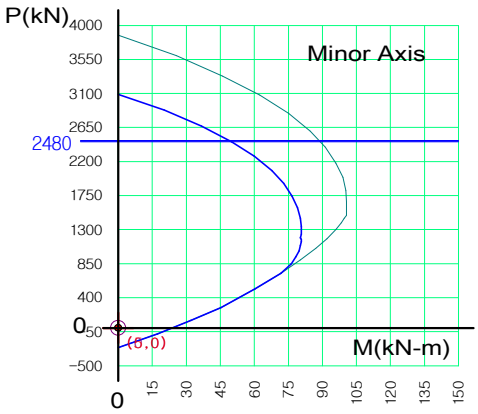


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	4.69952	4.69952
φPn (kN)	110.542	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.2692	0.00000
φMn (kN-m)	123.941	0.00000
Mc / φMn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.31933 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 46.1589 + 82.1722 = 128.331 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.018 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

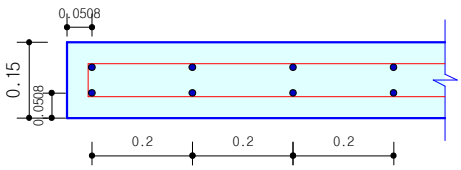
Wall ID : 5131 (Wall Mark : CW6)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

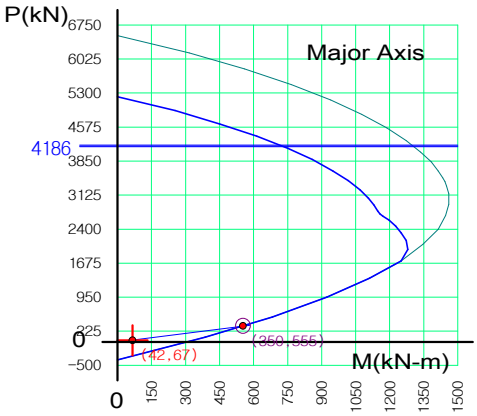
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

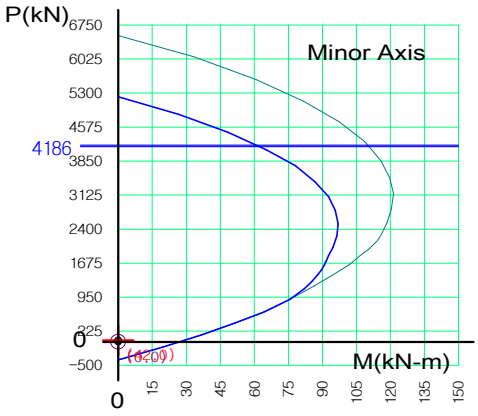


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4185.65 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	42.0920	42.0920
φPn (kN)	349.616	0.00000
Pu / φPn	0.120 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-66.836	0.00000
φMn (kN-m)	555.142	0.00000
Mc / φMn	0.120 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 36.9303 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 207.561 + 186.257 = 393.818 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.094 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

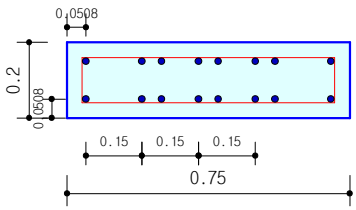
Wall ID : 5141 (Wall Mark : CW9)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

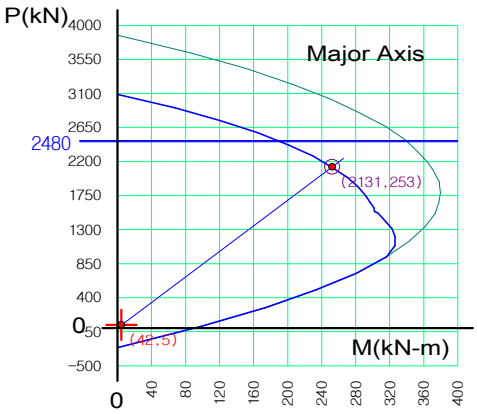
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

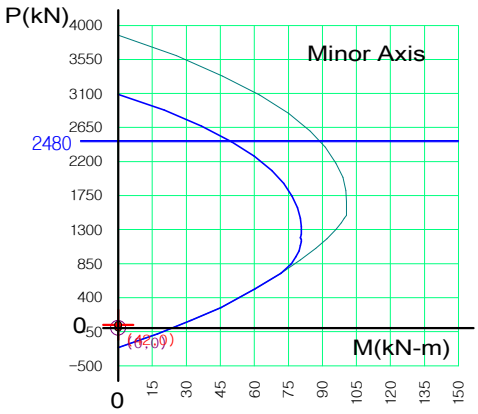


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	42.1766	42.1766
φPn (kN)	2131.28	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.0014	0.00000
φMn (kN-m)	252.733	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.89425 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 57.0634 + 82.1722 = 139.236 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.021 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

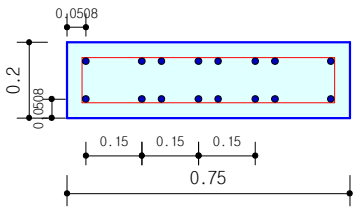
Wall ID : 5142 (Wall Mark : CW10)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

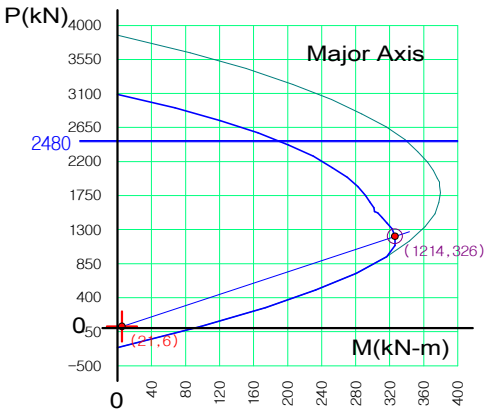
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

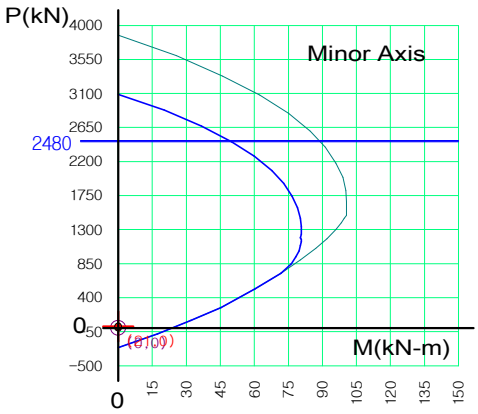


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	21.0305	21.0305
φPn (kN)	1214.13	0.00000
Pu / φPn	0.017 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	6.19922	0.00000
φMn (kN-m)	326.425	0.00000
Mc / φMn	0.019 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.39596 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 53.5535 + 82.1722 = 135.726 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.025 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

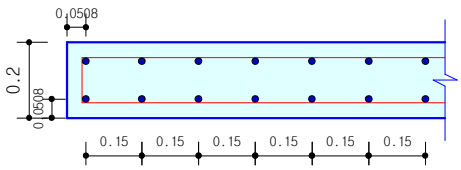
Wall ID : 5211 (Wall Mark : CW1)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

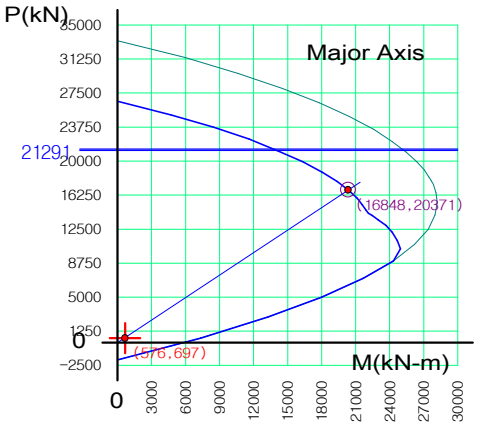
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

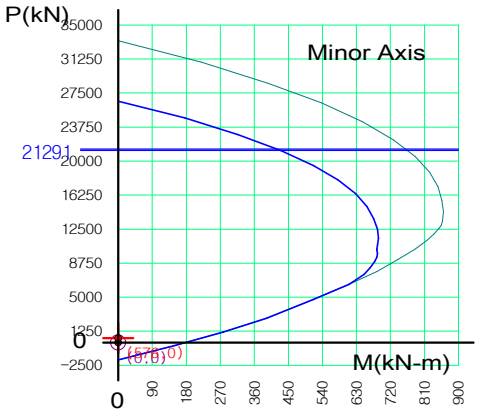


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	576.140	576.140
φPn (kN)	16848.5	0.00000
Pu / φPn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	696.581	0.00000
φMn (kN-m)	20370.6	0.00000
Mc / φMn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 114.837 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1336.72 + 712.159 = 2048.88 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.056 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

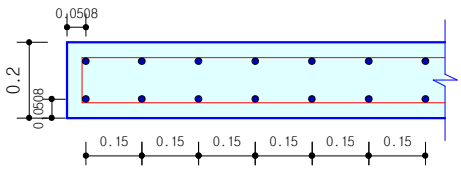
Wall ID : 5221 (Wall Mark : CW2)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

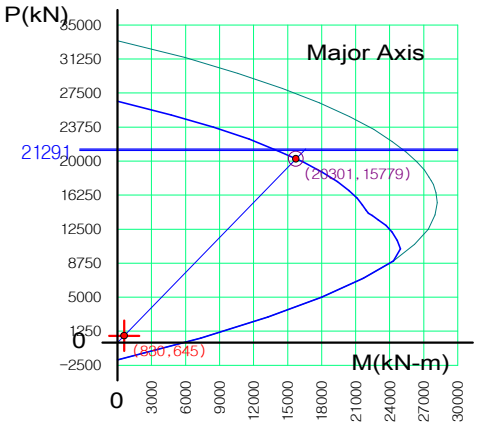
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

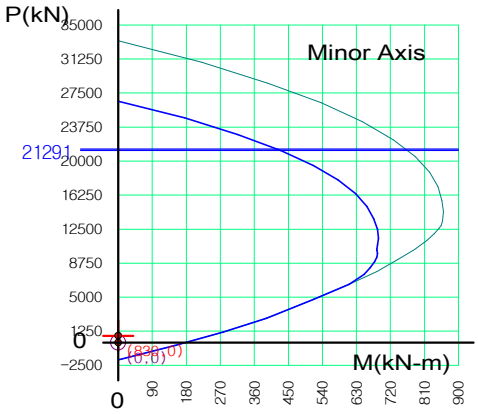


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	829.913	829.913
φPn (kN)	20300.9	0.00000
Pu / φPn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	645.046	0.00000
φMn (kN-m)	15778.8	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 177.970 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1360.68 + 712.159 = 2072.84 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.086 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

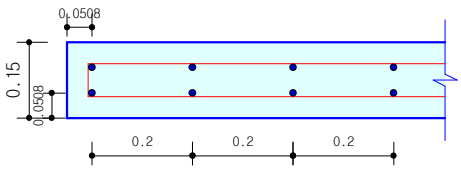
Wall ID : 5241 (Wall Mark : CW5)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5*0.15 m

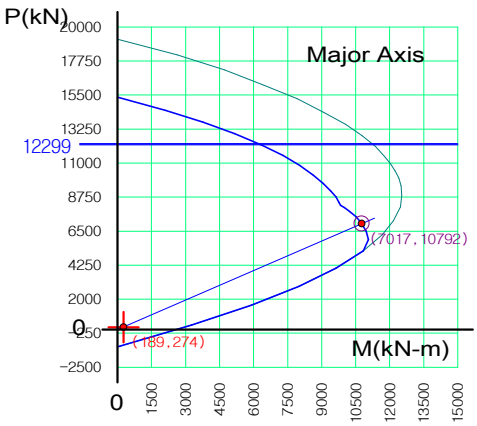
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

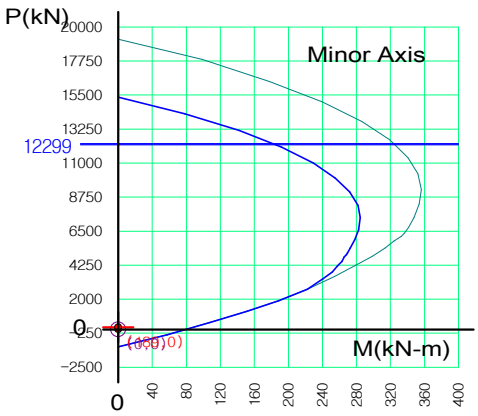


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12298.9 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	188.910	188.910
φPn (kN)	7017.48	0.00000
Pu / φPn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-273.62	0.00000
φMn (kN-m)	10792.0	0.00000
Mc / φMn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 129.176 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 748.229 + 547.814 = 1296.04 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.100 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

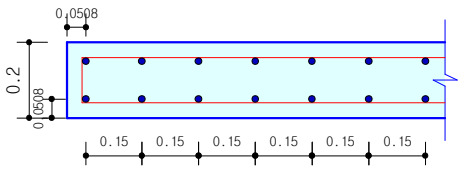
Wall ID : 5251 (Wall Mark : CW7)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

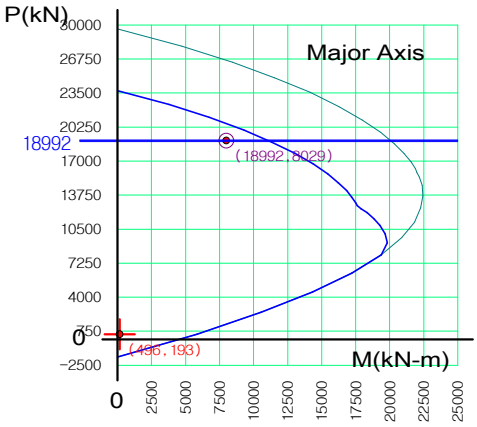
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

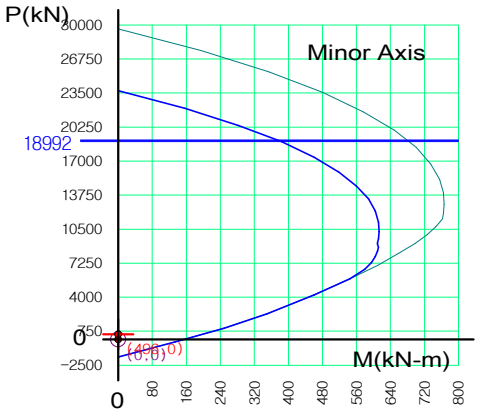


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	495.542	495.542
φPn (kN)	18991.7	0.00000
Pu / φPn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-193.17	0.00000
φMn (kN-m)	8029.16	0.00000
Mc / φMn	0.024 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 152.219 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1174.95 + 635.465 = 1810.41 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.084 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

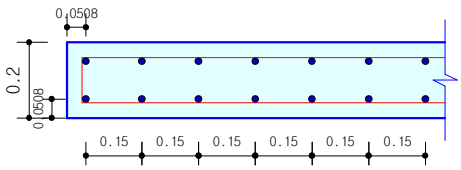
Wall ID : 5261 (Wall Mark : CW8)

Story : 4F (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

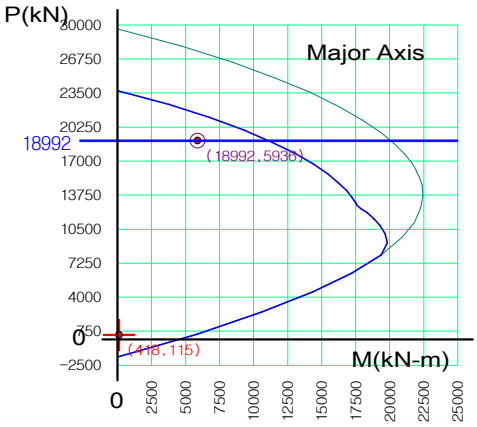
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

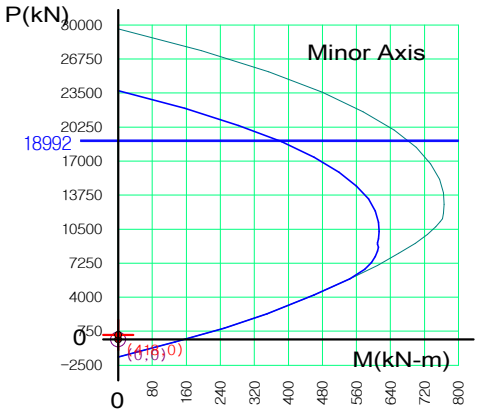


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	417.647	417.647
φPn (kN)	18991.7	0.00000
Pu / φPn	0.022 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-115.08	0.00000
φMn (kN-m)	5935.62	0.00000
Mc / φMn	0.019 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 59.7641 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1162.48 + 635.465 = 1797.95 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.033 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

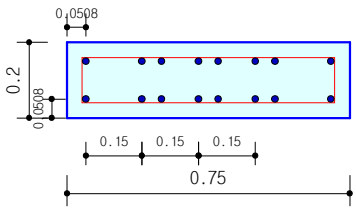
Wall ID : 6121 (Wall Mark : CW3)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

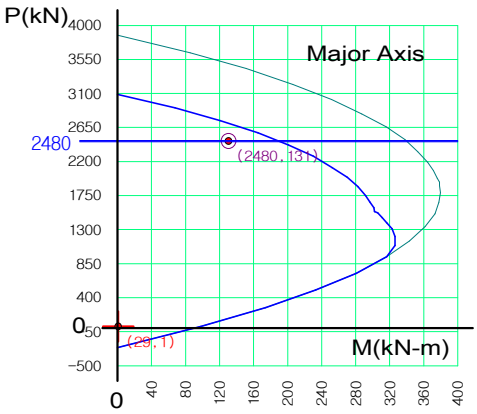
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

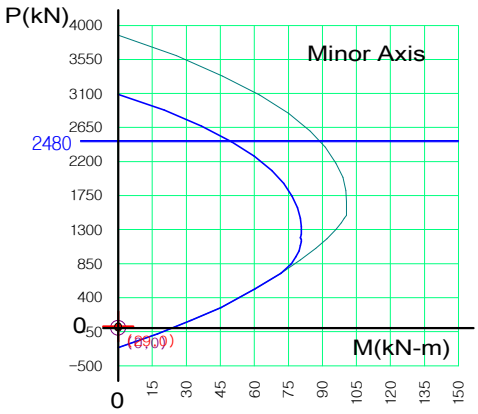


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	28.5806	28.5806
φPn (kN)	2479.92	0.00000
Pu / φPn	0.012 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.38491	0.00000
φMn (kN-m)	131.239	0.00000
Mc / φMn	0.011 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.19752 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 46.9551 + 82.1722 = 129.127 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

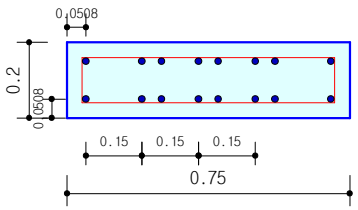
Wall ID : 6122 (Wall Mark : CW4)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

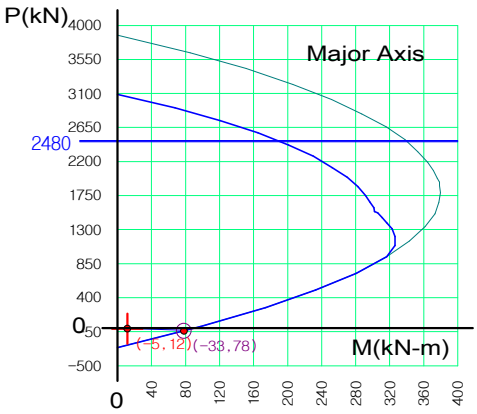
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

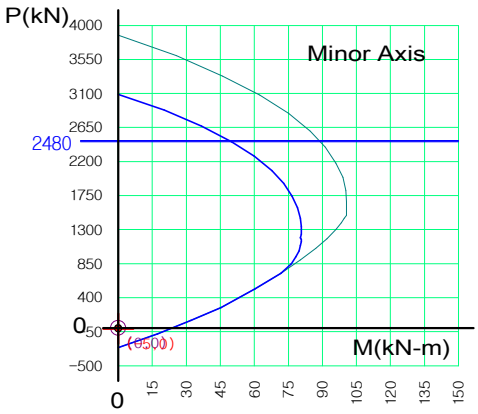


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-4.8711	-4.8711
φPn (kN)	-32.960	0.00000
Pu / φPn	0.148 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	11.5901	0.00000
φMn (kN-m)	78.4245	0.00000
Mc / φMn	0.148 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 6.90780 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 54.6448 + 82.1722 = 136.817 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.050 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

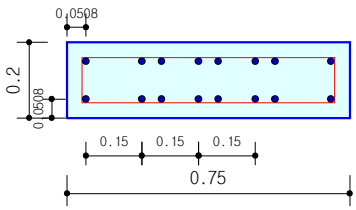
Wall ID : 6131 (Wall Mark : CW9)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

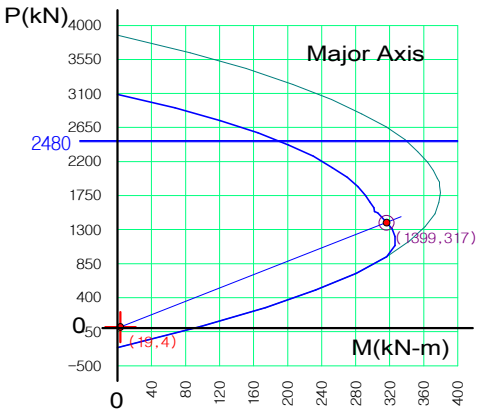
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

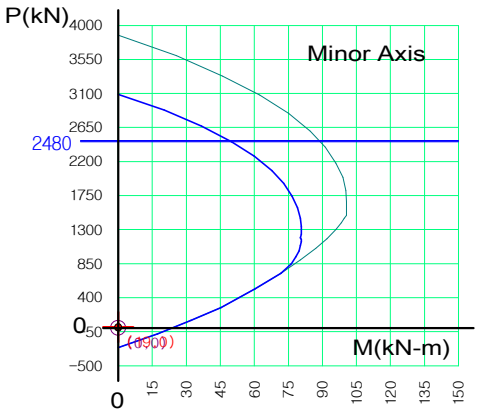


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	19.3973	19.3973
φPn (kN)	1398.93	0.00000
Pu / φPn	0.014 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	4.30527	0.00000
φMn (kN-m)	317.234	0.00000
Mc / φMn	0.014 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 2.07282 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 49.3364 + 82.1722 = 131.509 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

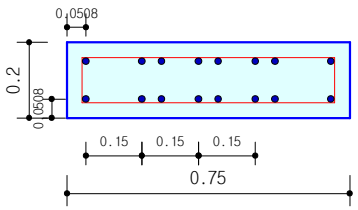
Wall ID : 6132 (Wall Mark : CW10)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 0.75*0.2 m

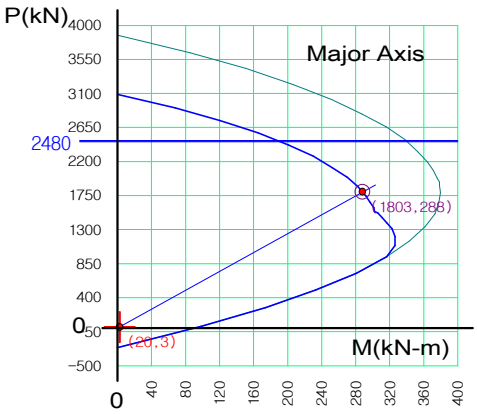
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

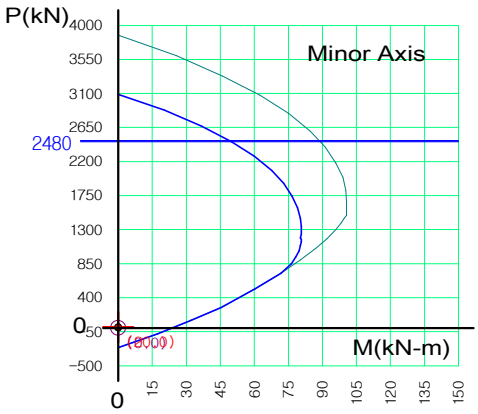


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2479.92 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	19.5314	19.5314
φPn (kN)	1802.79	0.00000
Pu / φPn	0.011 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.1242	0.00000
φMn (kN-m)	288.370	0.00000
Mc / φMn	0.011 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.68872 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 52.9912 + 82.1722 = 135.163 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

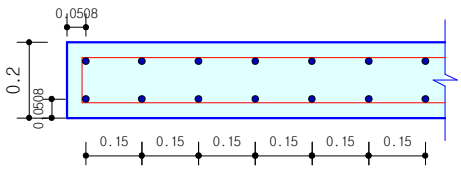
Wall ID : 6211 (Wall Mark : CW1)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

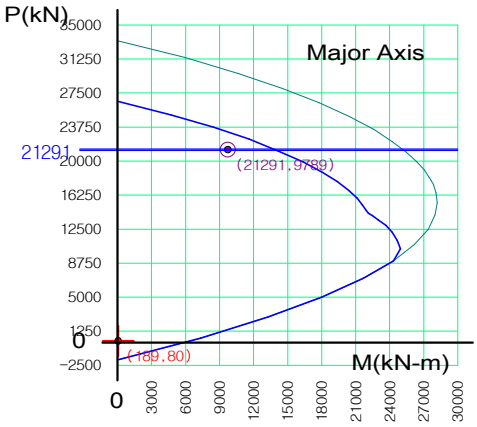
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

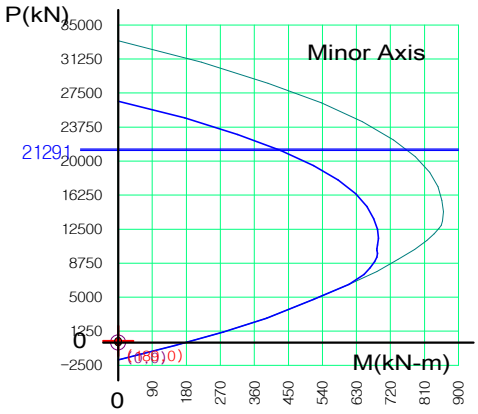


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	189.351	189.351
φPn (kN)	21291.2	0.00000
Pu / φPn	0.009 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	79.8323	0.00000
φMn (kN-m)	9789.00	0.00000
Mc / φMn	0.008 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 6.56157 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 563.920 + 712.159 = 1276.08 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.005 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

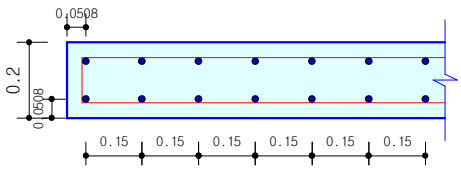
Wall ID : 6222 (Wall Mark : CW2)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

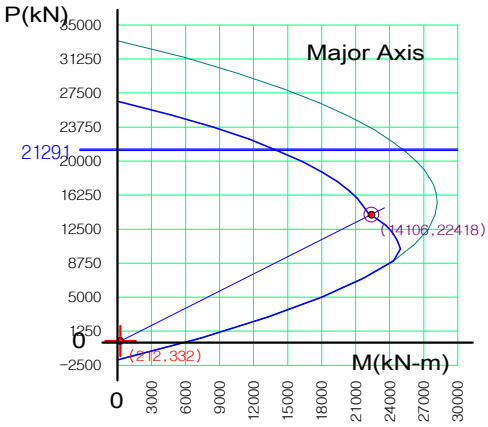
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

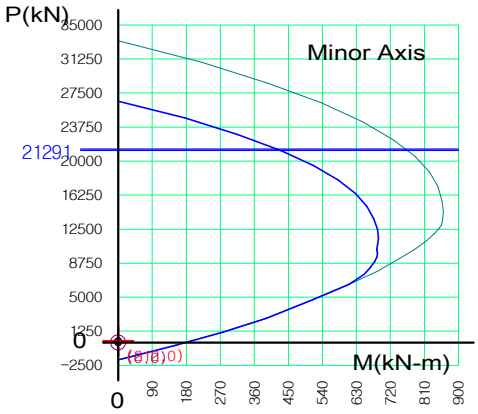


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21291.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	211.706	211.706
φPn (kN)	14106.2	0.00000
Pu / φPn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	331.509	0.00000
φMn (kN-m)	22418.2	0.00000
Mc / φMn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 67.2050 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1261.76 + 712.159 = 1973.92 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.034 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

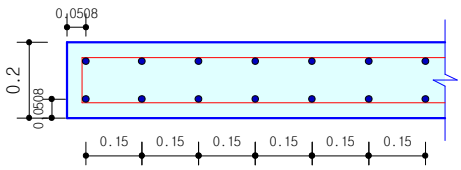
Wall ID : 6241 (Wall Mark : CW7)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

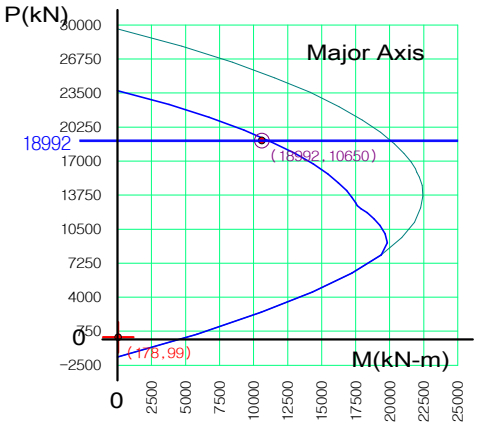
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

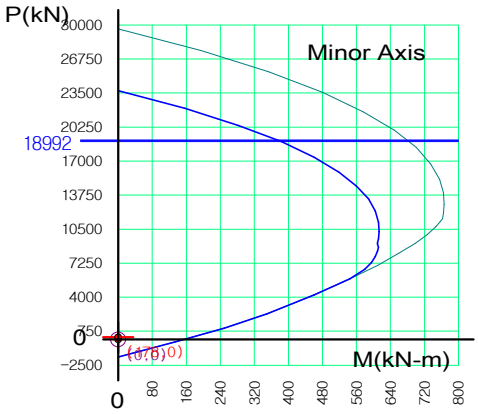


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	178.241	178.241
φPn (kN)	18991.7	0.00000
Pu / φPn	0.009 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-98.572	0.00000
φMn (kN-m)	10649.7	0.00000
Mc / φMn	0.009 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.64698 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 214.582 + 635.465 = 850.047 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

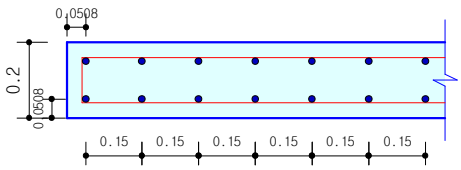
Wall ID : 6251 (Wall Mark : CW8)

Story : RF (Height = 3.4 m)

Material Data : fck = 28540, fy = 300000, fys = 300000 KPa

Wall Dim. (Length*Thk) : 5.8*0.2 m

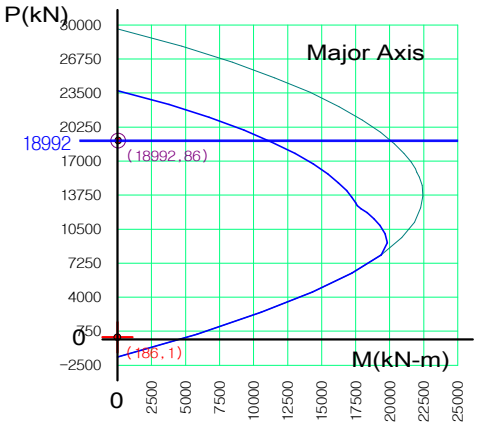
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

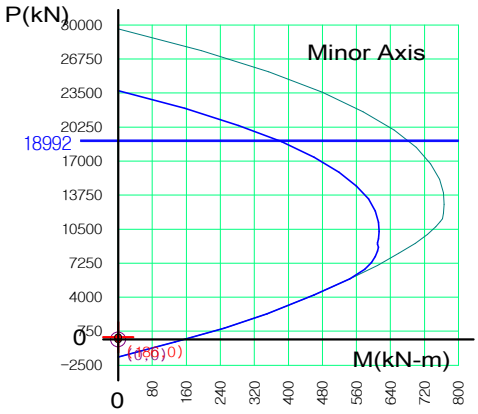


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18991.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	185.999	185.999
φPn (kN)	18991.7	0.00000
Pu / φPn	0.010 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.67683	0.00000
φMn (kN-m)	86.2780	0.00000
Mc / φMn	0.008 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 7.43674 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1125.42 + 635.465 = 1760.88 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.004 < 1.000 ..... O.K

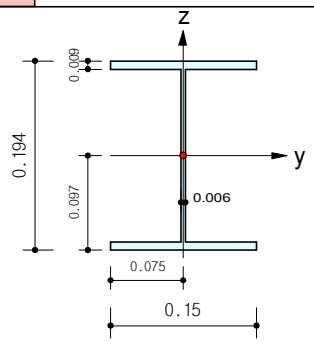
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 923
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name H 194x150x6/9 (No:6)
(Rolled : H 194x150x6/9).
Member Length : 3.40000



2. Member Forces

Axial Force Fxx = 0.00000 (LCB: 1, POS:I)
Bending Moments My = -17.895, Mz = 0.00000
End Moments Myi = -17.895, Myj = -6.1148 (for Lb)
Myi = -17.895, Myj = -6.1148 (for Ly)
Mzi = 0.00000, Mzj = 0.00000 (for Lz)
Shear Forces Fyy = 0.00000 (LCB: 1, POS:I)
Fzz = -21.451 (LCB: 1, POS:I)

Depth	0.19400	Web Thick	0.00600
Top F Width	0.15000	Top F Thick	0.00900
Bot.F Width	0.15000	Bot.F Thick	0.00900
Area	0.00390	Asz	0.00116
Qyb	0.02468	Qzb	0.00281
Iyy	0.00003	Izz	0.00001
Ybar	0.07500	Zbar	0.09700
Syy	0.00028	Szz	0.00007
ry	0.08300	rz	0.03610

3. Design Parameters

Unbraced Lengths Ly = 3.40000, Lz = 3.40000, Lb = 3.40000
Effective Length Factors Ky = 1.00, Kz = 1.00
Moment Factor / Bending Coefficient
Cmy = 1.00, Cmz = 1.00, Cb = 1.00

4. Checking Results

Slenderness Ratio
L/r = 94.2 < 300.0 (Memb:923, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 0.000/825.062 = 0.000 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 17.8950/57.4846 = 0.311 < 1.000 ..... O.K
Muz/phiMnz = 0.0000/21.9960 = 0.000 < 1.000 ..... O.K
Combined Strength (Tension+Bending)
Pu/phiPn = 0.00 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.311 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.131 < 1.000 ..... O.K

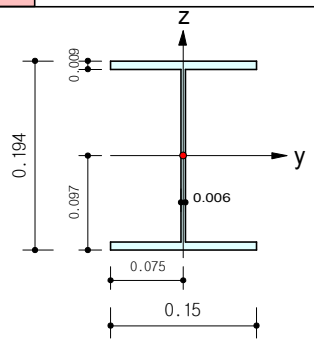
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1265
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 3SG1 (No:203)
(Rolled : H 194x150x6/9).
Member Length : 3.60000



2. Member Forces

Axial Force Fxx = 0.00000 (LCB: 1, POS:I)
Bending Moments My = -13.881, Mz = 0.00000
End Moments Myi = -13.881, Myj = -13.229 (for Lb)
Myi = -13.881, Myj = -13.229 (for Ly)
Mzi = 0.00000, Mzj = 0.00000 (for Lz)
Shear Forces Fyy = 0.00000 (LCB: 1, POS:I)
Fzz = 15.4761 (LCB: 1, POS:J)

Depth	0.19400	Web Thick	0.00600
Top F Width	0.15000	Top F Thick	0.00900
Bot.F Width	0.15000	Bot.F Thick	0.00900
Area	0.00390	Asz	0.00116
Qyb	0.02468	Qzb	0.00281
Iyy	0.00003	Izz	0.00001
Ybar	0.07500	Zbar	0.09700
Syy	0.00028	Szz	0.00007
ry	0.08300	rz	0.03610

3. Design Parameters

Unbraced Lengths Ly = 3.60000, Lz = 3.60000, Lb = 3.60000
Effective Length Factors Ky = 1.00, Kz = 1.00
Moment Factor / Bending Coefficient
Cmy = 1.00, Cmz = 1.00, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 99.7 < 200.0 (Memb:1246, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 0.000/825.062 = 0.000 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 13.8807/56.4515 = 0.246 < 1.000 ..... O.K
Muz/phiMnz = 0.0000/21.9960 = 0.000 < 1.000 ..... O.K
Combined Strength (Tension+Bending)
Pu/phiPn = 0.00 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.246 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.094 < 1.000 ..... O.K

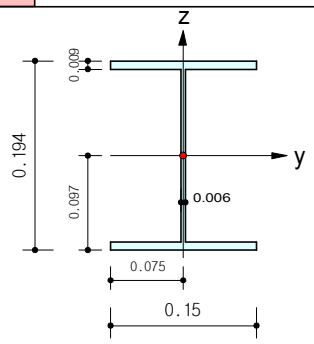
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1243
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 4SG1 (No:204)
(Rolled : H 194x150x6/9).
Member Length : 3.60000



2. Member Forces

Axial Force Fxx = 0.00000 (LCB: 1, POS:J)
Bending Moments My = -12.983, Mz = 0.00000
End Moments Myi = -12.400, Myj = -12.983 (for Lb)
Myi = -12.400, Myj = -12.983 (for Ly)
Mzi = 0.00000, Mzj = 0.00000 (for Lz)
Shear Forces Fyy = 0.00000 (LCB: 1, POS:I)
Fzz = 15.8289 (LCB: 1, POS:J)

Depth	0.19400	Web Thick	0.00600
Top F Width	0.15000	Top F Thick	0.00900
Bot.F Width	0.15000	Bot.F Thick	0.00900
Area	0.00390	Asz	0.00116
Qyb	0.02468	Qzb	0.00281
Iyy	0.00003	Izz	0.00001
Ybar	0.07500	Zbar	0.09700
Syy	0.00028	Szz	0.00007
ry	0.08300	rz	0.03610

3. Design Parameters

Unbraced Lengths Ly = 3.60000, Lz = 3.60000, Lb = 3.60000
Effective Length Factors Ky = 1.00, Kz = 1.00
Moment Factor / Bending Coefficient
Cmy = 1.00, Cmz = 1.00, Cb = 1.00

4. Checking Results

Slenderness Ratio
L/r = 99.7 < 300.0 (Memb:1243, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 0.000/825.062 = 0.000 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 12.9830/56.4515 = 0.230 < 1.000 ..... O.K
Muz/phiMnz = 0.0000/21.9960 = 0.000 < 1.000 ..... O.K
Combined Strength (Tension+Bending)
Pu/phiPn = 0.00 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.230 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.096 < 1.000 ..... O.K

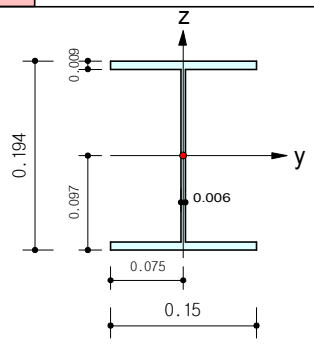
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1235
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name RSG1 (No:205)
(Rolled : H 194x150x6/9).
Member Length : 3.60000



2. Member Forces

Axial Force Fxx = 0.00000 (LCB: 1, POS:I)
Bending Moments My = -16.326, Mz = 0.00000
End Moments Myi = -16.326, Myj = -10.649 (for Lb)
Myi = -16.326, Myj = -10.649 (for Ly)
Mzi = 0.00000, Mzj = 0.00000 (for Lz)
Shear Forces Fyy = 0.00000 (LCB: 1, POS:I)
Fzz = -17.994 (LCB: 1, POS:I)

Depth	0.19400	Web Thick	0.00600
Top F Width	0.15000	Top F Thick	0.00900
Bot.F Width	0.15000	Bot.F Thick	0.00900
Area	0.00390	Asz	0.00116
Qyb	0.02468	Qzb	0.00281
Iyy	0.00003	Izz	0.00001
Ybar	0.07500	Zbar	0.09700
Syy	0.00028	Szz	0.00007
ry	0.08300	rz	0.03610

3. Design Parameters

Unbraced Lengths Ly = 3.60000, Lz = 3.60000, Lb = 3.60000
Effective Length Factors Ky = 1.00, Kz = 1.00
Moment Factor / Bending Coefficient
Cmy = 1.00, Cmz = 1.00, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 99.7 < 200.0 (Memb:1232, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 0.000/825.062 = 0.000 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 16.3264/56.4515 = 0.289 < 1.000 ..... O.K
Muz/phiMnz = 0.0000/21.9960 = 0.000 < 1.000 ..... O.K
Combined Strength (Tension+Bending)
Pu/phiPn = 0.00 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.289 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.110 < 1.000 ..... O.K

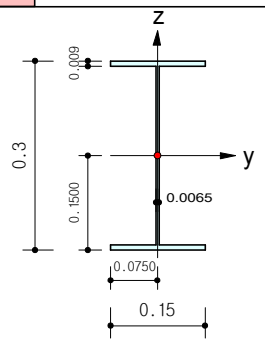
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1263
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 2SG1 (No:206)
(Rolled : H 300x150x6.5/9).
Member Length : 3.60000



2. Member Forces

Axial Force Fxx = 0.00000 (LCB: 1, POS:I)
Bending Moments My = -35.243, Mz = 0.00000
End Moments Myi = -35.243, Myj = -18.385 (for Lb)
Myi = -35.243, Myj = -18.385 (for Ly)
Mzi = 0.00000, Mzj = 0.00000 (for Lz)
Shear Forces Fyy = 0.00000 (LCB: 1, POS:I)
Fzz = -36.386 (LCB: 1, POS:I)

Depth	0.30000	Web Thick	0.00650
Top F Width	0.15000	Top F Thick	0.00900
Bot.F Width	0.15000	Bot.F Thick	0.00900
Area	0.00468	Asz	0.00195
Qyb	0.04016	Qzb	0.00281
Iyy	0.00007	Izz	0.00001
Ybar	0.07500	Zbar	0.15000
Syy	0.00048	Szz	0.00007
ry	0.12400	rz	0.03290

3. Design Parameters

Unbraced Lengths Ly = 3.60000, Lz = 3.60000, Lb = 3.60000
Effective Length Factors Ky = 1.00, Kz = 1.00
Moment Factor / Bending Coefficient
Cmy = 1.00, Cmz = 1.00, Cb = 1.00

4. Checking Results

Slenderness Ratio
L/r = 109.4 < 300.0 (Memb:1263, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 0.000/989.397 = 0.000 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 35.2431/90.6840 = 0.389 < 1.000 ..... O.K
Muz/phiMnz = 0.0000/22.2075 = 0.000 < 1.000 ..... O.K
Combined Strength (Tension+Bending)
Pu/phiPn = 0.00 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.389 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.132 < 1.000 ..... O.K

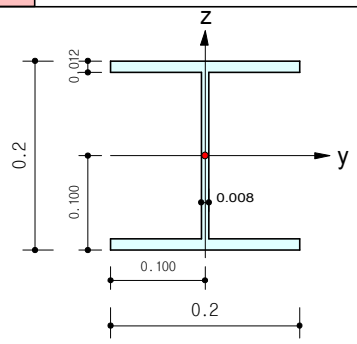
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1218
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 1SC1 (No:300)
(Rolled : H 200x200x8/12).
Member Length : 3.50000



Depth	0.20000	Web Thick	0.00800
Top F Width	0.20000	Top F Thick	0.01200
Bot.F Width	0.20000	Bot.F Thick	0.01200
Area	0.00635	Asz	0.00160
Qyb	0.03207	Qzb	0.00500
Iyy	0.00005	Izz	0.00002
Ybar	0.10000	Zbar	0.10000
Syy	0.00047	Szz	0.00016
ry	0.08620	rz	0.05020

2. Member Forces

Axial Force Fxx = -128.56 (LCB: 1, POS:J)
Bending Moments My = 7.76812, Mz = -0.1750
End Moments Myi = 0.00000, Myj = 7.76812 (for Lb)
Myi = 0.00000, Myj = 7.76812 (for Ly)
Mzi = 0.00000, Mzj = -0.1750 (for Lz)
Shear Forces Fyy = 0.05470 (LCB: 1, POS:I)
Fzz = -2.4275 (LCB: 1, POS:I)

3. Design Parameters

Unbraced Lengths Ly = 3.50000, Lz = 3.50000, Lb = 3.50000
Effective Length Factors Ky = 1.00, Kz = 0.76
Moment Factor / Bending Coefficient
Cmy = 0.85, Cmz = 0.85, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 55.8 < 200.0 (Memb:1209, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 128.56/1174.09 = 0.109 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 7.768/106.901 = 0.073 < 1.000 ..... O.K
Muz/phiMnz = 0.1750/51.6060 = 0.003 < 1.000 ..... O.K
Combined Strength (Compression+Bending)
Pu/phiPn = 0.11 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.131 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.000 < 1.000 ..... O.K
Vuz/phiVnz = 0.011 < 1.000 ..... O.K

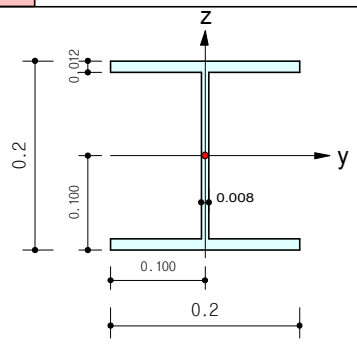
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1219
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 2SC1 (No:301)
(Rolled : H 200x200x8/12).
Member Length : 3.10000



2. Member Forces

Axial Force Fxx = -65.330 (LCB: 1, POS:I)
Bending Moments My = -12.733, Mz = -0.9397
End Moments Myi = -12.733, Myj = 7.30002 (for Lb)
Myi = -12.733, Myj = 7.30002 (for Ly)
Mzi = -0.9397, Mzj = 2.08427 (for Lz)
Shear Forces Fyy = -1.0406 (LCB: 1, POS:I)
Fzz = -6.8937 (LCB: 1, POS:I)

Depth	0.20000	Web Thick	0.00800
Top F Width	0.20000	Top F Thick	0.01200
Bot.F Width	0.20000	Bot.F Thick	0.01200
Area	0.00635	Asz	0.00160
Qyb	0.03207	Qzb	0.00500
Iyy	0.00005	Izz	0.00002
Ybar	0.10000	Zbar	0.10000
Syy	0.00047	Szz	0.00016
ry	0.08620	rz	0.05020

3. Design Parameters

Unbraced Lengths Ly = 3.10000, Lz = 3.10000, Lb = 3.10000
Effective Length Factors Ky = 1.00, Kz = 0.66
Moment Factor / Bending Coefficient
Cmy = 0.85, Cmz = 0.85, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 45.6 < 200.0 (Memb:1211, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 65.33/1239.59 = 0.053 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 12.733/108.854 = 0.117 < 1.000 ..... O.K
Muz/phiMnz = 0.9397/51.6060 = 0.018 < 1.000 ..... O.K
Combined Strength (Compression+Bending)
Pu/phiPn = 0.05 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.162 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.002 < 1.000 ..... O.K
Vuz/phiVnz = 0.031 < 1.000 ..... O.K

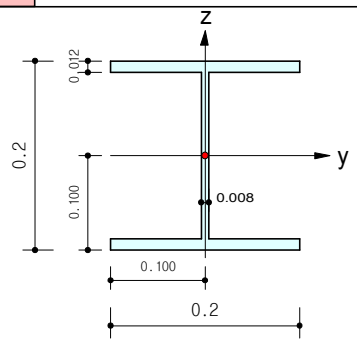
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1220
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 3SC1 (No:302)
(Rolled : H 200x200x8/12).
Member Length : 3.10000



2. Member Forces

Axial Force Fxx = -32.062 (LCB: 1, POS:J)
Bending Moments My = 7.49233, Mz = 3.53807
End Moments Myi = -6.1390, Myj = 7.49233 (for Lb)
Myi = -6.1390, Myj = 7.49233 (for Ly)
Mzi = -3.6231, Mzj = 3.53807 (for Lz)
Shear Forces Fyy = -2.4643 (LCB: 1, POS:I)
Fzz = -4.6908 (LCB: 1, POS:I)

Depth	0.20000	Web Thick	0.00800
Top F Width	0.20000	Top F Thick	0.01200
Bot.F Width	0.20000	Bot.F Thick	0.01200
Area	0.00635	Asz	0.00160
Qyb	0.03207	Qzb	0.00500
Iyy	0.00005	Izz	0.00002
Ybar	0.10000	Zbar	0.10000
Syy	0.00047	Szz	0.00016
ry	0.08620	rz	0.05020

3. Design Parameters

Unbraced Lengths Ly = 3.10000, Lz = 3.10000, Lb = 3.10000
Effective Length Factors Ky = 1.00, Kz = 0.72
Moment Factor / Bending Coefficient
Cmy = 0.85, Cmz = 0.85, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 49.7 < 200.0 (Memb:1213, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 32.06/1221.62 = 0.026 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 7.492/108.854 = 0.069 < 1.000 ..... O.K
Muz/phiMnz = 3.5381/51.6060 = 0.069 < 1.000 ..... O.K
Combined Strength (Compression+Bending)
Pu/phiPn = 0.03 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.151 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.004 < 1.000 ..... O.K
Vuz/phiVnz = 0.021 < 1.000 ..... O.K

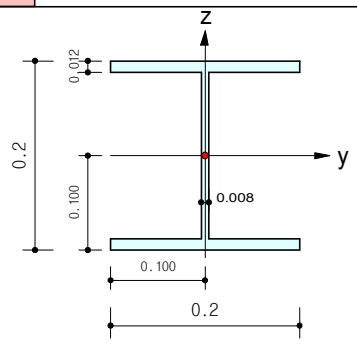
Steel Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(기존부).mgb

1. Design Information

Design Code KDS 41 30 : 2022
Unit System kN, m
Member No 1231
Material SS400 (No:6)
(Fy = 235000, Es = 205000000)
Section Name 4SC1 (No:303)
(Rolled : H 200x200x8/12).
Member Length : 3.40000



Depth	0.20000	Web Thick	0.00800
Top F Width	0.20000	Top F Thick	0.01200
Bot.F Width	0.20000	Bot.F Thick	0.01200
Area	0.00635	Asz	0.00160
Qyb	0.03207	Qzb	0.00500
Iyy	0.00005	Izz	0.00002
Ybar	0.10000	Zbar	0.10000
Syy	0.00047	Szz	0.00016
ry	0.08620	rz	0.05020

2. Member Forces

Axial Force Fxx = -30.083 (LCB: 1, POS:J)
Bending Moments My = 11.2272, Mz = -5.4921
End Moments Myi = -5.0398, Myj = 11.2272 (for Lb)
Myi = -5.0398, Myj = 11.2272 (for Ly)
Mzi = 2.25348, Mzj = -5.4921 (for Lz)
Shear Forces Fyy = 2.41596 (LCB: 1, POS:I)
Fzz = -5.0739 (LCB: 1, POS:I)

3. Design Parameters

Unbraced Lengths Ly = 3.40000, Lz = 3.40000, Lb = 3.40000
Effective Length Factors Ky = 1.00, Kz = 0.75
Moment Factor / Bending Coefficient
Cmy = 0.85, Cmz = 0.85, Cb = 1.00

4. Checking Results

Slenderness Ratio
KL/r = 51.0 < 200.0 (Memb:1231, LCB: 1)..... O.K
Axial Strength
Pu/phiPn = 30.08/1184.08 = 0.025 < 1.000 ..... O.K
Bending Strength
Muy/phiMny = 11.227/107.389 = 0.105 < 1.000 ..... O.K
Muz/phiMnz = 5.4921/51.6060 = 0.106 < 1.000 ..... O.K
Combined Strength (Compression+Bending)
Pu/phiPn = 0.03 < 0.20
Rmax = Pu/(2*phiPn) + [Muy/phiMny + Muz/phiMnz] = 0.224 < 1.000 ..... O.K
Shear Strength
Vuy/phiVny = 0.004 < 1.000 ..... O.K
Vuz/phiVnz = 0.022 < 1.000 ..... O.K

C-2. 증측부

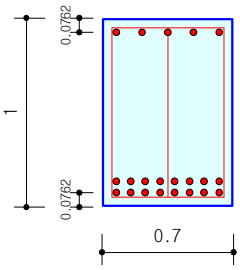
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

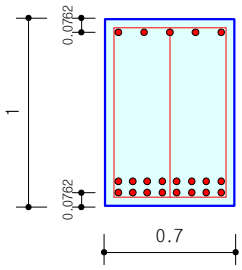
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB1 (No : 32201)	Beam Span	8.7m

[END-I]



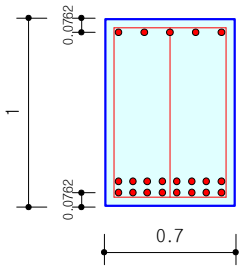
TOP 5-D22
BOT 16-D22
STIRRUPS 3-D13 @200

[MID]



TOP 5-D22
BOT 16-D22
STIRRUPS 3-D13 @200

[END-J]



TOP 5-D22
BOT 16-D22
STIRRUPS 3-D13 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	136.79	176.41	420.43
Factored Strength (φMn)	713.46	713.46	713.46
Check Ratio (Mu/φMn)	0.1917	0.2473	0.5893
(+) Load Combination No.	1	1	1
Moment (Mu)	179.87	617.68	610.20
Factored Strength (φMn)	2075.50	2075.50	2075.50
Check Ratio (Mu/φMn)	0.0867	0.2976	0.2940
Using Rebar Top (As_top)	0.0019	0.0019	0.0019
Using Rebar Bot (As_bot)	0.0062	0.0062	0.0062

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	159.26	294.64	348.66
Shear Strength by Conc.(φVc)	452.56	441.00	452.56
Shear Strength by Rebar.(φVs)	561.82	547.47	561.82
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.1570	0.2981	0.3437

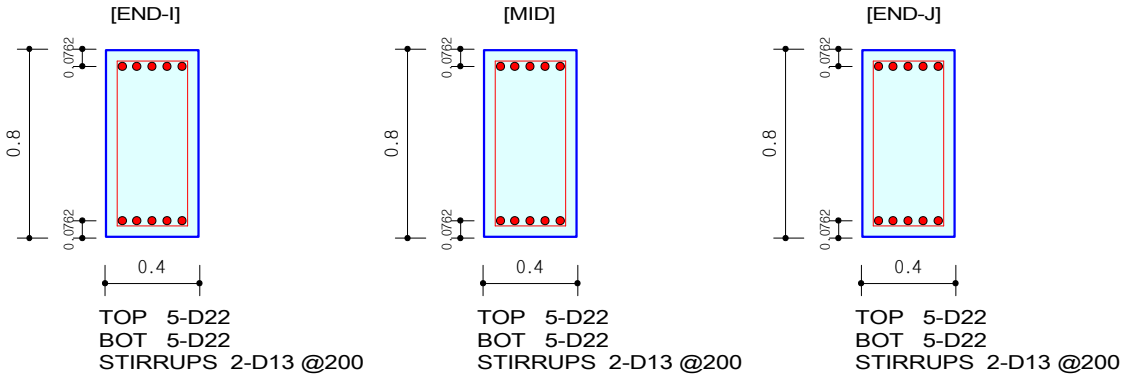
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB2 (No : 32202)	Beam Span	6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	12.17	103.64	82.13
Factored Strength (φMn)	528.39	528.39	528.39
Check Ratio (Mu/φMn)	0.0230	0.1961	0.1554
(+) Load Combination No.	1	1	1
Moment (Mu)	26.69	44.99	61.46
Factored Strength (φMn)	528.39	528.39	528.39
Check Ratio (Mu/φMn)	0.0505	0.0851	0.1163
Using Rebar Top (As_top)	0.0019	0.0019	0.0019
Using Rebar Bot (As_bot)	0.0019	0.0019	0.0019

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	23.71	185.38	183.05
Shear Strength by Conc.(φVc)	202.62	202.62	202.62
Shear Strength by Rebar.(φVs)	293.46	293.46	293.46
Using Shear Reinf. (AsV)	0.0013	0.0013	0.0013
Using Stirrups Spacing	2-D13 @200	2-D13 @200	2-D13 @200
Check Ratio	0.0478	0.3737	0.3690

RC Beam Strength Checking Result

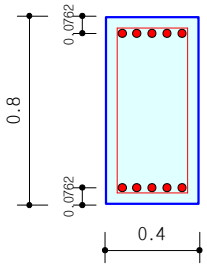
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

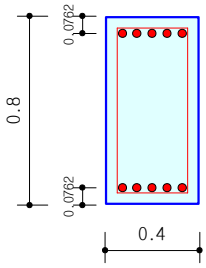
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB2A (No : 32203)	Beam Span	3.86m

[END-I]



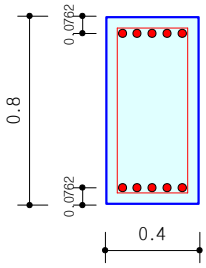
TOP 5-D22
BOT 5-D22
STIRRUPS 2-D13 @200

[MID]



TOP 5-D22
BOT 5-D22
STIRRUPS 2-D13 @200

[END-J]



TOP 5-D22
BOT 5-D22
STIRRUPS 2-D13 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	19.31	70.53	20.49
Factored Strength (φMn)	528.39	528.39	528.39
Check Ratio (Mu/φMn)	0.0365	0.1335	0.0388
(+) Load Combination No.	1	1	1
Moment (Mu)	36.66	38.02	26.40
Factored Strength (φMn)	528.39	528.39	528.39
Check Ratio (Mu/φMn)	0.0694	0.0720	0.0500
Using Rebar Top (As_top)	0.0019	0.0019	0.0019
Using Rebar Bot (As_bot)	0.0019	0.0019	0.0019

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	106.58	125.83	52.87
Shear Strength by Conc.(φVc)	202.62	202.62	202.62
Shear Strength by Rebar.(φVs)	293.46	293.46	293.46
Using Shear Reinf. (AsV)	0.0013	0.0013	0.0013
Using Stirrups Spacing	2-D13 @200	2-D13 @200	2-D13 @200
Check Ratio	0.2148	0.2536	0.1066

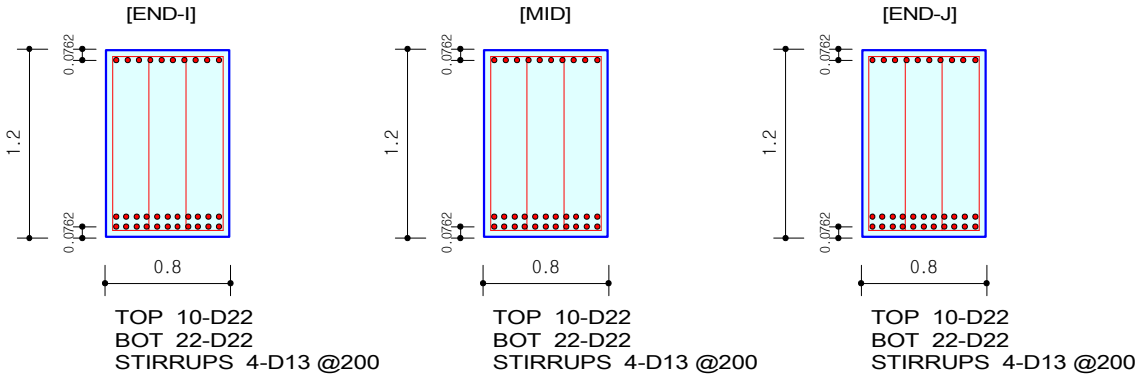
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB3 (No : 32204)	Beam Span	12m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	202.56	165.54	59.39
Factored Strength (φMn)	1676.12	1676.12	1676.12
Check Ratio (Mu/φMn)	0.1208	0.0988	0.0354
(+) Load Combination No.	1	1	1
Moment (Mu)	57.51	214.64	214.64
Factored Strength (φMn)	3524.92	3524.92	3524.92
Check Ratio (Mu/φMn)	0.0163	0.0609	0.0609
Using Rebar Top (As_top)	0.0039	0.0039	0.0039
Using Rebar Bot (As_bot)	0.0085	0.0085	0.0085

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	139.26	159.84	128.65
Shear Strength by Conc.(φVc)	629.19	629.19	615.97
Shear Strength by Rebar.(φVs)	911.27	911.27	892.13
Using Shear Reinf. (AsV)	0.0025	0.0025	0.0025
Using Stirrups Spacing	4-D13 @200	4-D13 @200	4-D13 @200
Check Ratio	0.0904	0.1038	0.0853

RC Beam Strength Checking Result

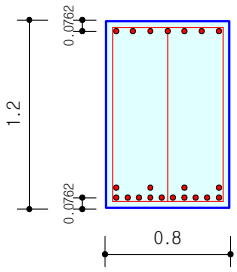
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

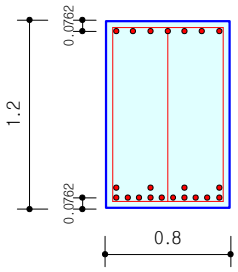
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB4 (No : 32205)	Beam Span	12m

[END-I]



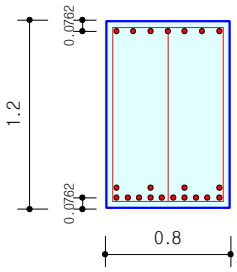
TOP 7-D22
BOT 14-D22
STIRRUPS 3-D13 @200

[MID]



TOP 7-D22
BOT 14-D22
STIRRUPS 3-D13 @200

[END-J]



TOP 7-D22
BOT 14-D22
STIRRUPS 3-D13 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	675.63	22.84	294.29
Factored Strength (φMn)	1191.83	1191.83	1191.83
Check Ratio (Mu/φMn)	0.5669	0.0192	0.2469
(+) Load Combination No.	1	1	1
Moment (Mu)	87.84	391.71	206.19
Factored Strength (φMn)	2294.61	2294.61	2294.61
Check Ratio (Mu/φMn)	0.0383	0.1707	0.0899
Using Rebar Top (As_top)	0.0027	0.0027	0.0027
Using Rebar Bot (As_bot)	0.0054	0.0054	0.0054

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	1046.25	1017.83	312.93
Shear Strength by Conc.(φVc)	629.19	621.63	629.19
Shear Strength by Rebar.(φVs)	683.45	675.25	683.45
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.7971	0.7848	0.2384

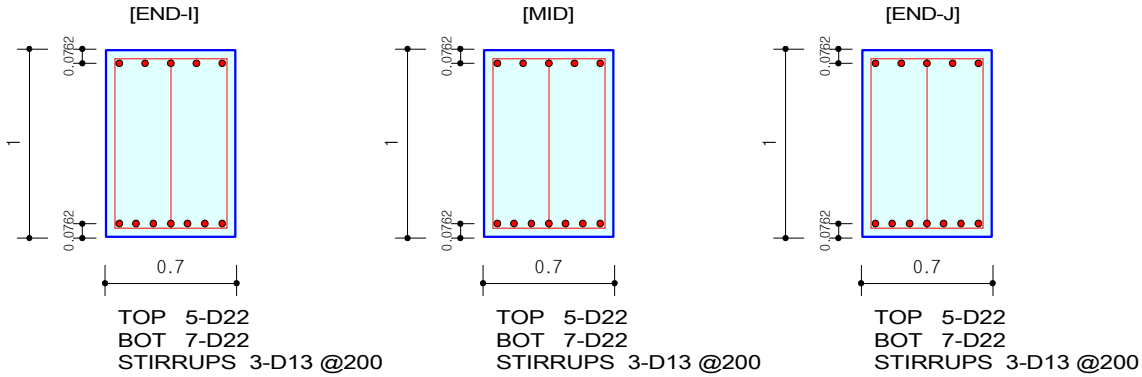
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TB5 (No : 32206)	Beam Span	6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	129.80	3.29	135.75
Factored Strength (φMn)	700.55	700.55	700.55
Check Ratio (Mu/φMn)	0.1853	0.0047	0.1938
(+) Load Combination No.	1	1	1
Moment (Mu)	0.80	65.56	0.80
Factored Strength (φMn)	965.17	965.17	965.17
Check Ratio (Mu/φMn)	0.0008	0.0679	0.0008
Using Rebar Top (As_top)	0.0019	0.0019	0.0019
Using Rebar Bot (As_bot)	0.0027	0.0027	0.0027

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	174.02	32.71	189.44
Shear Strength by Conc.(φVc)	452.56	452.56	452.56
Shear Strength by Rebar.(φVs)	561.82	561.82	561.82
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.1716	0.0323	0.1868

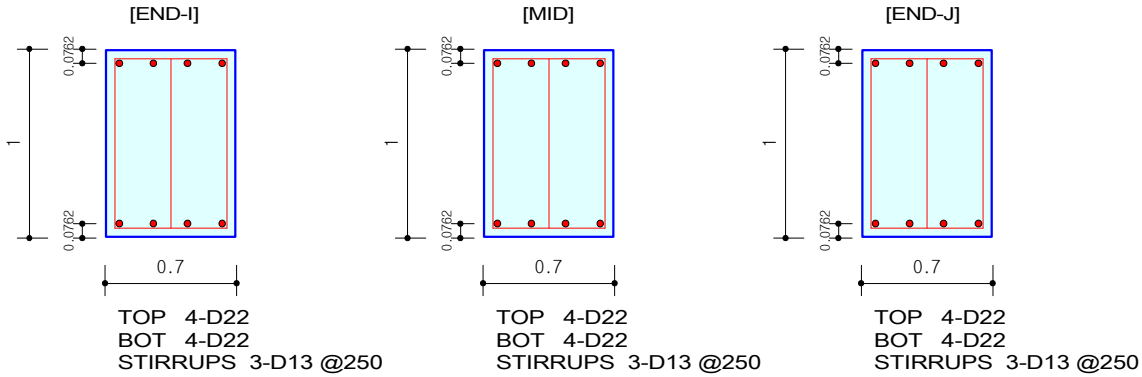
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TWG1 (No : 32210)	Beam Span	6.5m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	213.74	253.42	27.66
Factored Strength (φMn)	567.18	567.18	567.18
Check Ratio (Mu/φMn)	0.3768	0.4468	0.0488
(+) Load Combination No.	1	1	1
Moment (Mu)	19.81	21.13	15.39
Factored Strength (φMn)	567.18	567.18	567.18
Check Ratio (Mu/φMn)	0.0349	0.0373	0.0271
Using Rebar Top (As_top)	0.0015	0.0015	0.0015
Using Rebar Bot (As_bot)	0.0015	0.0015	0.0015

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	177.95	184.77	48.30
Shear Strength by Conc.(φVc)	452.56	452.56	452.56
Shear Strength by Rebar.(φVs)	449.45	449.45	449.45
Using Shear Reinf. (AsV)	0.0015	0.0015	0.0015
Using Stirrups Spacing	3-D13 @250	3-D13 @250	3-D13 @250
Check Ratio	0.1973	0.2048	0.0535

RC Beam Strength Checking Result

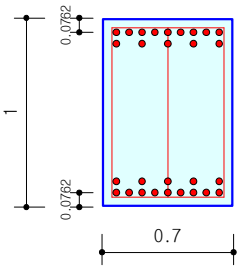
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TG1 (No : 32220)	Beam Span	12m

[END-I]



TOP 14-D22
BOT 14-D22
STIRRUPS 3-D13 @200

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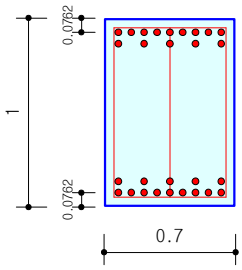
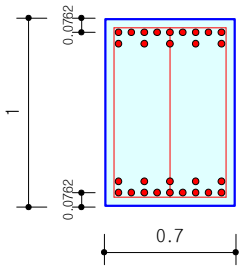


TOP 14-D22
BOT 14-D22
STIRRUPS 3-D13 @200

[END-J]



TOP 14-D22
BOT 14-D22
STIRRUPS 3-D13 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	237.61	183.11	895.87
Factored Strength (φMn)	1835.31	1835.31	1835.31
Check Ratio (Mu/φMn)	0.1295	0.0998	0.4881
(+) Load Combination No.	1	1	1
Moment (Mu)	298.13	993.86	979.21
Factored Strength (φMn)	1835.31	1835.31	1835.31
Check Ratio (Mu/φMn)	0.1624	0.5415	0.5335
Using Rebar Top (As_top)	0.0054	0.0054	0.0054
Using Rebar Bot (As_bot)	0.0054	0.0054	0.0054

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	243.12	589.77	658.26
Shear Strength by Conc.(φVc)	444.30	444.30	444.30
Shear Strength by Rebar.(φVs)	551.57	551.57	551.57
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.2441	0.5922	0.6610

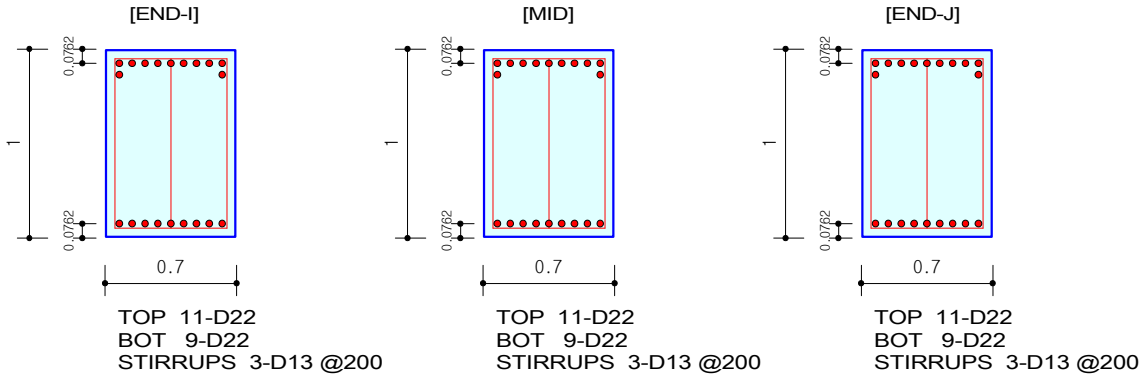
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TG2 (No : 32221)	Beam Span	6.5m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	387.10	164.74	456.44
Factored Strength (φMn)	1476.63	1476.63	1476.63
Check Ratio (Mu/φMn)	0.2621	0.1116	0.3091
(+) Load Combination No.	1	1	1
Moment (Mu)	274.23	467.85	87.11
Factored Strength (φMn)	1227.34	1227.34	1227.34
Check Ratio (Mu/φMn)	0.2234	0.3812	0.0710
Using Rebar Top (As_top)	0.0043	0.0043	0.0043
Using Rebar Bot (As_bot)	0.0035	0.0035	0.0035

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	333.06	399.94	428.04
Shear Strength by Conc.(φVc)	448.36	448.36	448.36
Shear Strength by Rebar.(φVs)	556.60	556.60	556.60
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.3314	0.3980	0.4259

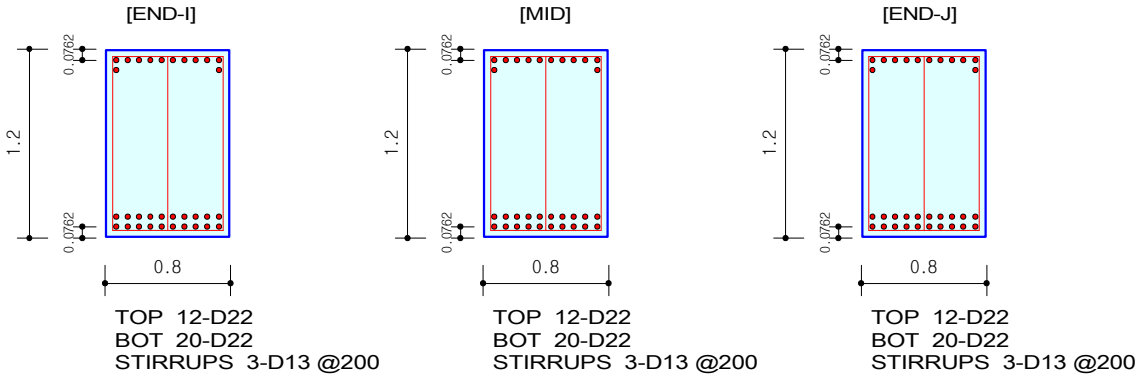
RC Beam Strength Checking Result

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TG3 (No : 32222)	Beam Span	12m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	161.98	103.30	170.75
Factored Strength (φMn)	1979.77	1979.77	1979.77
Check Ratio (Mu/φMn)	0.0818	0.0522	0.0862
(+) Load Combination No.	1	1	1
Moment (Mu)	0.00	331.15	145.88
Factored Strength (φMn)	3207.34	3207.34	3207.34
Check Ratio (Mu/φMn)	0.0000	0.1032	0.0455
Using Rebar Top (As_top)	0.0046	0.0046	0.0046
Using Rebar Bot (As_bot)	0.0077	0.0077	0.0077

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	493.53	482.77	163.65
Shear Strength by Conc.(φVc)	624.78	624.78	624.78
Shear Strength by Rebar.(φVs)	678.67	678.67	678.67
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.3786	0.3704	0.1256

RC Beam Strength Checking Result

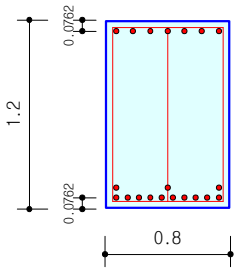
Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

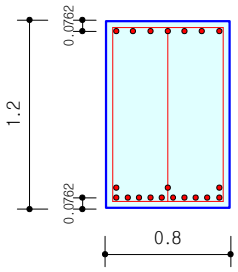
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2TG4 (No : 32223)	Beam Span	10.74m

[END-I]



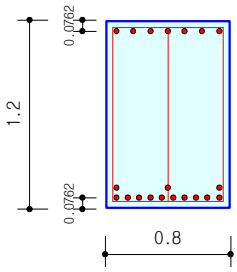
TOP 7-D22
BOT 13-D22
STIRRUPS 3-D13 @200

[MID]



TOP 7-D22
BOT 13-D22
STIRRUPS 3-D13 @200

[END-J]



TOP 7-D22
BOT 13-D22
STIRRUPS 3-D13 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	29.51	105.56	123.09
Factored Strength (φMn)	1190.72	1190.72	1190.72
Check Ratio (Mu/φMn)	0.0248	0.0887	0.1034
(+) Load Combination No.	1	1	1
Moment (Mu)	340.99	517.50	125.70
Factored Strength (φMn)	2140.59	2140.59	2140.59
Check Ratio (Mu/φMn)	0.1593	0.2418	0.0587
Using Rebar Top (As_top)	0.0027	0.0027	0.0027
Using Rebar Bot (As_bot)	0.0050	0.0050	0.0050

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	715.44	710.19	130.93
Shear Strength by Conc.(φVc)	623.09	623.09	629.19
Shear Strength by Rebar.(φVs)	676.83	676.83	683.45
Using Shear Reinf. (AsV)	0.0019	0.0019	0.0019
Using Stirrups Spacing	3-D13 @200	3-D13 @200	3-D13 @200
Check Ratio	0.5504	0.5463	0.0997

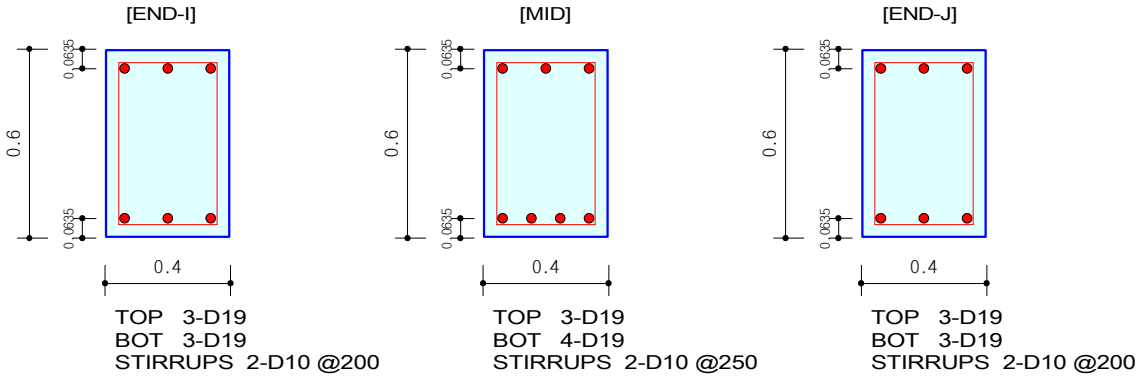
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	2B1 (No : 32231)	Beam Span	3.4m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	45.22	40.64	10.97
Factored Strength (φMn)	179.87	180.02	179.87
Check Ratio (Mu/φMn)	0.2514	0.2258	0.0610
(+) Load Combination No.	1	1	1
Moment (Mu)	9.38	11.10	5.86
Factored Strength (φMn)	179.87	234.85	179.87
Check Ratio (Mu/φMn)	0.0521	0.0473	0.0326
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	60.33	57.45	21.40
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.2213	0.2315	0.0785

RC Beam Strength Checking Result

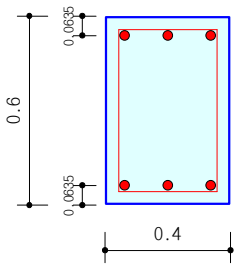
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

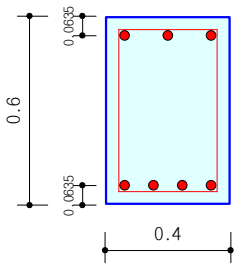
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3B1 (No : 32301)	Beam Span	8.8m

[END-I]



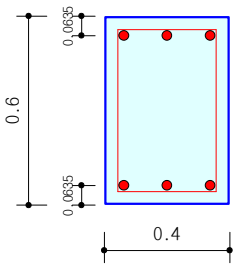
TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	35.94	32.82	74.76
Factored Strength (φMn)	179.87	180.02	179.87
Check Ratio (Mu/φMn)	0.1998	0.1823	0.4156
(+) Load Combination No.	1	1	1
Moment (Mu)	144.99	144.99	13.41
Factored Strength (φMn)	179.87	234.85	179.87
Check Ratio (Mu/φMn)	0.8061	0.6174	0.0746
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	91.41	100.11	77.31
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3353	0.4034	0.2835

RC Beam Strength Checking Result

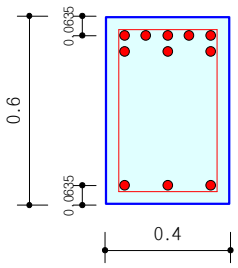
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

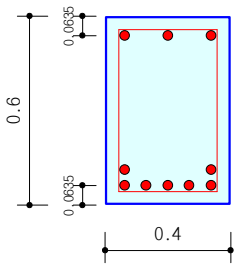
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3B2 (No : 32302)	Beam Span	8.8m

[END-I]



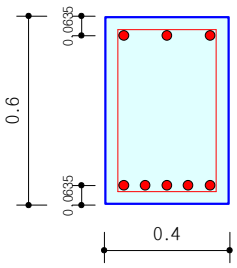
TOP 8-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 7-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 5-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	81.63	0.00	87.13
Factored Strength (φMn)	436.31	183.16	180.13
Check Ratio (Mu/φMn)	0.1871	0.0000	0.4837
(+) Load Combination No.	1	1	1
Moment (Mu)	123.36	193.17	120.61
Factored Strength (φMn)	184.43	387.97	289.70
Check Ratio (Mu/φMn)	0.6689	0.4979	0.4163
Using Rebar Top (As_top)	0.0023	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0014

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	112.98	65.33	114.23
Shear Strength by Conc.(φVc)	145.56	146.66	150.19
Shear Strength by Rebar.(φVs)	118.68	95.67	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.4276	0.2696	0.4190

RC Beam Strength Checking Result

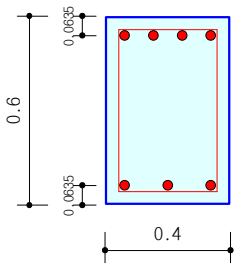
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3B3 (No : 32303)	Beam Span	6m

[END-I]



TOP 4-D19
BOT 3-D19
STIRRUPS 2-D10 @200

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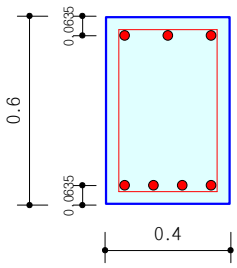
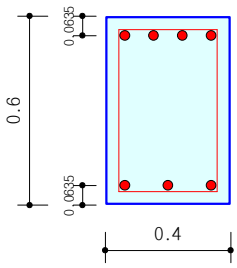


TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 4-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	97.10	0.00	95.60
Factored Strength (φMn)	234.85	180.02	234.85
Check Ratio (Mu/φMn)	0.4134	0.0000	0.4071
(+) Load Combination No.	1	1	1
Moment (Mu)	14.15	56.39	14.93
Factored Strength (φMn)	180.02	234.85	180.02
Check Ratio (Mu/φMn)	0.0786	0.2401	0.0829
Using Rebar Top (As_top)	0.0011	0.0009	0.0011
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	85.70	55.43	85.20
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3143	0.2234	0.3125

RC Beam Strength Checking Result

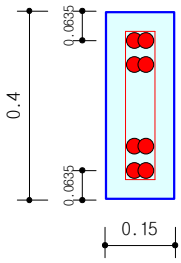
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

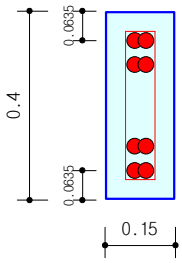
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3B5 (No : 32305)	Beam Span	2.2m

[END-I]



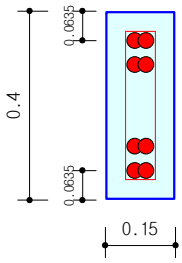
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	0.00	1.49	12.18
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0000	0.0127	0.1034
(+) Load Combination No.	1	1	1
Moment (Mu)	11.30	10.25	3.86
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0960	0.0870	0.0328
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	11.09	17.66	20.50
Shear Strength by Conc.(φVc)	33.01	33.01	33.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.1058	0.1685	0.1957

RC Beam Strength Checking Result

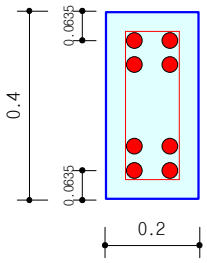
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

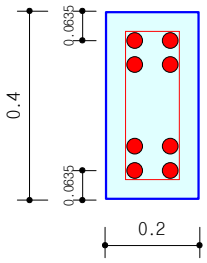
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3B6 (No : 32306)	Beam Span	2.74m

[END-I]



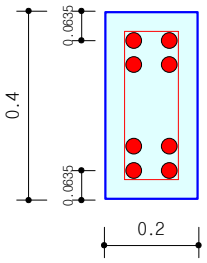
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	17.01	16.88	40.35
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.1395	0.1384	0.3308
(+) Load Combination No.	1	1	1
Moment (Mu)	30.61	18.60	1.42
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.2509	0.1524	0.0116
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	34.85	40.54	44.00
Shear Strength by Conc.(φVc)	44.01	44.01	44.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.3010	0.3501	0.3800

RC Beam Strength Checking Result

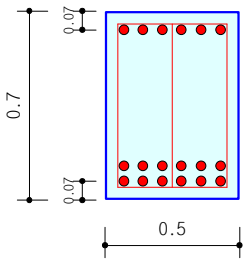
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

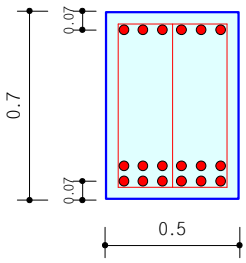
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3TB1 (No : 32311)	Beam Span	6.5m

[END-I]



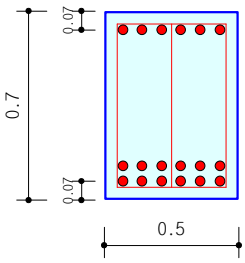
TOP 6-D22
BOT 12-D22
STIRRUPS 3-D10 @150

[MID]



TOP 6-D22
BOT 12-D22
STIRRUPS 3-D10 @150

[END-J]



TOP 6-D22
BOT 12-D22
STIRRUPS 3-D10 @150

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	9.16	37.97	7.43
Factored Strength (φMn)	548.21	548.21	548.21
Check Ratio (Mu/φMn)	0.0167	0.0693	0.0136
(+) Load Combination No.	1	1	1
Moment (Mu)	12.44	35.60	0.78
Factored Strength (φMn)	1018.85	1018.85	1018.85
Check Ratio (Mu/φMn)	0.0122	0.0349	0.0008
Using Rebar Top (As_top)	0.0023	0.0023	0.0023
Using Rebar Bot (As_bot)	0.0046	0.0046	0.0046

3. Shear Capacity

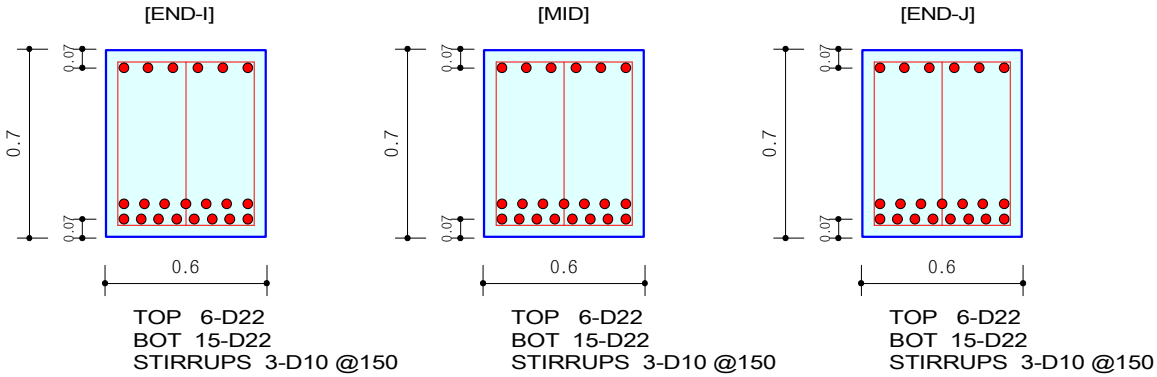
	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	39.09	75.89	20.15
Shear Strength by Conc.(φVc)	212.19	220.45	220.45
Shear Strength by Rebar.(φVs)	276.83	287.60	287.60
Using Shear Reinf. (AsV)	0.0014	0.0014	0.0014
Using Stirrups Spacing	3-D10 @150	3-D10 @150	3-D10 @150
Check Ratio	0.0799	0.1494	0.0397

Certified by :

MIDAS	Company		Project Title	
	Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3TB2 (No : 32312)	Beam Span	6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	85.07	173.72	13.13
Factored Strength (φMn)	556.49	556.49	556.49
Check Ratio (Mu/φMn)	0.1529	0.3122	0.0236
(+) Load Combination No.	1	1	1
Moment (Mu)	2.83	184.80	11.55
Factored Strength (φMn)	1270.44	1270.44	1270.44
Check Ratio (Mu/φMn)	0.0022	0.1455	0.0091
Using Rebar Top (As_top)	0.0023	0.0023	0.0023
Using Rebar Bot (As_bot)	0.0058	0.0058	0.0058

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	96.93	356.25	25.90
Shear Strength by Conc.(φVc)	264.54	264.54	264.54
Shear Strength by Rebar.(φVs)	287.60	287.60	287.60
Using Shear Reinf. (AsV)	0.0014	0.0014	0.0014
Using Stirrups Spacing	3-D10 @150	3-D10 @150	3-D10 @150
Check Ratio	0.1755	0.6452	0.0469

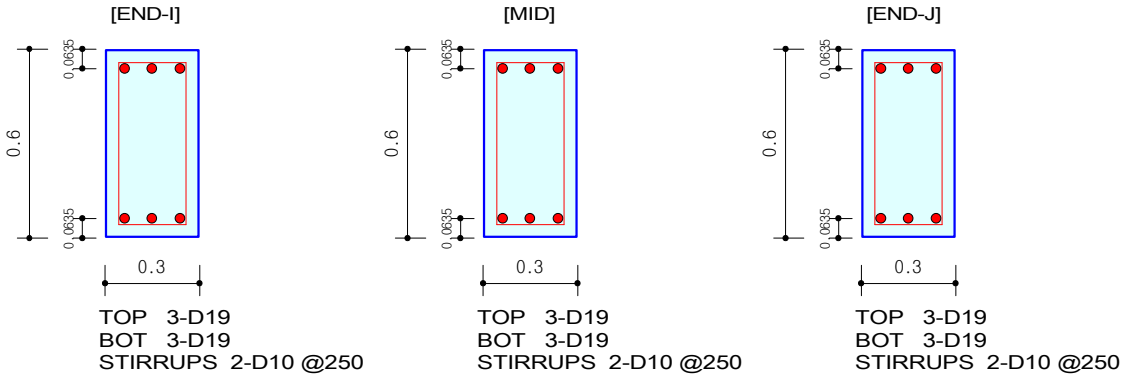
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	3WG1 (No : 32320)	Beam Span	8.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	32.86	53.18	20.71
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.1865	0.3019	0.1175
(+) Load Combination No.	1	1	1
Moment (Mu)	54.72	29.40	12.74
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.3107	0.1669	0.0723
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	82.03	132.12	31.06
Shear Strength by Conc.(φVc)	112.64	112.64	112.64
Shear Strength by Rebar.(φVs)	97.97	97.97	97.97
Using Shear Reinf. (AsV)	0.0006	0.0006	0.0006
Using Stirrups Spacing	2-D10 @250	2-D10 @250	2-D10 @250
Check Ratio	0.3895	0.6274	0.1475

RC Beam Strength Checking Result

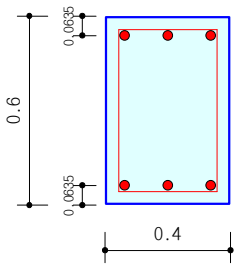
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

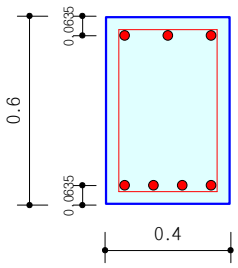
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B1 (No : 32401)	Beam Span	6.5m

[END-I]



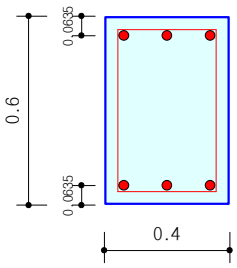
TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	35.71	31.36	77.50
Factored Strength (φMn)	179.87	180.02	179.87
Check Ratio (Mu/φMn)	0.1986	0.1742	0.4309
(+) Load Combination No.	1	1	1
Moment (Mu)	31.25	37.46	13.41
Factored Strength (φMn)	179.87	234.85	179.87
Check Ratio (Mu/φMn)	0.1738	0.1595	0.0746
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

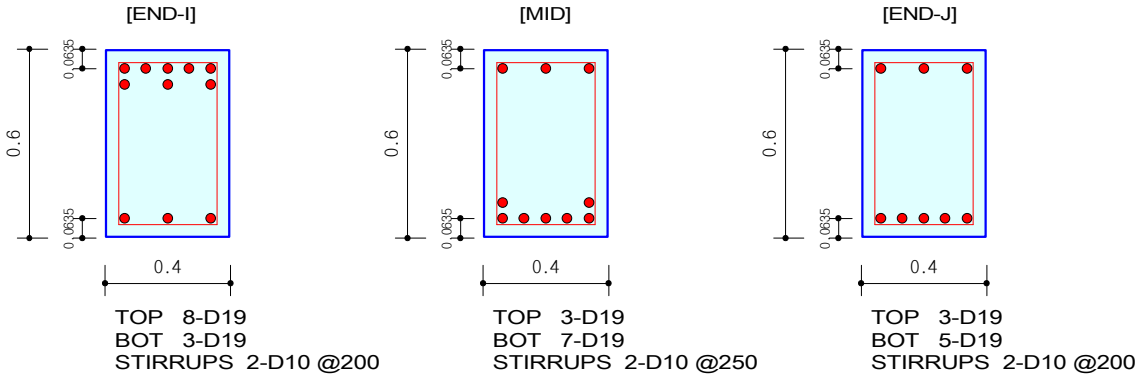
	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	40.62	63.70	84.15
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.1490	0.2567	0.3087

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B2 (No : 32402)	Beam Span	8.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	128.51	45.39	86.81
Factored Strength (φMn)	436.31	183.16	180.13
Check Ratio (Mu/φMn)	0.2945	0.2478	0.4819
(+) Load Combination No.	1	1	1
Moment (Mu)	129.62	193.22	120.80
Factored Strength (φMn)	184.43	387.97	289.70
Check Ratio (Mu/φMn)	0.7028	0.4980	0.4170
Using Rebar Top (As_top)	0.0023	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0020	0.0014

3. Shear Capacity

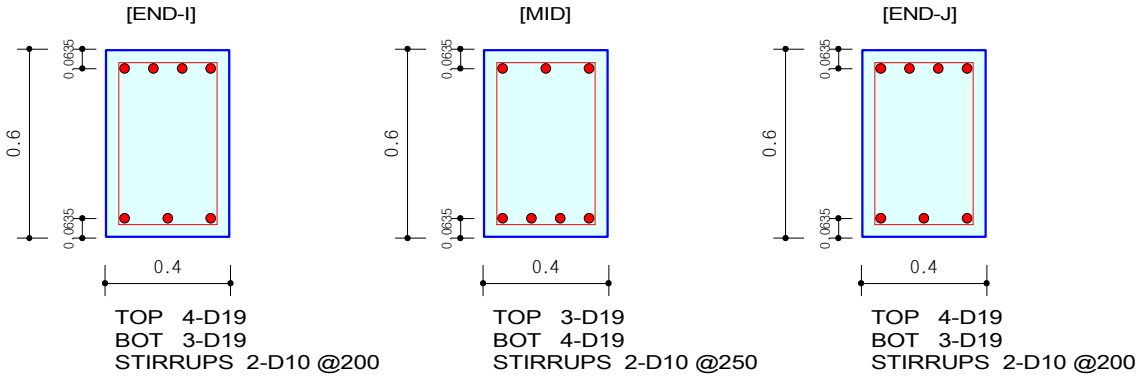
	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	113.04	107.10	114.17
Shear Strength by Conc.(φVc)	145.56	150.19	150.19
Shear Strength by Rebar.(φVs)	118.68	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.4278	0.4316	0.4187

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B3 (No : 32403)	Beam Span	6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	96.88	0.00	95.32
Factored Strength (φMn)	234.85	180.02	234.85
Check Ratio (Mu/φMn)	0.4125	0.0000	0.4059
(+) Load Combination No.	1	1	1
Moment (Mu)	14.38	56.64	15.16
Factored Strength (φMn)	180.02	234.85	180.02
Check Ratio (Mu/φMn)	0.0799	0.2412	0.0842
Using Rebar Top (As_top)	0.0011	0.0009	0.0011
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	85.71	55.44	85.19
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3144	0.2234	0.3125

RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B5 (No : 32405)	Beam Span	2.2m

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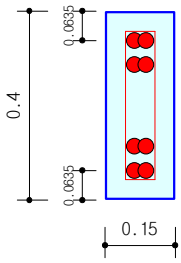

TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

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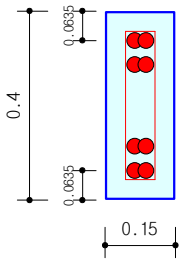
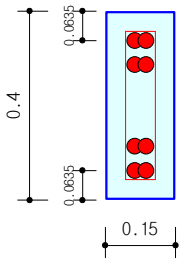


TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	0.00	1.52	12.09
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0000	0.0129	0.1027
(+) Load Combination No.	1	1	1
Moment (Mu)	10.93	9.99	3.75
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0928	0.0848	0.0319
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	11.61	17.45	20.30
Shear Strength by Conc.(φVc)	33.01	33.01	33.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.1108	0.1665	0.1937

RC Beam Strength Checking Result

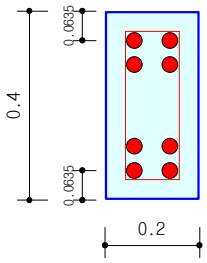
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B6 (No : 32406)	Beam Span	2.74m

[END-I]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

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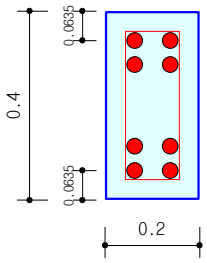
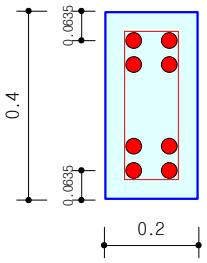


TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	17.16	2.06	11.40
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.1407	0.0169	0.0935
(+) Load Combination No.	1	1	1
Moment (Mu)	1.53	7.47	1.48
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0125	0.0613	0.0122
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	34.95	18.68	20.92
Shear Strength by Conc.(φVc)	44.01	44.01	44.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.3019	0.1614	0.1807

RC Beam Strength Checking Result

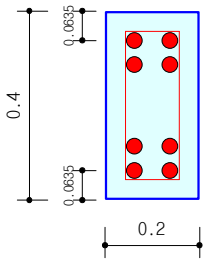
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4B7 (No : 32407)	Beam Span	3.5m

[END-I]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

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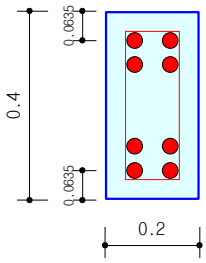
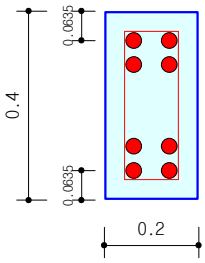


TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	19.69	7.75	19.30
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.1614	0.0635	0.1582
(+) Load Combination No.	1	1	1
Moment (Mu)	1.90	14.72	11.62
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0156	0.1207	0.0953
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	27.66	20.25	19.33
Shear Strength by Conc.(φVc)	44.01	44.01	44.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.2389	0.1749	0.1670

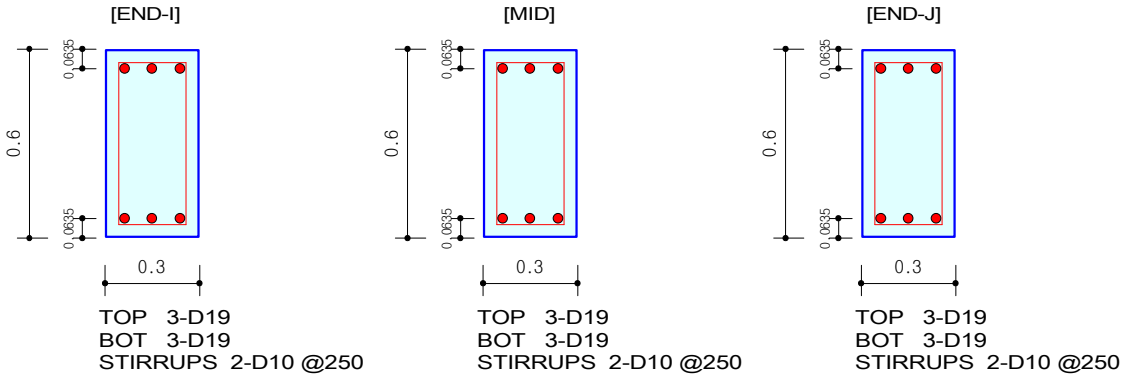
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	4WG1 (No : 32450)	Beam Span	8.8m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	33.61	49.48	72.45
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.1908	0.2809	0.4113
(+) Load Combination No.	1	1	1
Moment (Mu)	66.08	38.24	12.74
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.3751	0.2171	0.0723
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	53.39	72.55	77.30
Shear Strength by Conc.(φVc)	112.64	112.64	112.64
Shear Strength by Rebar.(φVs)	97.97	97.97	97.97
Using Shear Reinf. (AsV)	0.0006	0.0006	0.0006
Using Stirrups Spacing	2-D10 @250	2-D10 @250	2-D10 @250
Check Ratio	0.2535	0.3445	0.3670

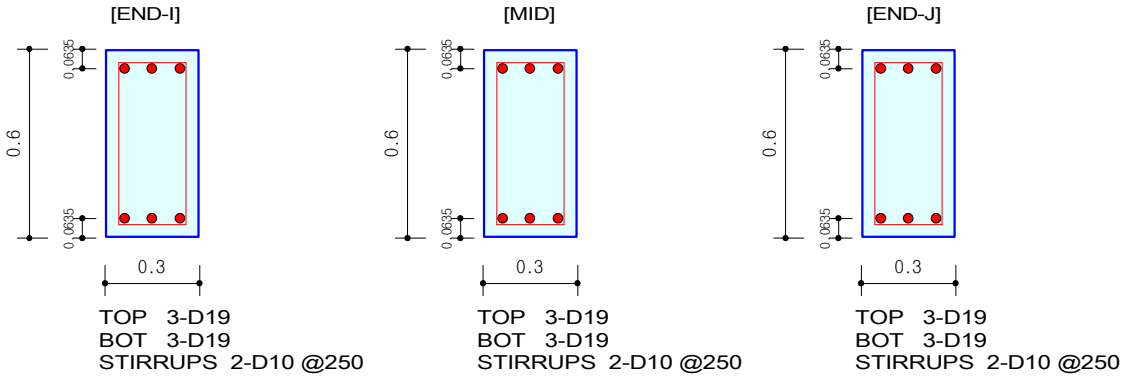
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB1 (No : 32501)	Beam Span	6.5m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	36.28	33.33	59.03
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.2060	0.1892	0.3351
(+) Load Combination No.	1	1	1
Moment (Mu)	19.33	21.29	7.46
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.1097	0.1209	0.0423
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	38.12	45.16	65.06
Shear Strength by Conc.(φVc)	112.64	112.64	112.64
Shear Strength by Rebar.(φVs)	97.97	97.97	97.97
Using Shear Reinf. (AsV)	0.0006	0.0006	0.0006
Using Stirrups Spacing	2-D10 @250	2-D10 @250	2-D10 @250
Check Ratio	0.1810	0.2144	0.3089

RC Beam Strength Checking Result

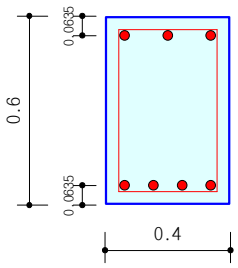
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

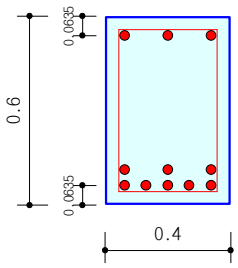
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB2 (No : 32502)	Beam Span	8.8m

[END-I]



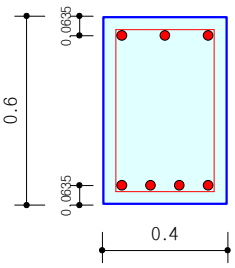
TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 3-D19
BOT 8-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	120.48	57.41	125.68
Factored Strength (φMn)	180.02	184.43	180.02
Check Ratio (Mu/φMn)	0.6693	0.3113	0.6981
(+) Load Combination No.	1	1	1
Moment (Mu)	185.30	274.94	183.71
Factored Strength (φMn)	234.85	436.31	234.85
Check Ratio (Mu/φMn)	0.7890	0.6301	0.7822
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0011	0.0023	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	142.95	136.32	143.68
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.5243	0.5493	0.5270

RC Beam Strength Checking Result

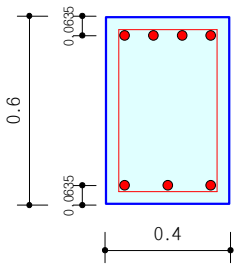
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB3 (No : 32503)	Beam Span	6m

[END-I]



TOP 4-D19
BOT 3-D19
STIRRUPS 2-D10 @200

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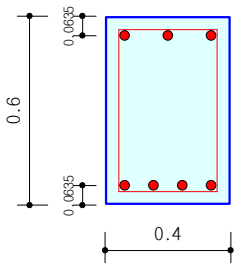
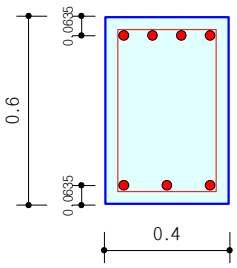


TOP 3-D19
BOT 4-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 4-D19
BOT 3-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	103.16	0.00	93.28
Factored Strength (φMn)	234.85	180.02	234.85
Check Ratio (Mu/φMn)	0.4393	0.0000	0.3972
(+) Load Combination No.	1	1	1
Moment (Mu)	14.52	60.53	19.46
Factored Strength (φMn)	180.02	234.85	180.02
Check Ratio (Mu/φMn)	0.0807	0.2577	0.1081
Using Rebar Top (As_top)	0.0011	0.0009	0.0011
Using Rebar Bot (As_bot)	0.0009	0.0011	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	90.34	59.03	87.04
Shear Strength by Conc.(φVc)	150.19	150.19	150.19
Shear Strength by Rebar.(φVs)	122.46	97.97	122.46
Using Shear Reinf. (AsV)	0.0007	0.0006	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @250	2-D10 @200
Check Ratio	0.3313	0.2379	0.3193

RC Beam Strength Checking Result

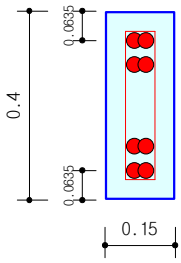
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB5 (No : 32505)	Beam Span	2.2m

[END-I]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

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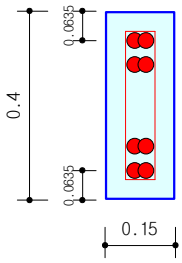
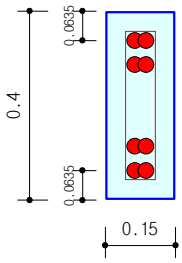


TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	3.36	0.19	13.38
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0285	0.0016	0.1137
(+) Load Combination No.	1	1	1
Moment (Mu)	10.03	10.03	5.68
Factored Strength (φMn)	117.75	117.75	117.75
Check Ratio (Mu/φMn)	0.0852	0.0852	0.0482
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	24.50	21.14	25.61
Shear Strength by Conc.(φVc)	33.01	33.01	33.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.2339	0.2018	0.2444

RC Beam Strength Checking Result

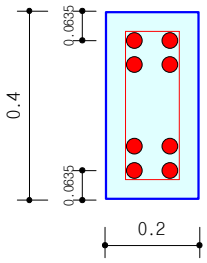
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

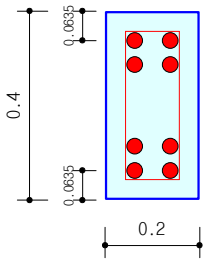
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB6 (No : 32506)	Beam Span	2.7m

[END-I]



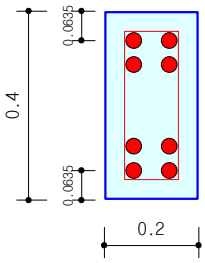
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	10.79	1.53	8.39
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0885	0.0125	0.0687
(+) Load Combination No.	1	1	1
Moment (Mu)	0.66	5.12	1.58
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0054	0.0420	0.0130
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	24.89	15.12	20.18
Shear Strength by Conc.(φVc)	44.01	44.01	44.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.2149	0.1306	0.1743

RC Beam Strength Checking Result

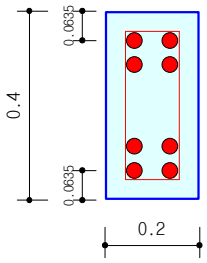
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

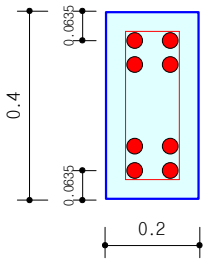
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RB7 (No : 32507)	Beam Span	3.5m

[END-I]



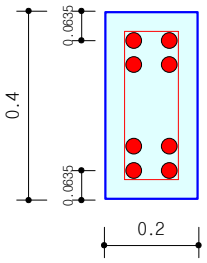
TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[MID]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

[END-J]



TOP 4-D19
BOT 4-D19
STIRRUPS 2-D10 @200

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	10.02	11.17	15.27
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0821	0.0916	0.1252
(+) Load Combination No.	1	1	1
Moment (Mu)	3.21	25.37	9.33
Factored Strength (φMn)	121.99	121.99	121.99
Check Ratio (Mu/φMn)	0.0263	0.2080	0.0765
Using Rebar Top (As_top)	0.0011	0.0011	0.0011
Using Rebar Bot (As_bot)	0.0011	0.0011	0.0011

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	20.22	33.99	40.32
Shear Strength by Conc.(φVc)	44.01	44.01	44.01
Shear Strength by Rebar.(φVs)	71.78	71.78	71.78
Using Shear Reinf. (AsV)	0.0007	0.0007	0.0007
Using Stirrups Spacing	2-D10 @200	2-D10 @200	2-D10 @200
Check Ratio	0.1746	0.2935	0.3483

RC Beam Strength Checking Result

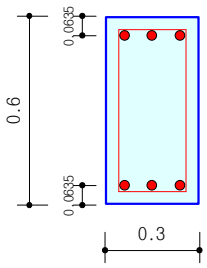
Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

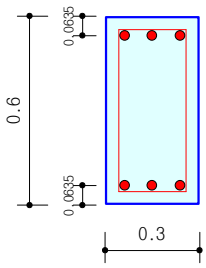
Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	RWG1 (No : 32550)	Beam Span	8.8m

[END-I]



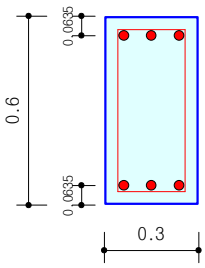
TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @250

[MID]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @250

[END-J]



TOP 3-D19
BOT 3-D19
STIRRUPS 2-D10 @250

2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	32.63	54.89	74.04
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.1852	0.3116	0.4203
(+) Load Combination No.	1	1	1
Moment (Mu)	64.53	39.25	12.86
Factored Strength (φMn)	176.15	176.15	176.15
Check Ratio (Mu/φMn)	0.3663	0.2228	0.0730
Using Rebar Top (As_top)	0.0009	0.0009	0.0009
Using Rebar Bot (As_bot)	0.0009	0.0009	0.0009

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	49.59	76.70	82.41
Shear Strength by Conc.(φVc)	112.64	112.64	112.64
Shear Strength by Rebar.(φVs)	97.97	97.97	97.97
Using Shear Reinf. (AsV)	0.0006	0.0006	0.0006
Using Stirrups Spacing	2-D10 @250	2-D10 @250	2-D10 @250
Check Ratio	0.2354	0.3642	0.3913

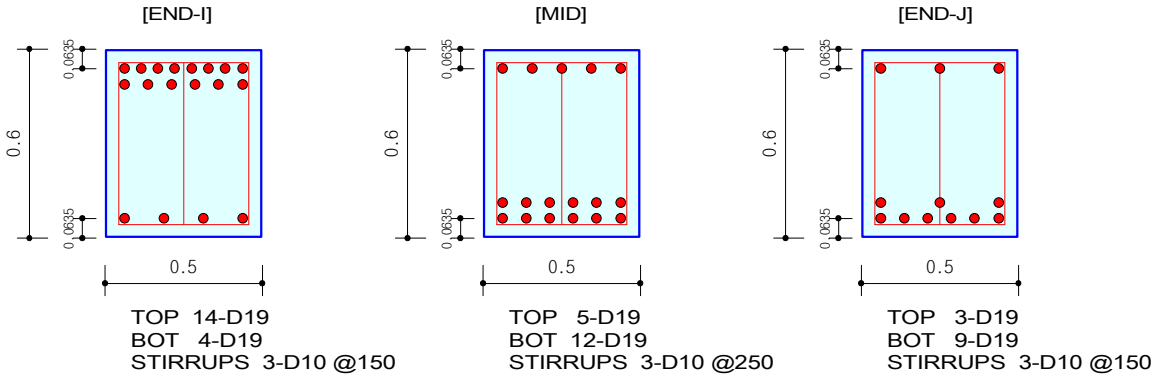
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	PHRWG1 (No : 32601)	Beam Span	6m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	77.18	69.37	27.98
Factored Strength (φMn)	741.69	298.43	189.83
Check Ratio (Mu/φMn)	0.1041	0.2325	0.1474
(+) Load Combination No.	1	1	1
Moment (Mu)	37.19	70.36	27.15
Factored Strength (φMn)	245.04	640.58	495.59
Check Ratio (Mu/φMn)	0.1518	0.1098	0.0548
Using Rebar Top (As_top)	0.0040	0.0014	0.0009
Using Rebar Bot (As_bot)	0.0011	0.0034	0.0026

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	134.67	126.12	87.65
Shear Strength by Conc.(φVc)	181.12	180.02	187.73
Shear Strength by Rebar.(φVs)	236.29	140.91	244.92
Using Shear Reinf. (AsV)	0.0014	0.0009	0.0014
Using Stirrups Spacing	3-D10 @150	3-D10 @250	3-D10 @150
Check Ratio	0.3226	0.3930	0.2026

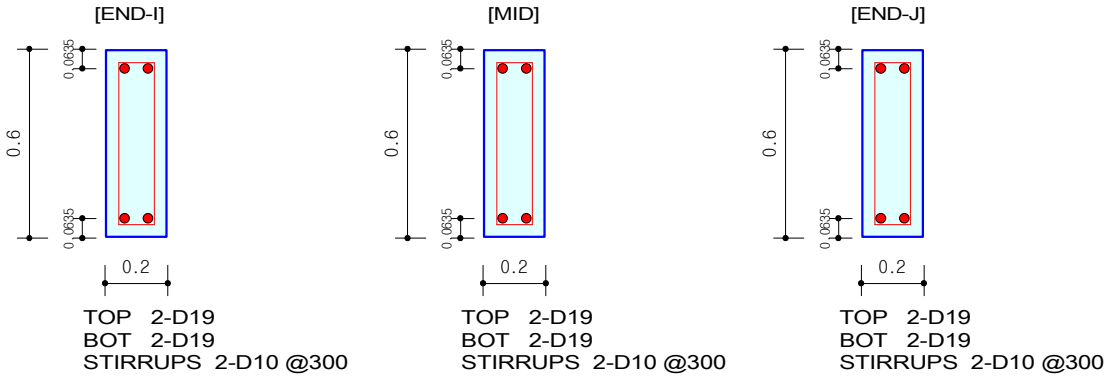
RC Beam Strength Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Information

Design Code	KDS 41 20 : 2022	Unit System	kN, m
Material Data	fck = 27550, fy = 400000, fys = 400000 KPa		
Section Property	WG1 (No : 40000)	Beam Span	12m



2. Bending Moment Capacity

	END-I	MID	END-J
(-) Load Combination No.	1	1	1
Moment (Mu)	36.78	50.29	60.43
Factored Strength (φMn)	117.43	117.43	117.43
Check Ratio (Mu/φMn)	0.3132	0.4282	0.5146
(+) Load Combination No.	1	1	1
Moment (Mu)	22.83	48.83	49.28
Factored Strength (φMn)	117.43	117.43	117.43
Check Ratio (Mu/φMn)	0.1944	0.4158	0.4197
Using Rebar Top (As_top)	0.0006	0.0006	0.0006
Using Rebar Bot (As_bot)	0.0006	0.0006	0.0006

3. Shear Capacity

	END-I	MID	END-J
Load Combination No.	1	1	1
Factored Shear Force (Vu)	74.55	103.59	104.23
Shear Strength by Conc.(φVc)	75.09	75.09	75.09
Shear Strength by Rebar.(φVs)	81.64	81.64	81.64
Using Shear Reinf. (AsV)	0.0005	0.0005	0.0005
Using Stirrups Spacing	2-D10 @300	2-D10 @300	2-D10 @300
Check Ratio	0.4756	0.6609	0.6650

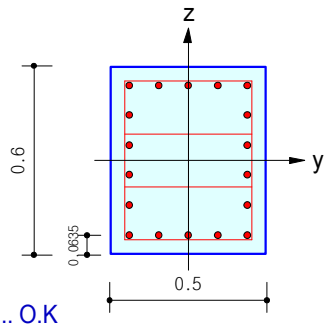
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 665 (PM), 659, 662 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 5.6 m
Section Property : 1C1 (No : 31101)
Rebar Pattern : 18 - 6 - D19 Ast = 0.005157 m² (ρst = 0.017)

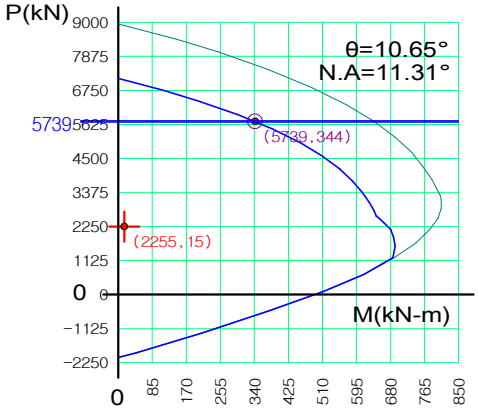


2. Axial and Moments Capacity

Load Combination : 1 (Pos : J)

Concentric Max. Axial Load	φPn-max	= 5739.06 kN	
Axial Load Ratio	Pu / φPn	= 2254.95 / 5739.06	= 0.393 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 15.3411 / 343.752	= 0.045 < 1.000 ..... O.K
	Mcy / φMny	= 15.0767 / 337.827	= 0.045 < 1.000 ..... O.K
	Mcz / φMnz	= -2.8360 / 63.5463	= 0.045 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
7173.83	0.00
6421.73	200.29
5499.82	386.70
4591.58	511.49
3761.30	586.40
3052.29	627.55
2624.77	644.32
2372.61	666.38
1906.73	688.93
1230.04	686.22
109.97	512.07
-1266.84	208.77
-2062.80	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Applied Shear Force (Vu)	27.5604 kN	48.1367 kN
Design Shear Strength (φVc+φVs)	227.358 + 199.267 = 426.625 kN	251.562 + 183.689 = 435.251 kN
Shear Ratio	0.065 < 1.000 ..... O.K	0.111 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	27.5604 kN	48.1367 kN
Design Shear Strength (φVc+φVs)	228.221 + 199.267 = 427.488 kN	252.446 + 183.689 = 436.135 kN
Shear Ratio	0.064 < 1.000 ..... O.K	0.110 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

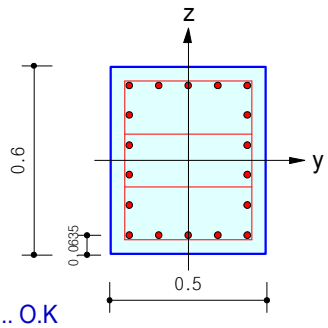
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 672 (PM), 672, 670 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 5.6 m
Section Property : 1C2 (No : 31102)
Rebar Pattern : 18 - 6 - D19 Ast = 0.005157 m² (ρst = 0.017)

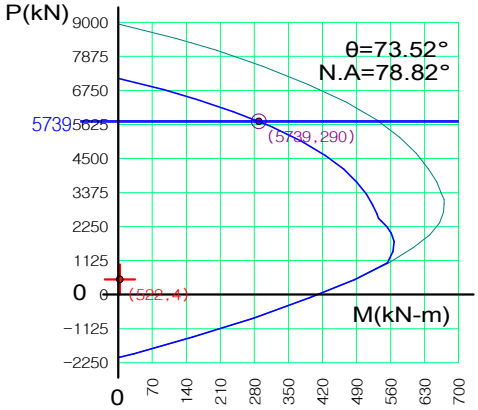


2. Axial and Moments Capacity

Load Combination : 1 (Pos : J)

Concentric Max. Axial Load	φPn-max	= 5739.06 kN	
Axial Load Ratio	Pu / φPn	= 521.665 / 5739.06	= 0.091 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 4.44088 / 289.799	= 0.015 < 1.000 ..... O.K
	Mcy / φMny	= -1.2595 / 82.1931	= 0.015 < 1.000 ..... O.K
	Mcz / φMnz	= 4.25853 / 277.899	= 0.015 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
7173.83	0.00
6462.32	161.87
5578.18	313.34
4623.77	426.41
3740.86	491.28
2982.62	524.00
2527.19	536.55
2264.88	552.68
1757.83	568.01
1053.32	554.23
-99.57	393.80
-1378.61	153.20
-2062.80	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Applied Shear Force (Vu)	2.34961 kN	11.6497 kN
Design Shear Strength (φVc+φVs)	204.328 + 199.267 = 403.596 kN	197.880 + 183.689 = 381.569 kN
Shear Ratio	0.006 < 1.000 ..... O.K	0.031 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	2.34961 kN	11.6497 kN
Design Shear Strength (φVc+φVs)	205.191 + 199.267 = 404.459 kN	198.763 + 183.689 = 382.452 kN
Shear Ratio	0.006 < 1.000 ..... O.K	0.030 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

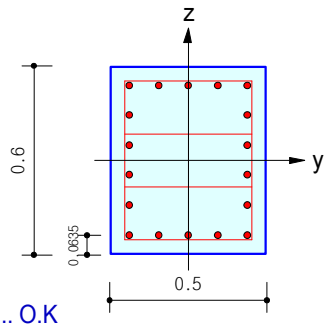
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 668 (PM), 668, 666 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 5.6 m
Section Property : 1C3 (No : 31103)
Rebar Pattern : 18 - 6 - D19 Ast = 0.005157 m² (ρst = 0.017)

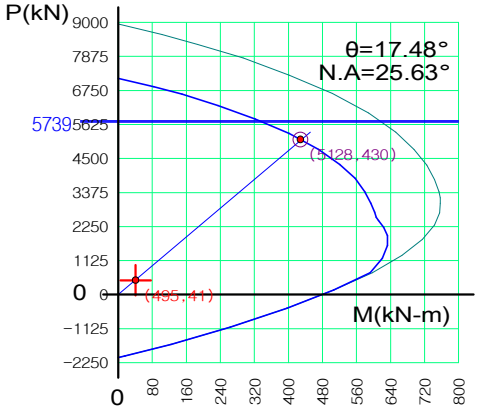


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 5739.06 kN	
Axial Load Ratio	Pu / φPn	= 494.632 / 5128.25	= 0.096 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 41.3825 / 429.534	= 0.096 < 1.000 ..... O.K
	Mcy / φMny	= 39.4705 / 409.689	= 0.096 < 1.000 ..... O.K
	Mcz / φMnz	= 12.4333 / 129.053	= 0.096 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
7173.83	0.00
6636.19	150.31
5816.38	322.71
4812.36	471.68
3853.08	557.34
3044.75	595.45
2562.13	606.23
2242.01	624.09
1629.61	633.12
743.64	593.34
-435.11	397.74
-1633.14	124.45
-2062.80	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Applied Shear Force (Vu)	5.30518 kN	17.3675 kN
Design Shear Strength (φVc+φVs)	204.874 + 199.267 = 404.142 kN	192.519 + 183.689 = 376.208 kN
Shear Ratio	0.013 < 1.000 ..... O.K	0.046 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	5.30518 kN	17.3675 kN
Design Shear Strength (φVc+φVs)	205.737 + 199.267 = 405.004 kN	193.402 + 183.689 = 377.091 kN
Shear Ratio	0.013 < 1.000 ..... O.K	0.046 < 1.000 ..... O.K
As-H_use	0.00143 m²/m, 4-D10 @200	0.00107 m²/m, 3-D10 @200

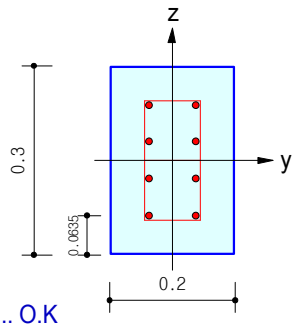
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 679 (PM), 678 (Shear)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 5.6 m
Section Property : 1C4 (No : 31104)
Rebar Pattern : 8 - 4 - D22 Ast = 0.0030968 m² (ρst = 0.052 > ρmax = 0.030)

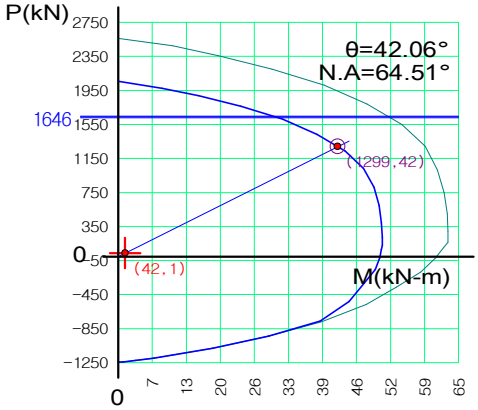


2. Axial and Moments Capacity

Load Combination : 1 (Pos : J)

Concentric Max. Axial Load	φPn-max	= 1645.60 kN	
Axial Load Ratio	Pu / φPn	= 42.4421 / 1298.57	= 0.033 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 1.37197 / 41.8982	= 0.033 < 1.000 ..... O.K
	Mcy / φMny	= -1.0186 / 31.1070	= 0.033 < 1.000 ..... O.K
	Mcz / φMnz	= -0.9191 / 28.0680	= 0.033 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
2057.00	0.00
1889.33	15.32
1614.06	31.46
1243.37	43.42
815.95	48.83
402.55	50.29
134.95	50.49
-12.43	50.01
-314.34	47.03
-757.29	38.62
-1076.24	18.06
-1216.74	3.41
-1238.72	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Applied Shear Force (Vu)	0.25017 kN	0.41172 kN
Design Shear Strength (φVc+φVs)	29.4091 + 46.7354 = 76.1445 kN	33.9695 + 53.9825 = 87.9520 kN
Shear Ratio	0.003 < 1.000 ..... O.K	0.005 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	0.25017 kN	0.41172 kN
Design Shear Strength (φVc+φVs)	29.5440 + 46.7354 = 76.2794 kN	34.1253 + 53.9825 = 88.1079 kN
Shear Ratio	0.003 < 1.000 ..... O.K	0.005 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

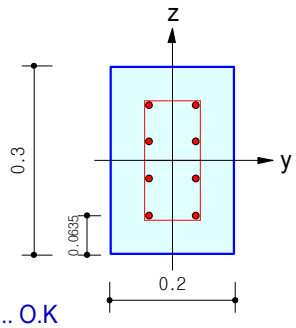
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 2100 (PM), 2100, 2097 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 3.3 m
Section Property : 2C4 (No : 31204)
Rebar Pattern : 8 - 4 - D22 Ast = 0.0030968 m² (ρst = 0.052 > ρmax = 0.030)

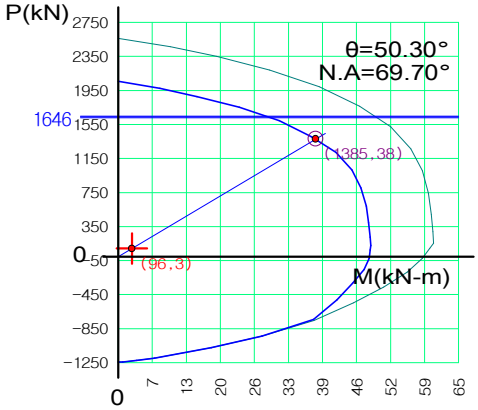


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 1645.60 kN	
Axial Load Ratio	Pu / φPn	= 96.1410 / 1384.81	= 0.069 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 2.62406 / 37.7296	= 0.070 < 1.000 ..... O.K
	Mcy / φMny	= 1.67616 / 24.1003	= 0.070 < 1.000 ..... O.K
	Mcz / φMnz	= 2.01896 / 29.0293	= 0.070 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
2057.00	0.00
1883.24	15.06
1597.17	30.85
1224.85	41.70
807.47	46.48
400.35	47.94
130.64	48.29
-17.74	47.97
-311.92	44.85
-742.56	37.27
-1069.81	17.90
-1215.48	3.47
-1238.72	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	0.60586 kN	1.01669 kN
Design Shear Strength (φVc+φVs)	31.7796 + 46.7354 = 78.5150 kN	36.3512 + 53.9825 = 90.3338 kN
Shear Ratio	0.008 < 1.000 ..... O.K	0.011 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	0.60586 kN	1.01669 kN
Design Shear Strength (φVc+φVs)	31.8591 + 46.7354 = 78.5945 kN	36.4431 + 53.9825 = 90.4256 kN
Shear Ratio	0.008 < 1.000 ..... O.K	0.011 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

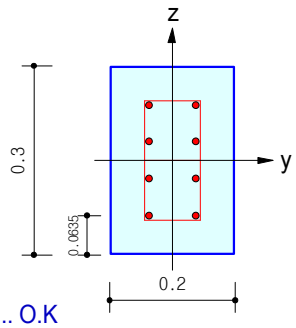
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 2101 (PM), 2101, 2098 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 3.3 m
Section Property : 3C4 (No : 31304)
Rebar Pattern : 8 - 4 - D22 Ast = 0.0030968 m² (ρst = 0.052 > ρmax = 0.030)

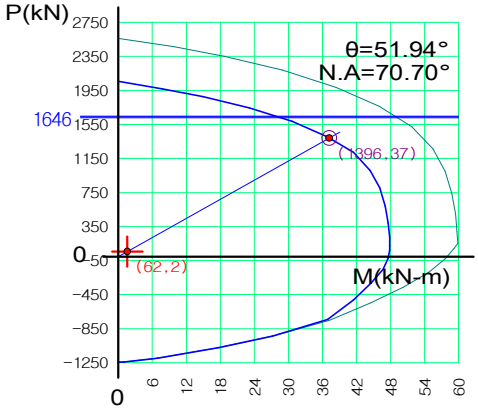


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 1645.60 kN	
Axial Load Ratio	Pu / φPn	= 62.3711 / 1396.35	= 0.045 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 1.66356 / 37.2163	= 0.045 < 1.000 ..... O.K
	Mcy / φMny	= 1.02561 / 22.9444	= 0.045 < 1.000 ..... O.K
	Mcz / φMnz	= 1.30979 / 29.3020	= 0.045 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
2057.00	0.00
1882.07	15.02
1593.92	30.80
1221.28	41.49
805.84	46.15
399.93	47.62
129.81	47.99
-18.76	47.70
-311.45	44.55
-739.73	37.01
-1068.58	17.84
-1215.24	3.47
-1238.72	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	0.79668 kN	0.68448 kN
Design Shear Strength (φVc+φVs)	30.6274 + 46.7354 = 77.3629 kN	35.2140 + 53.9825 = 89.1965 kN
Shear Ratio	0.010 < 1.000 ..... O.K	0.008 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	0.79668 kN	0.68448 kN
Design Shear Strength (φVc+φVs)	30.7069 + 46.7354 = 77.4423 kN	35.3058 + 53.9825 = 89.2883 kN
Shear Ratio	0.010 < 1.000 ..... O.K	0.008 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

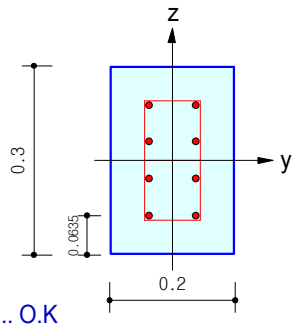
RC Column Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022 UNIT SYSTEM : kN, m
Member Number : 2102 (PM), 2102, 2099 (Shear-y,z)
Material Data : fck = 27550, fy = 400000, fys = 400000 KPa
Column Height : 3.3 m
Section Property : 4C4 (No : 31404)
Rebar Pattern : 8 - 4 - D22 Ast = 0.0030968 m² (ρst = 0.052 > ρmax = 0.030)

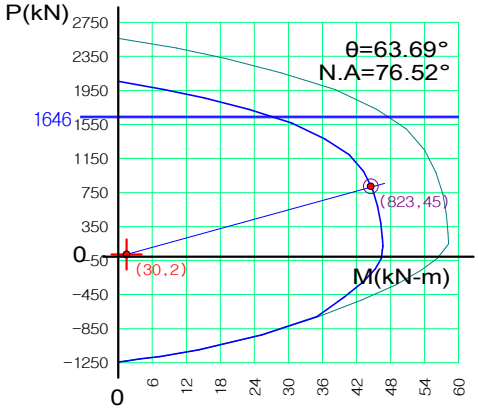


2. Axial and Moments Capacity

Load Combination : 1 (Pos : I)

Concentric Max. Axial Load	φPn-max	= 1645.60 kN	
Axial Load Ratio	Pu / φPn	= 29.5260 / 823.477	= 0.036 < 1.000 ..... O.K
Moment Ratio	Mc / φMn	= 1.59902 / 44.6180	= 0.036 < 1.000 ..... O.K
	Mcy / φMny	= 0.70862 / 19.7730	= 0.036 < 1.000 ..... O.K
	Mcz / φMnz	= 1.43343 / 39.9975	= 0.036 < 1.000 ..... O.K

P-M Interaction Diagram



φPn(kN)	φMn(kN-m)
2057.00	0.00
1862.12	15.21
1567.90	30.65
1199.18	40.71
794.84	44.84
395.10	46.30
122.93	46.71
-18.43	46.50
-292.22	43.30
-702.67	35.10
-1093.48	14.17
-1205.14	3.95
-1238.72	0.00

3. Shear Capacity

[END]	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Applied Shear Force (Vu)	1.03440 kN	0.40800 kN
Design Shear Strength (φVc+φVs)	29.5069 + 46.7354 = 76.2423 kN	34.0609 + 53.9825 = 88.0434 kN
Shear Ratio	0.014 < 1.000 ..... O.K	0.005 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

[MIDDLE]	y (LCB : 1, POS : 1/2)	z (LCB : 1, POS : 1/2)
Applied Shear Force (Vu)	1.03440 kN	0.40800 kN
Design Shear Strength (φVc+φVs)	29.5864 + 46.7354 = 76.3218 kN	34.1527 + 53.9825 = 88.1352 kN
Shear Ratio	0.014 < 1.000 ..... O.K	0.005 < 1.000 ..... O.K
As-H_use	0.00107 m²/m, 3-D10 @200	0.00071 m²/m, 2-D10 @200

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

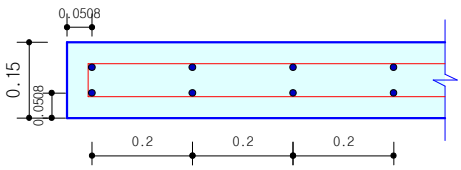
Wall ID : 600 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.715*0.15 m

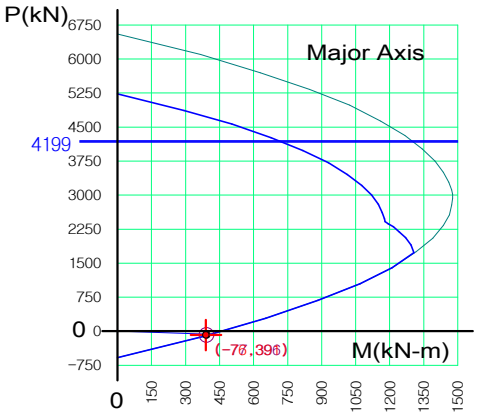
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

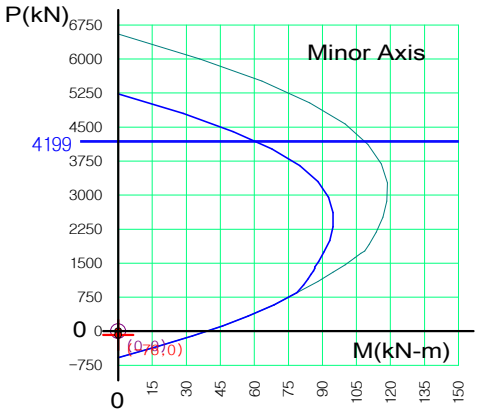


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4199.29 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	-76.248	-76.248
φPn (kN)	-77.067	0.00000
Pu / φPn	0.989 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	391.301	0.00000
φMn (kN-m)	395.503	0.00000
Mc / φMn	0.989 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 200.657 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 163.532 + 250.534 = 414.066 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.485 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

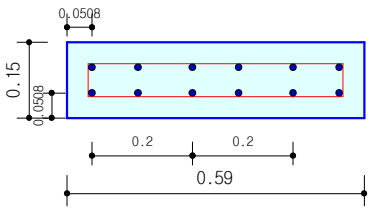
Wall ID : 601 (Wall Mark : W1)

Story-PM, Shear : 2F (Height = 3.3 m), 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.59*0.15 m

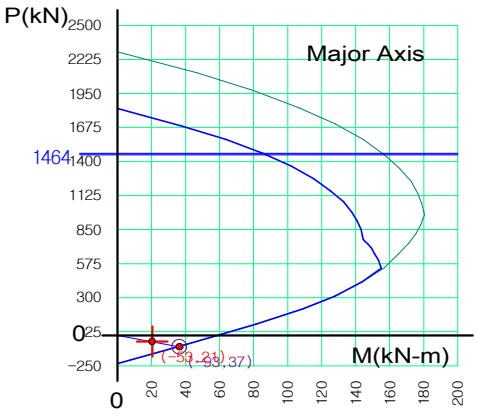
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

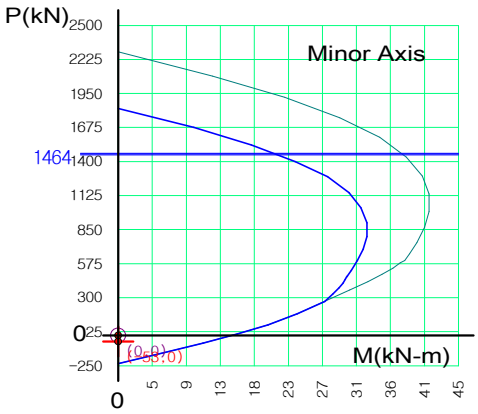


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1463.90 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-52.931	-52.931
φPn (kN)	-93.349	0.00000
Pu / φPn	0.567 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-20.850	0.00000
φMn (kN-m)	36.7712	0.00000
Mc / φMn	0.567 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 14.7893 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 26.8207 + 86.1895 = 113.010 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.131 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

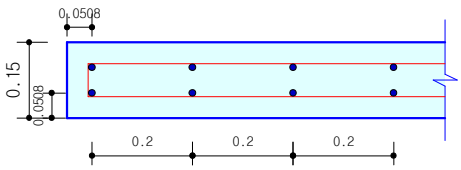
Wall ID : 602 (Wall Mark : W1)

Story-PM, Shear : 2F (Height = 3.3 m), 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.25*0.15 m

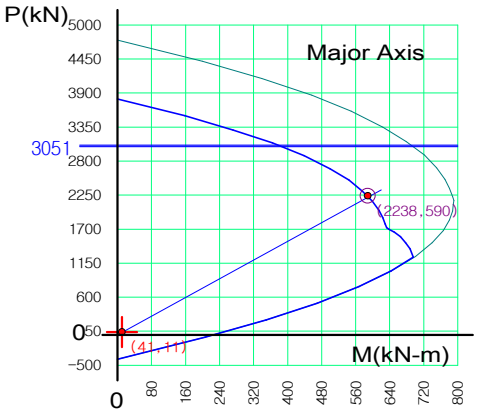
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

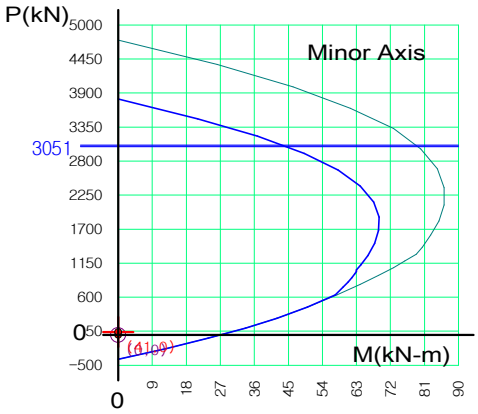


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3050.78 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	40.9171	40.9171
φPn (kN)	2237.82	0.00000
Pu / φPn	0.018 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	10.7817	0.00000
φMn (kN-m)	589.666	0.00000
Mc / φMn	0.018 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.61376 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 94.7421 + 182.605 = 277.347 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.013 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

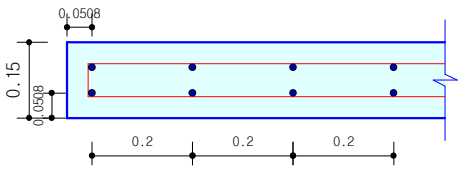
Wall ID : 603 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.415*0.15 m

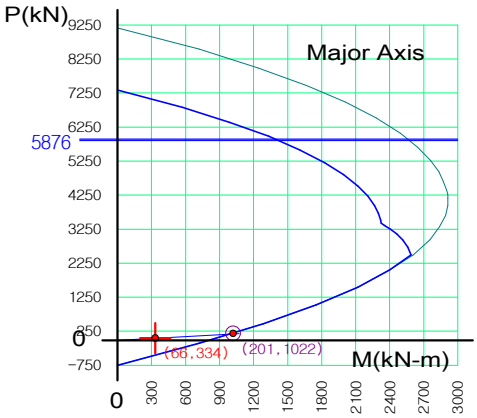
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

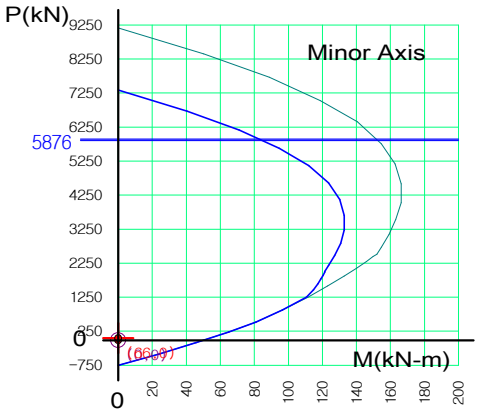


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5876.09 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	65.6671	65.6671
φPn (kN)	201.109	0.00000
Pu / φPn	0.327 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-333.64	0.00000
φMn (kN-m)	1021.78	0.00000
Mc / φMn	0.327 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 166.727 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 346.733 + 352.792 = 699.525 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.238 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

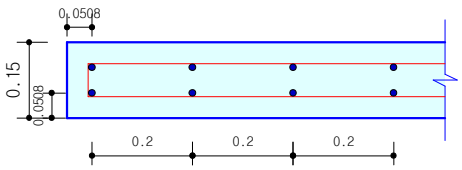
Wall ID : 604 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.15 m

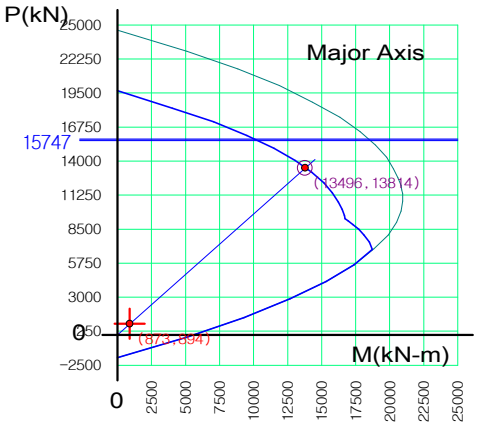
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

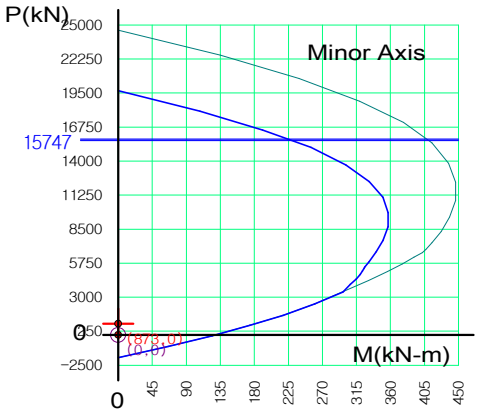


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 15747.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	873.019	873.019
φPn (kN)	13496.3	0.00000
Pu / φPn	0.065 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-893.57	0.00000
φMn (kN-m)	13814.0	0.00000
Mc / φMn	0.065 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 387.324 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1044.64 + 949.545 = 1994.18 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.194 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

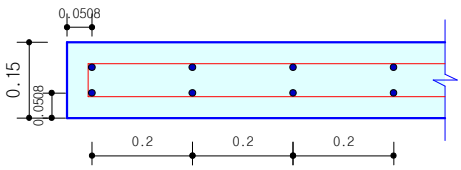
Wall ID : 605 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.26*0.15 m

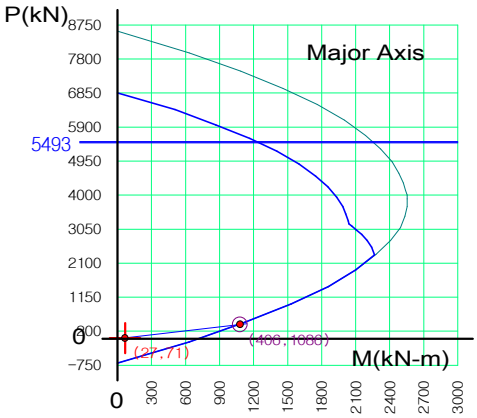
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

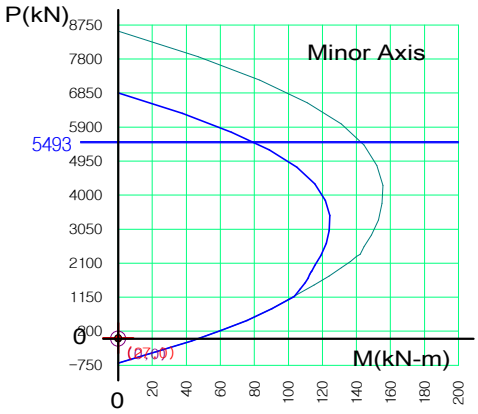


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5493.26 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	26.6598	26.6598
φPn (kN)	406.083	0.00000
Pu / φPn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	71.2910	0.00000
φMn (kN-m)	1085.90	0.00000
Mc / φMn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 44.5856 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 323.124 + 330.149 = 653.274 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.068 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 606 (Wall Mark : W1)

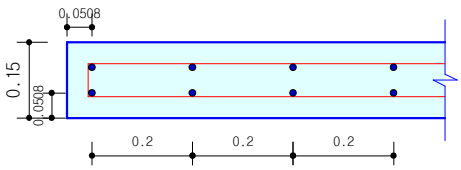
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.76*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

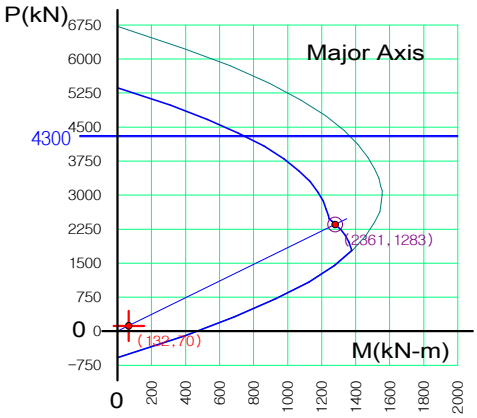
Unit System : kN, m

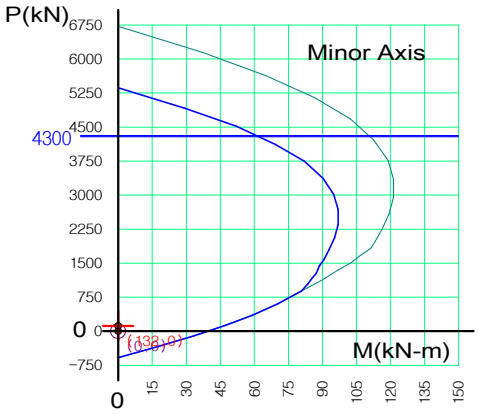


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4300.45 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	131.817	131.817
φPn (kN)	2360.71	0.00000
Pu / φPn	0.056 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-69.863	0.00000
φMn (kN-m)	1282.86	0.00000
Mc / φMn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 37.0154 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 228.754 + 257.108 = 485.862 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.076 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

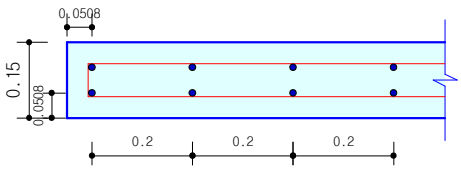
Wall ID : 607 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.9*0.15 m

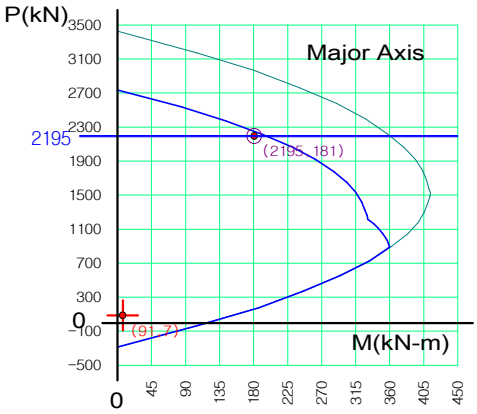
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

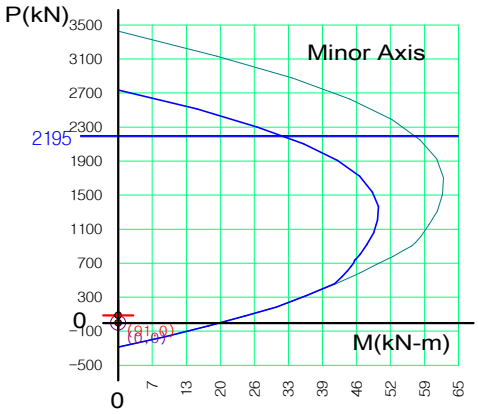


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2195.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	91.3571	91.3571
φPn (kN)	2195.19	0.00000
Pu / φPn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	7.33619	0.00000
φMn (kN-m)	181.089	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.59204 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 54.9160 + 131.475 = 186.391 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

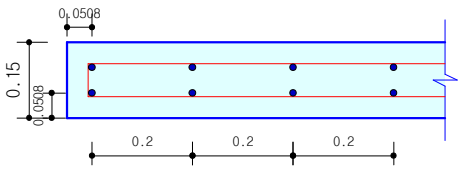
Wall ID : 608 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.96*0.15 m

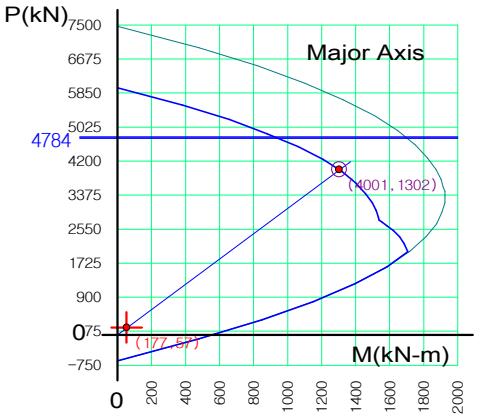
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

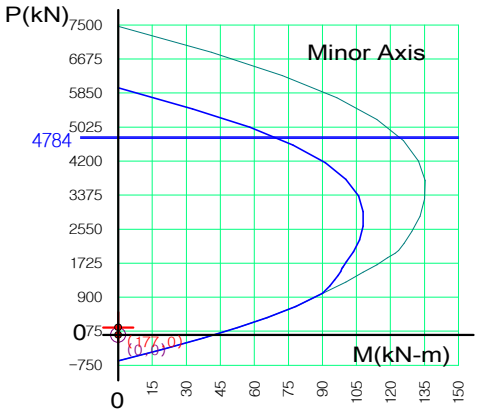


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4784.45 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	176.635	176.635
φPn (kN)	4001.40	0.00000
Pu / φPn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-57.491	0.00000
φMn (kN-m)	1302.37	0.00000
Mc / φMn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 30.0274 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 301.140 + 286.324 = 587.465 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.051 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

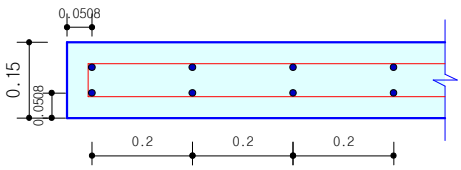
Wall ID : 609 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 5.4*0.15 m

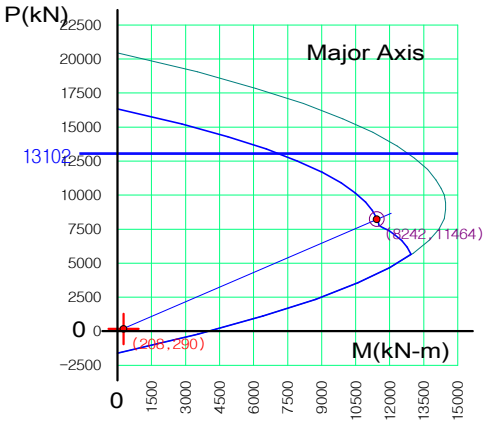
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

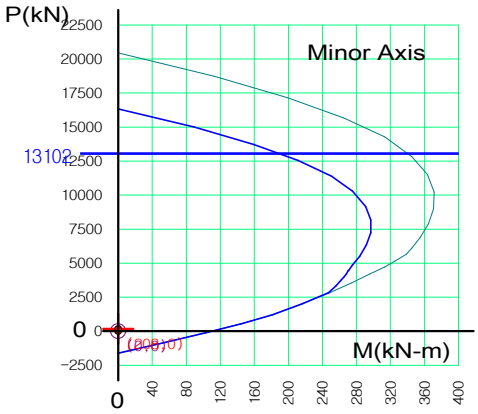


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 13102.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	208.198	208.198
φPn (kN)	8242.46	0.00000
Pu / φPn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-289.56	0.00000
φMn (kN-m)	11463.7	0.00000
Mc / φMn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 123.293 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 785.121 + 788.853 = 1573.97 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.078 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

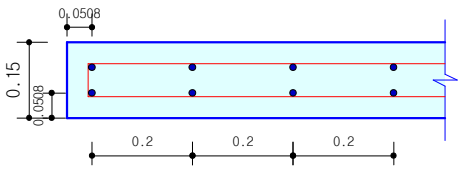
Wall ID : 610 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.15 m

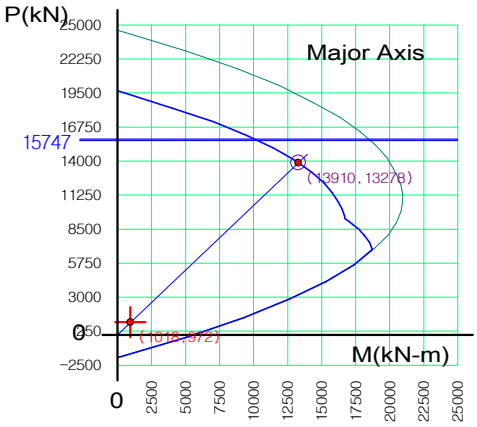
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

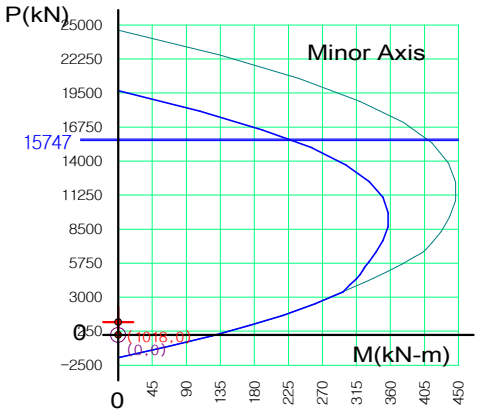


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 15747.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1018.36	1018.36
φPn (kN)	13910.2	0.00000
Pu / φPn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-972.07	0.00000
φMn (kN-m)	13277.9	0.00000
Mc / φMn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 412.636 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1067.89 + 949.545 = 2017.44 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.205 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 611 (Wall Mark : W1)

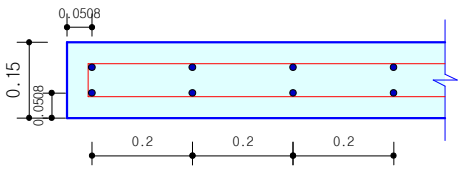
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.76*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

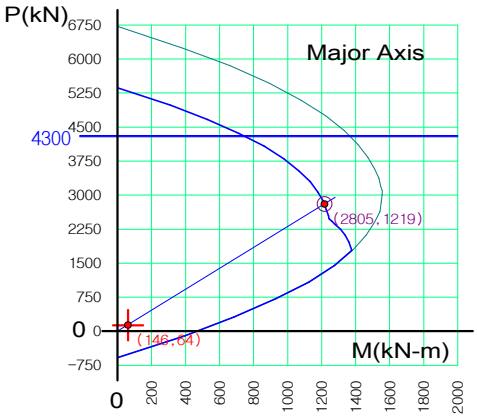
Unit System : kN, m

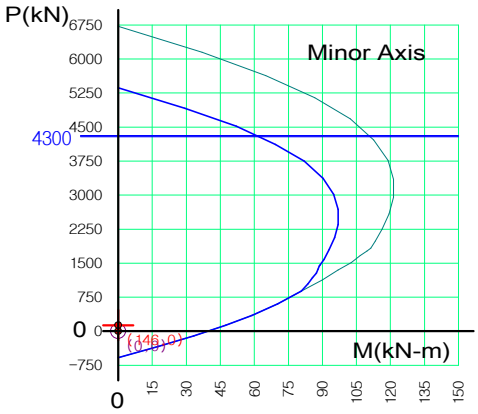


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4300.45 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	146.293	146.293
φPn (kN)	2805.03	0.00000
Pu / φPn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-63.578	0.00000
φMn (kN-m)	1219.05	0.00000
Mc / φMn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 32.8981 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 223.938 + 257.108 = 481.046 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.068 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

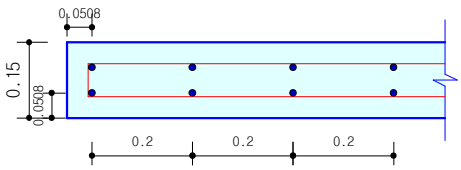
Wall ID : 612 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.9*0.15 m

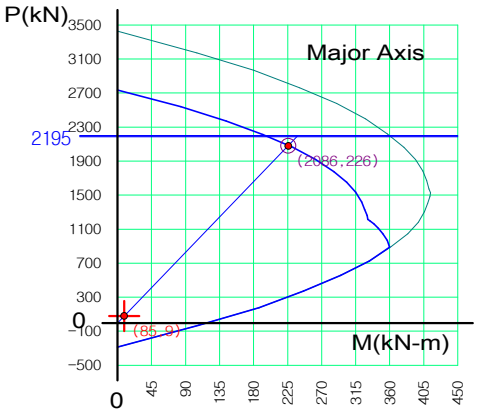
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

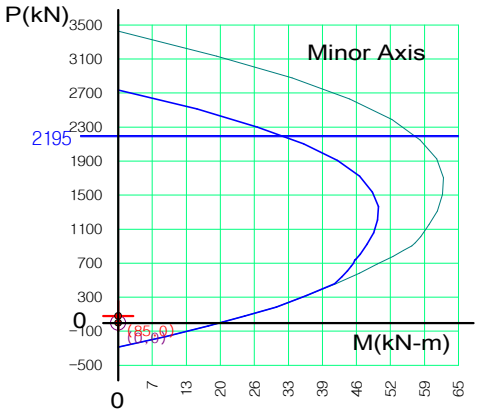


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2195.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	85.1569	85.1569
φPn (kN)	2085.87	0.00000
Pu / φPn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	9.24071	0.00000
φMn (kN-m)	226.346	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 4.87445 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 57.6913 + 131.475 = 189.167 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.026 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

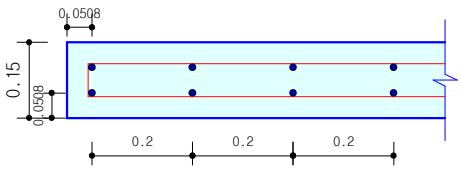
Wall ID : 613 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.96*0.15 m

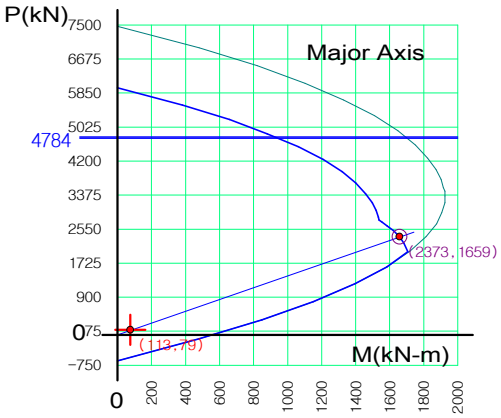
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

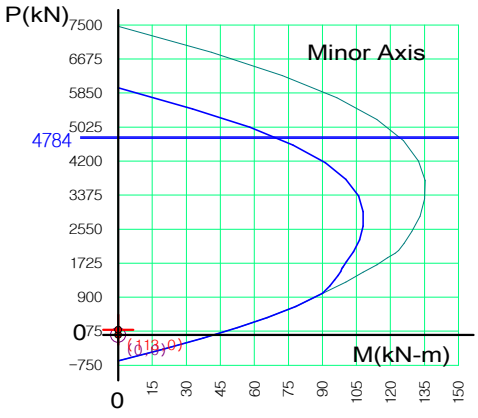


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4784.45 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	113.486	113.486
φPn (kN)	2373.09	0.00000
Pu / φPn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-79.034	0.00000
φMn (kN-m)	1659.25	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 43.0830 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 291.037 + 286.324 = 577.361 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.075 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

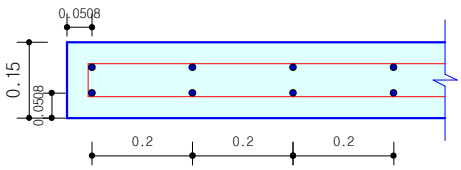
Wall ID : 614 (Wall Mark : W1)

Story-PM, Shear : 3F (Height = 3.3 m), 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.52*0.15 m

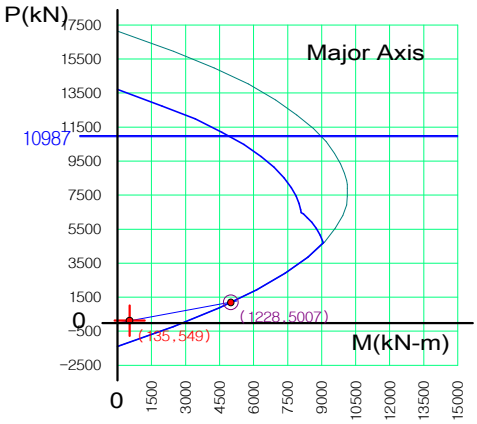
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

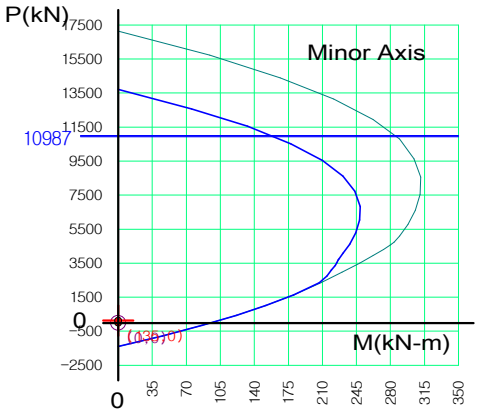


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 10986.5 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	134.575	134.575
φPn (kN)	1227.76	0.00000
Pu / φPn	0.110 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-548.79	0.00000
φMn (kN-m)	5006.74	0.00000
Mc / φMn	0.110 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 222.026 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 666.396 + 660.299 = 1326.69 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.167 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

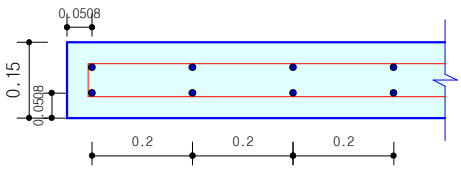
Wall ID : 615 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.15 m

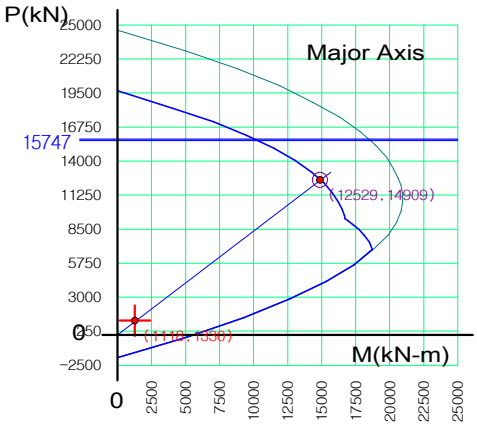
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

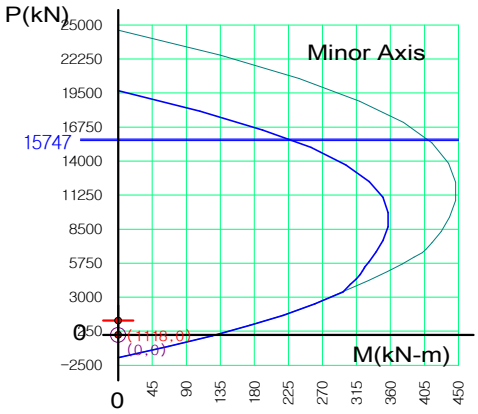


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 15747.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1117.79	1117.79
φPn (kN)	12529.1	0.00000
Pu / φPn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1330.1	0.00000
φMn (kN-m)	14908.6	0.00000
Mc / φMn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 625.817 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1083.80 + 949.545 = 2033.35 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.308 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

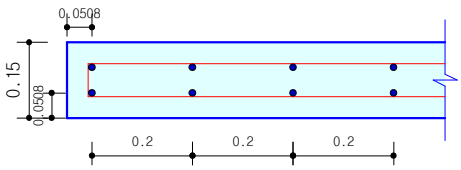
Wall ID : 616 (Wall Mark : W1)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.7*0.15 m

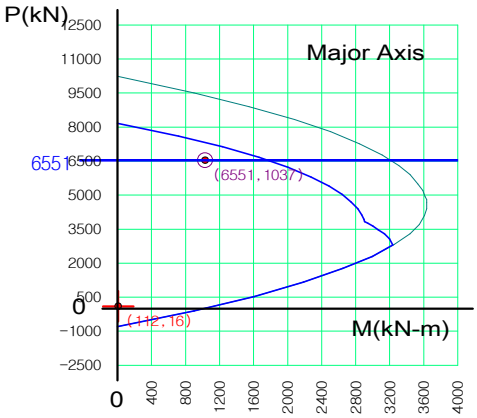
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

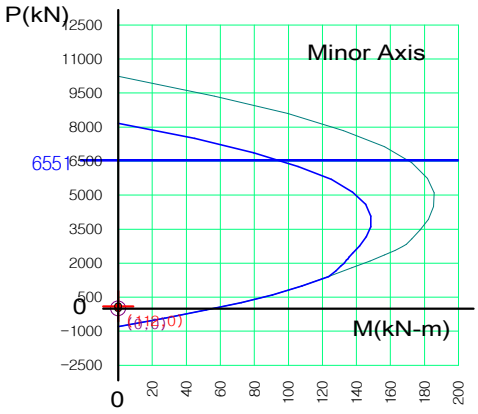


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 6551.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	111.686	111.686
φPn (kN)	6551.18	0.00000
Pu / φPn	0.017 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-15.818	0.00000
φMn (kN-m)	1037.37	0.00000
Mc / φMn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 17.1295 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 390.529 + 394.426 = 784.955 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.022 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

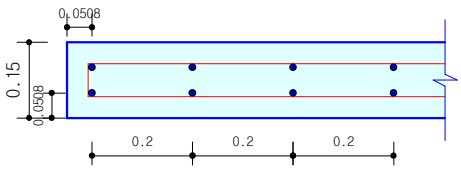
Wall ID : 617 (Wall Mark : W1)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.6*0.15 m

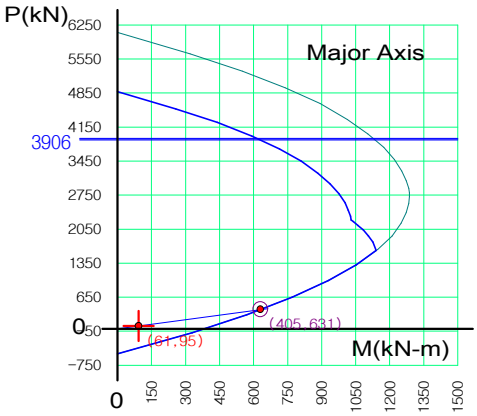
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

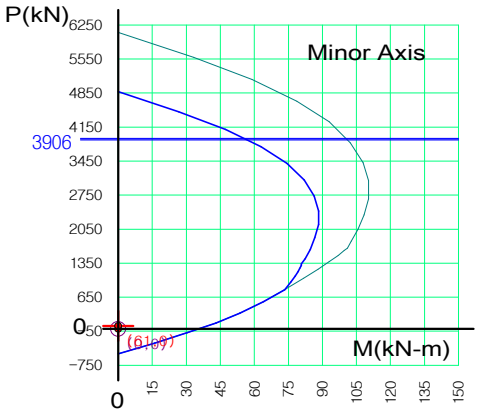


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3906.37 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	61.0741	61.0741
φPn (kN)	405.418	0.00000
Pu / φPn	0.151 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-95.039	0.00000
φMn (kN-m)	630.883	0.00000
Mc / φMn	0.151 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 50.5590 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 171.360 + 233.734 = 405.094 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.125 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 618 (Wall Mark : W1)

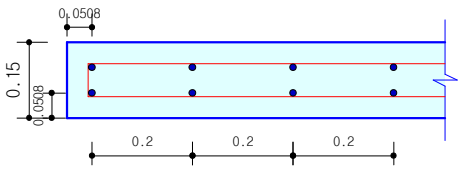
Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.9*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

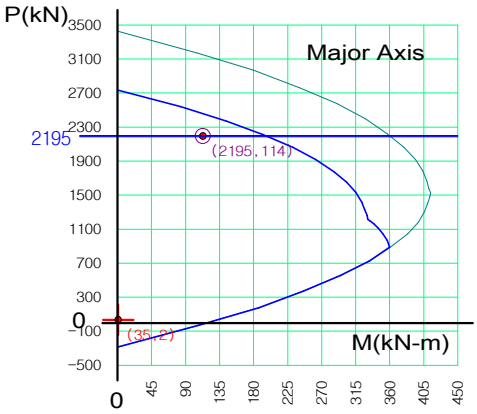
Unit System : kN, m

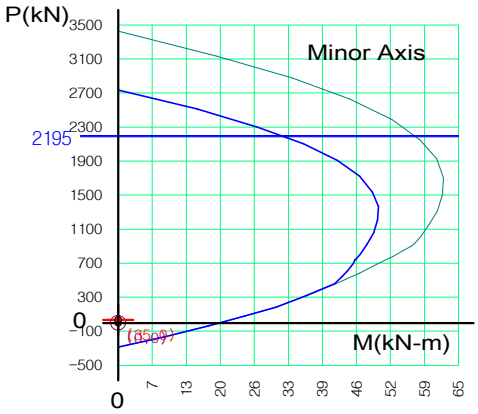


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2195.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	35.0466	35.0466
φPn (kN)	2195.19	0.00000
Pu / φPn	0.016 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.61898	0.00000
φMn (kN-m)	113.719	0.00000
Mc / φMn	0.014 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 1.18066 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 51.5403 + 131.475 = 183.016 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

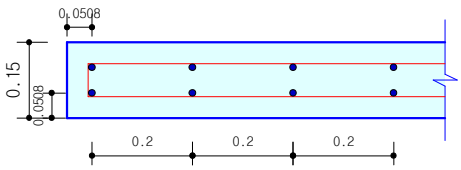
Wall ID : 619 (Wall Mark : W1)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.12*0.15 m

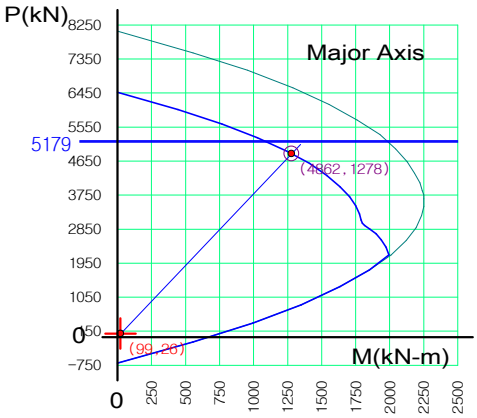
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

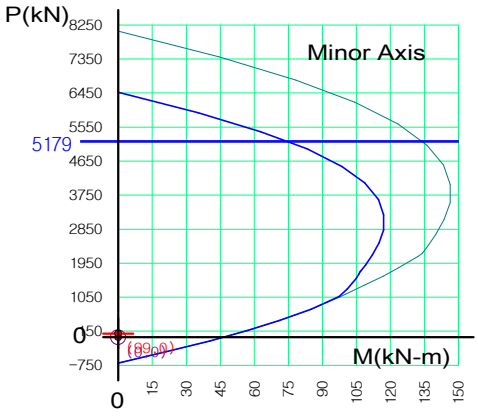


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5178.52 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	98.9340	98.9340
φPn (kN)	4862.03	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-26.013	0.00000
φMn (kN-m)	1278.39	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 13.9969 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 310.984 + 309.698 = 620.682 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.023 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

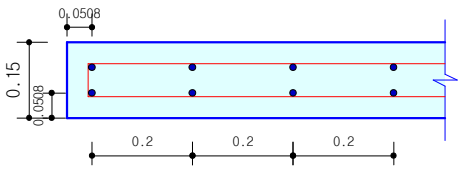
Wall ID : 620 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6*0.15 m

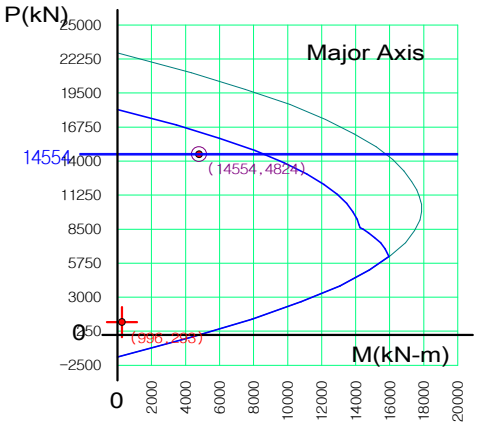
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

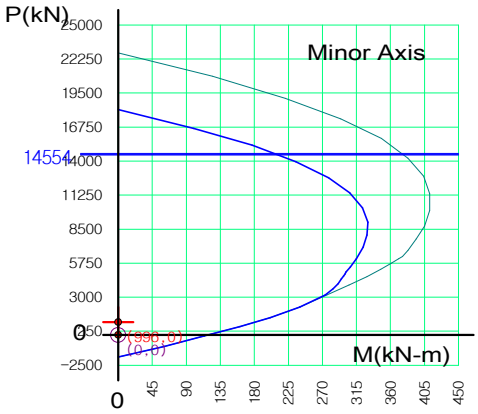


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14554.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	995.941	995.941
φPn (kN)	14554.3	0.00000
Pu / φPn	0.068 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	293.096	0.00000
φMn (kN-m)	4824.13	0.00000
Mc / φMn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 82.8436 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 556.476 + 876.503 = 1432.98 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.058 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

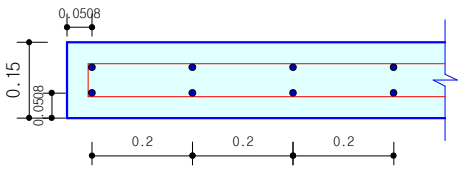
Wall ID : 621 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.09*0.15 m

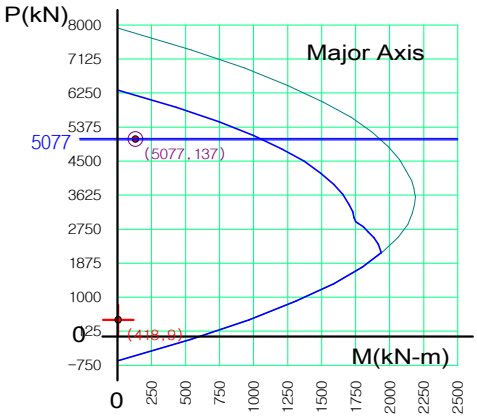
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

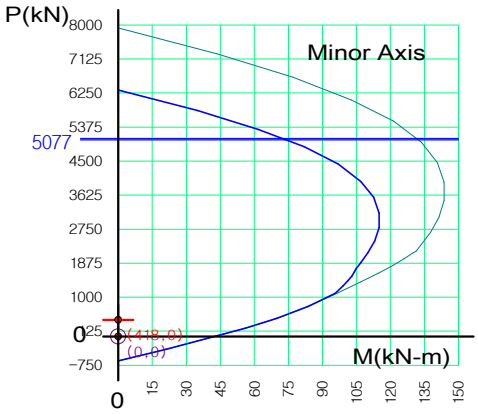


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5076.70 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	418.316	418.316
φPn (kN)	5076.70	0.00000
Pu / φPn	0.082 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	9.20330	0.00000
φMn (kN-m)	136.538	0.00000
Mc / φMn	0.067 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 6.47491 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 106.360 + 305.315 = 411.675 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

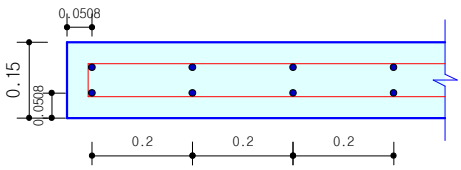
Wall ID : 622 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.4*0.15 m

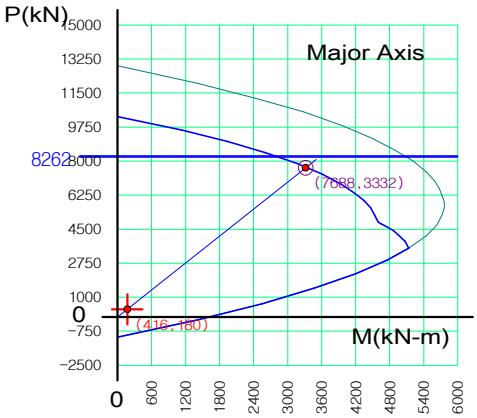
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

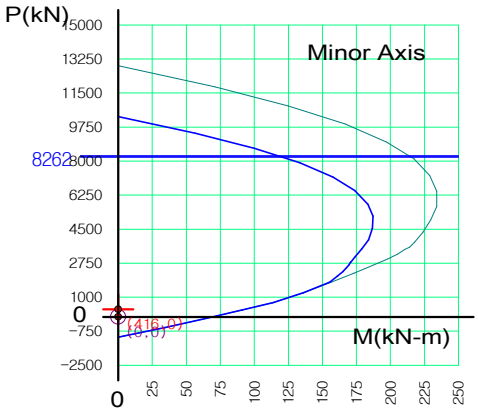


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 8262.36 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	415.919	415.919
φPn (kN)	7688.45	0.00000
Pu / φPn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-180.27	0.00000
φMn (kN-m)	3332.39	0.00000
Mc / φMn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 85.3000 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 539.908 + 496.685 = 1036.59 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.082 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

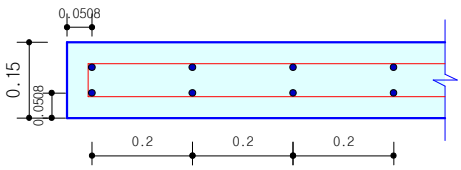
Wall ID : 623 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.32*0.15 m

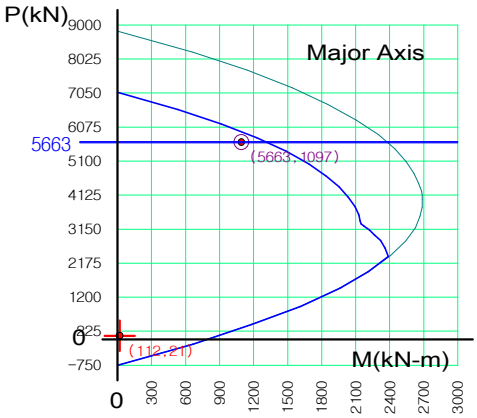
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

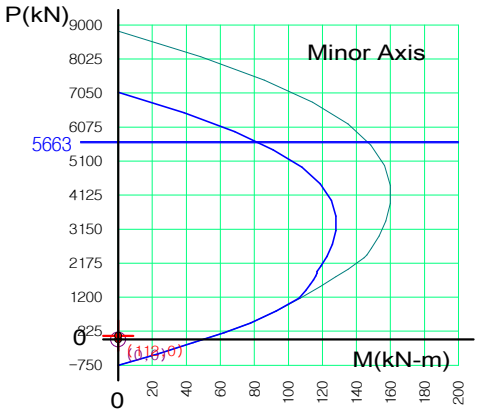


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5662.52 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	111.943	111.943
φPn (kN)	5662.52	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-20.659	0.00000
φMn (kN-m)	1097.01	0.00000
Mc / φMn	0.019 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 11.3433 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 340.910 + 338.915 = 679.825 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.017 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

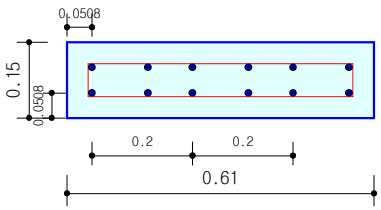
Wall ID : 624 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.61*0.15 m

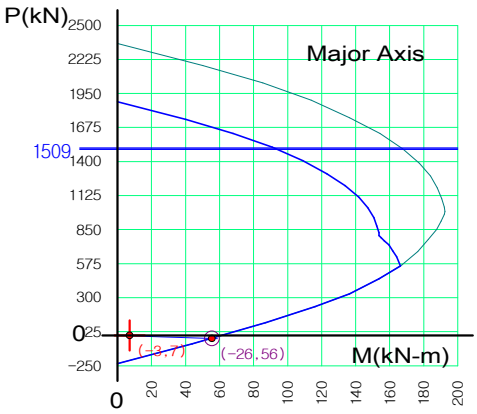
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

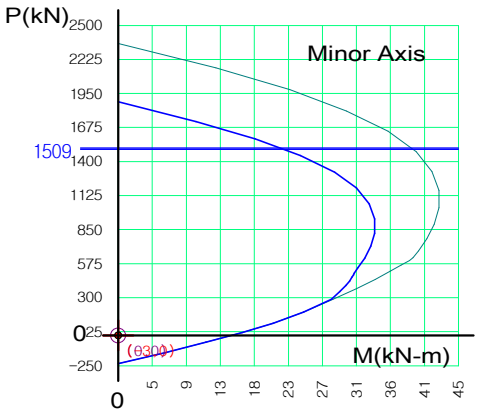


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1508.86 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-3.3543	-3.3543
φPn (kN)	-25.655	0.00000
Pu / φPn	0.131 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	7.30186	0.00000
φMn (kN-m)	55.8467	0.00000
Mc / φMn	0.131 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 4.23151 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 28.3826 + 89.1111 = 117.494 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.036 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 625 (Wall Mark : W1)

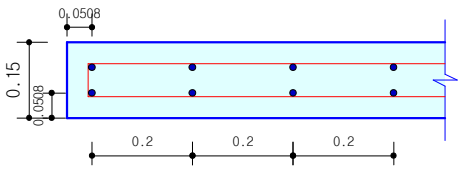
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

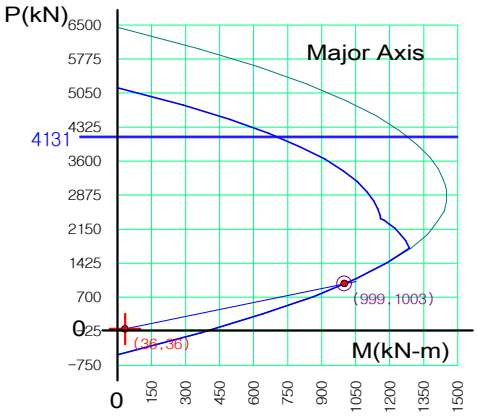
Unit System : kN, m

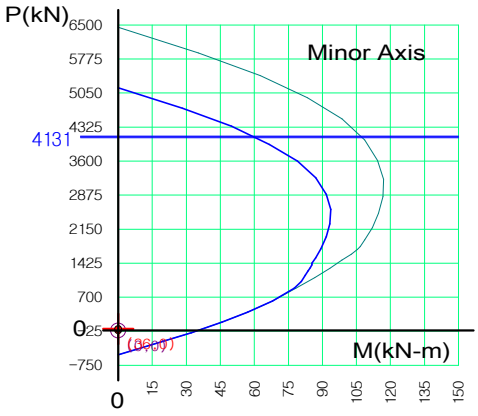


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4131.18 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	35.6930	35.6930
φPn (kN)	999.331	0.00000
Pu / φPn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-35.822	0.00000
φMn (kN-m)	1002.94	0.00000
Mc / φMn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 20.8473 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 219.486 + 248.343 = 467.829 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.045 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

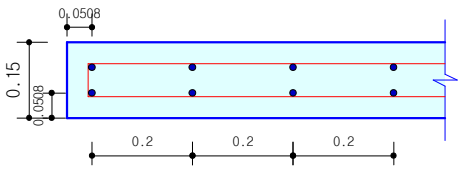
Wall ID : 626 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.7*0.15 m

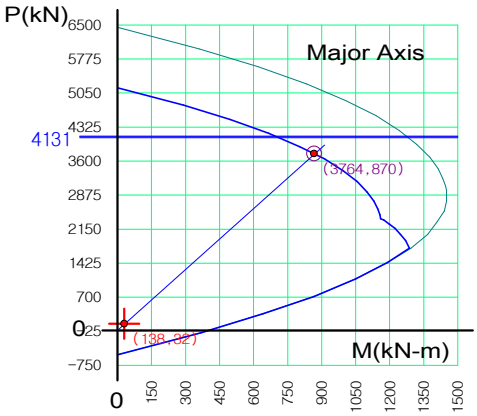
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

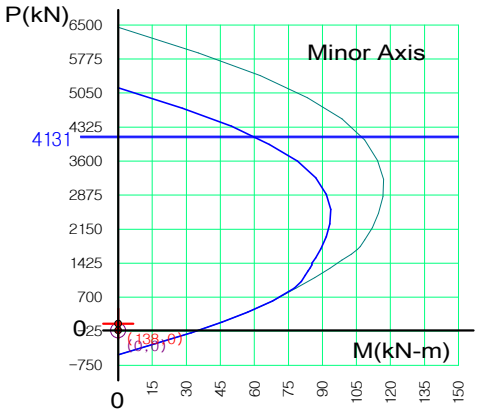


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4131.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	137.723	137.723
φPn (kN)	3764.25	0.00000
Pu / φPn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-31.816	0.00000
φMn (kN-m)	869.607	0.00000
Mc / φMn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 17.5936 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 226.041 + 248.343 = 474.383 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.037 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

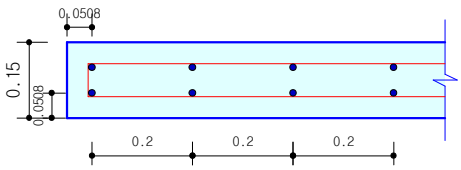
Wall ID : 627 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.8*0.15 m

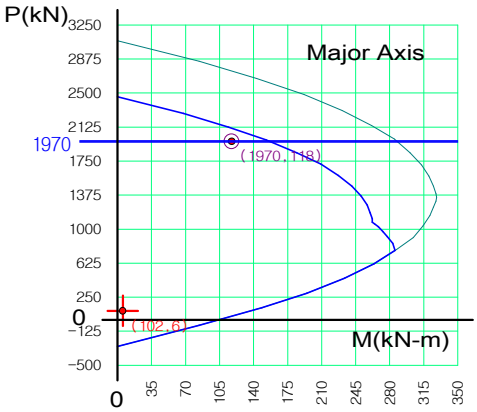
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

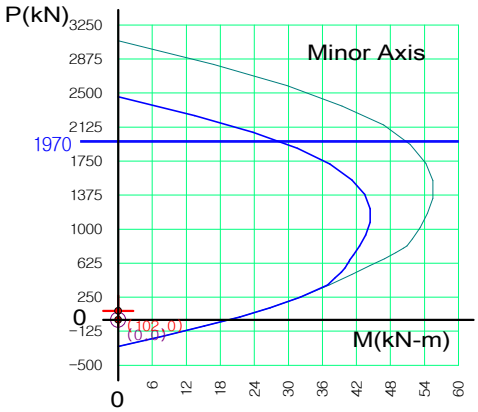


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1970.38 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	102.172	102.172
φPn (kN)	1970.38	0.00000
Pu / φPn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	5.66281	0.00000
φMn (kN-m)	117.614	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 3.06132 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 49.6155 + 116.867 = 166.483 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.018 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 628 (Wall Mark : W1)

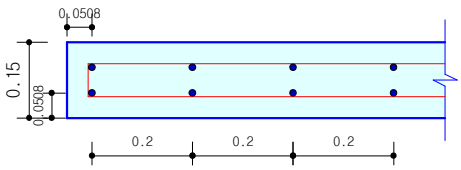
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.12*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

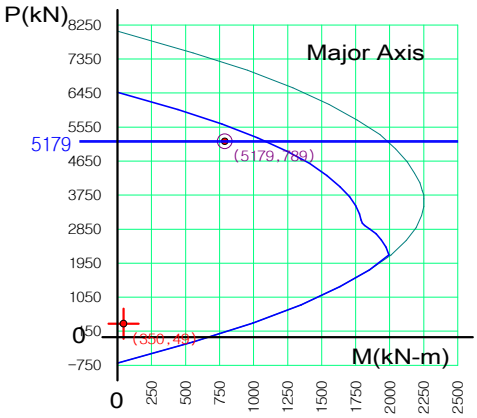
Unit System : kN, m

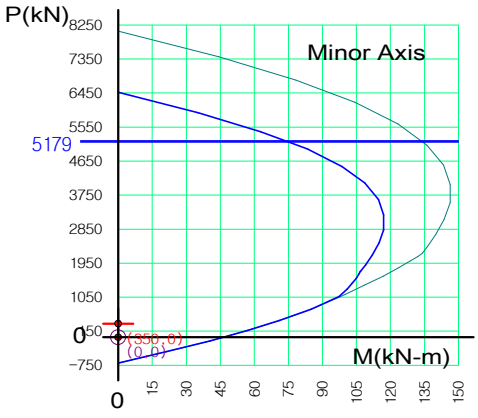


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5178.52 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	350.204	350.204
φPn (kN)	5178.52	0.00000
Pu / φPn	0.068 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-49.237	0.00000
φMn (kN-m)	789.111	0.00000
Mc / φMn	0.062 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 19.8761 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 280.262 + 309.698 = 589.960 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.034 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

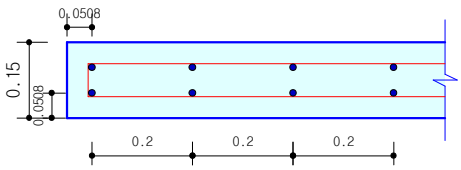
Wall ID : 629 (Wall Mark : W1)

Story-PM, Shear : 2F (Height = 3.3 m), 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.96*0.15 m

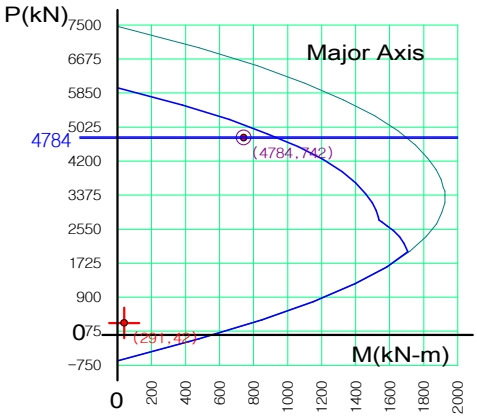
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

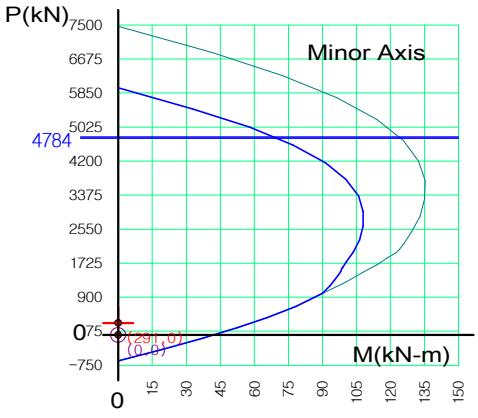


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4784.45 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	290.662	290.662
φPn (kN)	4784.45	0.00000
Pu / φPn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	42.4373	0.00000
φMn (kN-m)	742.378	0.00000
Mc / φMn	0.057 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.03607 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 143.623 + 286.324 = 429.948 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.014 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 630 (Wall Mark : W1)

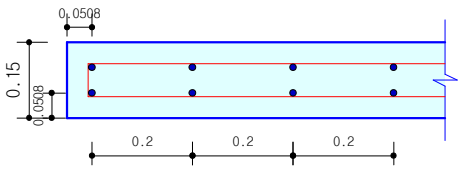
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.8*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

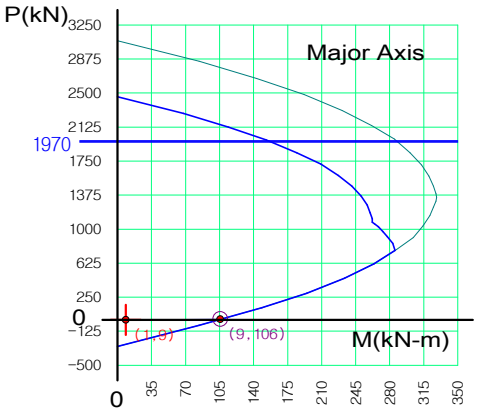
Unit System : kN, m

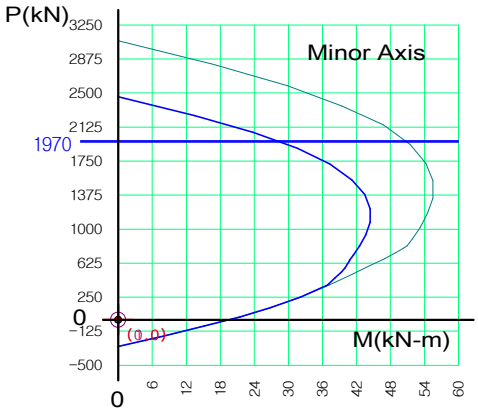


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1970.38 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	0.78658	0.78658
φPn (kN)	9.18704	0.00000
Pu / φPn	0.086 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	9.11410	0.00000
φMn (kN-m)	106.450	0.00000
Mc / φMn	0.086 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 3.66807 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 32.6583 + 116.867 = 149.525 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.025 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

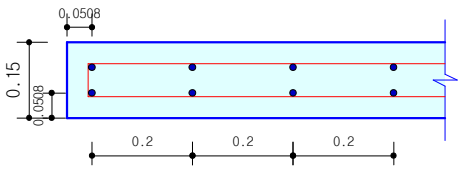
Wall ID : 631 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.86*0.15 m

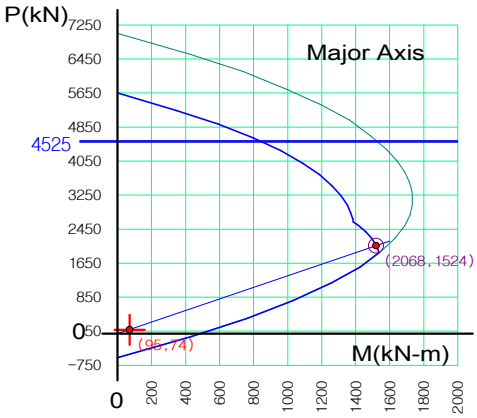
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

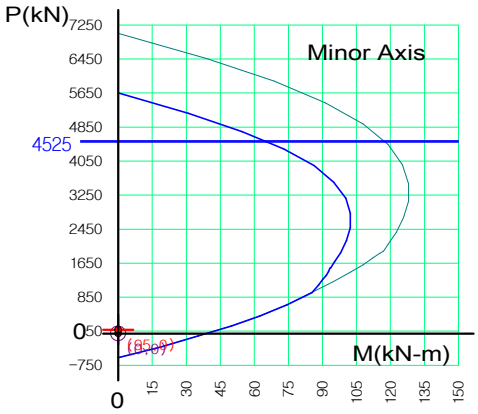


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4525.26 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	94.8603	94.8603
φPn (kN)	2068.23	0.00000
Pu / φPn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	73.5124	0.00000
φMn (kN-m)	1523.94	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 21.3346 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 125.134 + 271.716 = 396.850 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.054 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 632 (Wall Mark : W1)

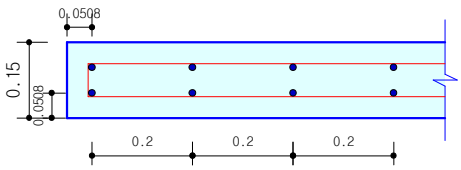
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

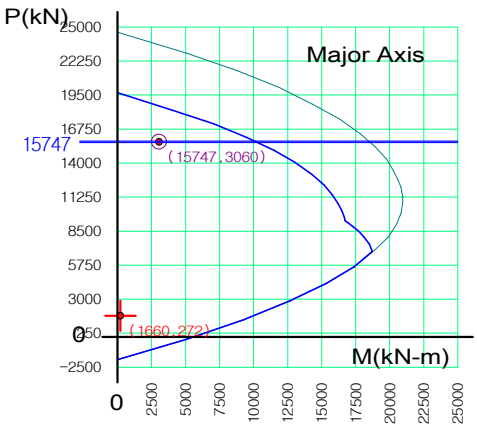
Unit System : kN, m

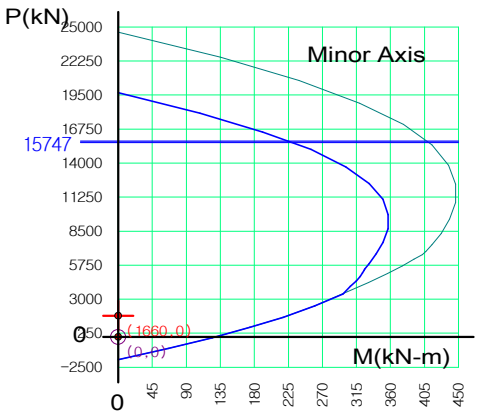


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 15747.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1659.88	1659.88
φPn (kN)	15747.2	0.00000
Pu / φPn	0.105 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-272.02	0.00000
φMn (kN-m)	3060.48	0.00000
Mc / φMn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 112.248 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 876.673 + 949.545 = 1826.22 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.061 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 633 (Wall Mark : W1)

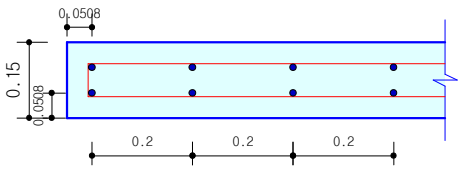
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.96*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

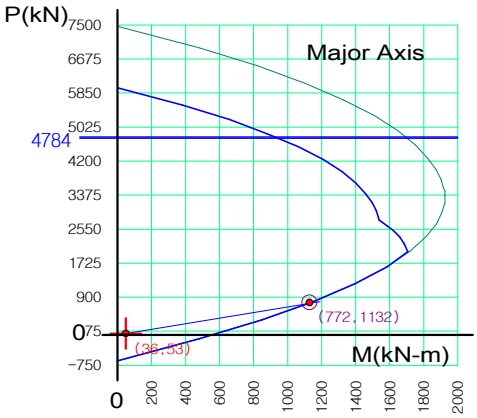
Unit System : kN, m

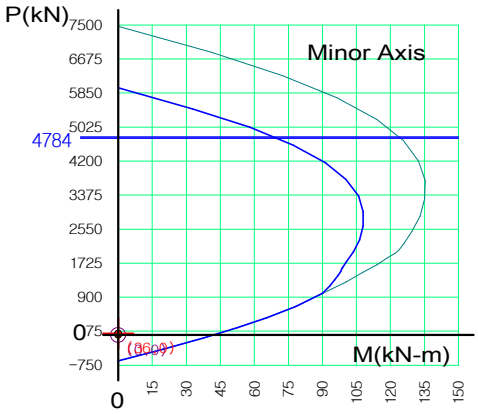


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4784.45 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	35.9546	35.9546
φPn (kN)	772.254	0.00000
Pu / φPn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-52.717	0.00000
φMn (kN-m)	1132.29	0.00000
Mc / φMn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 35.3718 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 282.285 + 286.324 = 568.610 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.062 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 634 (Wall Mark : W1)

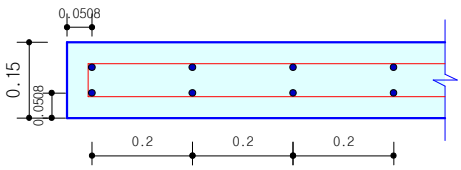
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.8*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

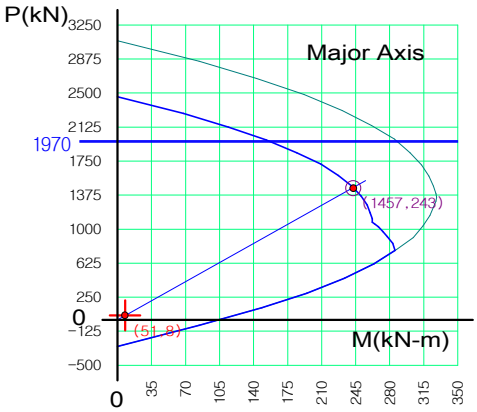
Unit System : kN, m

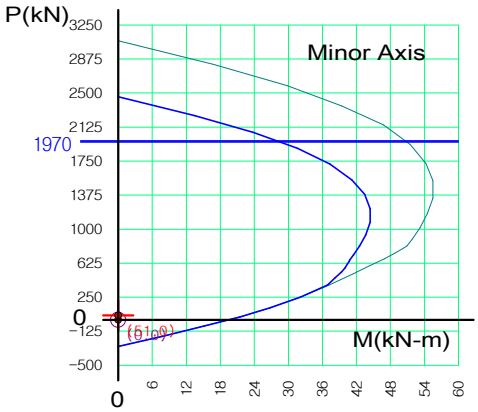


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1970.38 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	50.7250	50.7250
φPn (kN)	1457.43	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	8.46048	0.00000
φMn (kN-m)	243.086	0.00000
Mc / φMn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 5.02311 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 49.3095 + 116.867 = 166.177 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.030 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

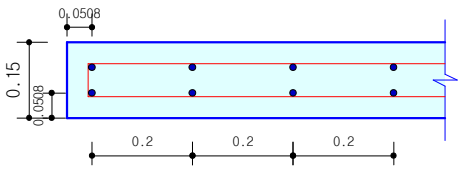
Wall ID : 635 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.86*0.15 m

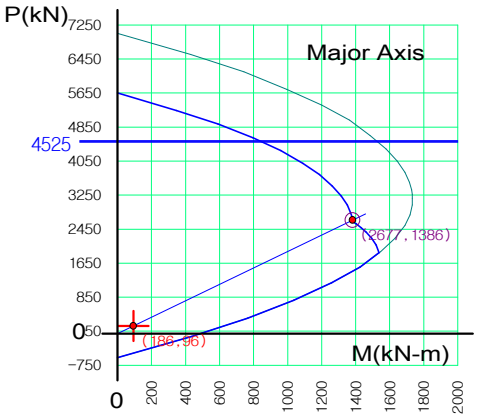
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

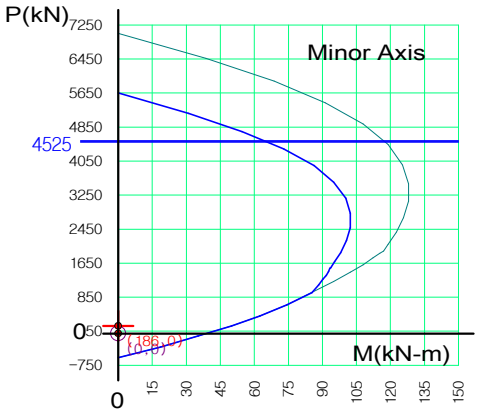


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4525.26 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	185.617	185.617
φPn (kN)	2676.74	0.00000
Pu / φPn	0.069 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	96.1292	0.00000
φMn (kN-m)	1386.26	0.00000
Mc / φMn	0.069 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 50.7664 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 273.641 + 271.716 = 545.357 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.093 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

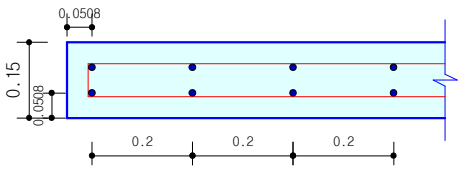
Wall ID : 636 (Wall Mark : W1)

Story-PM, Shear : 2F (Height = 3.3 m), 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.26*0.15 m

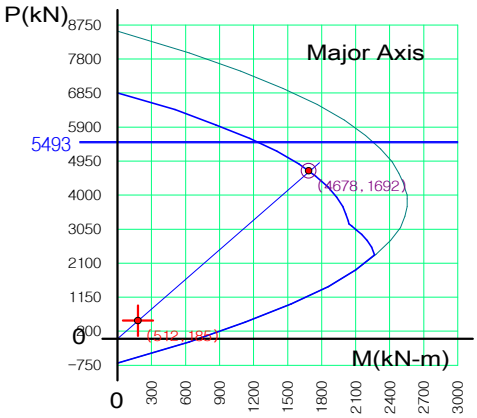
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

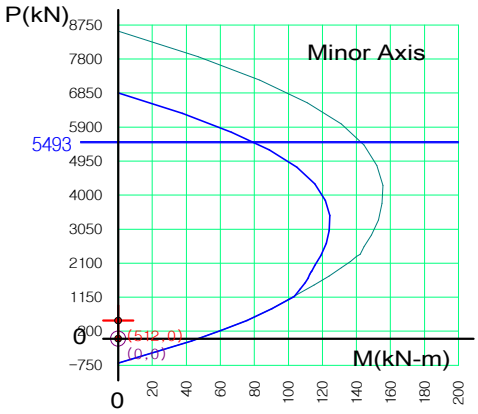


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5493.26 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	511.630	511.630
φPn (kN)	4677.70	0.00000
Pu / φPn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	185.017	0.00000
φMn (kN-m)	1691.56	0.00000
Mc / φMn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 9.53344 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 145.653 + 330.149 = 475.802 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.020 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

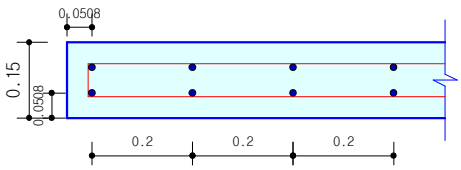
Wall ID : 637 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.7*0.15 m

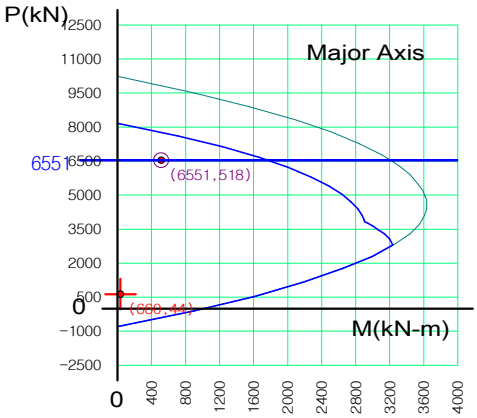
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

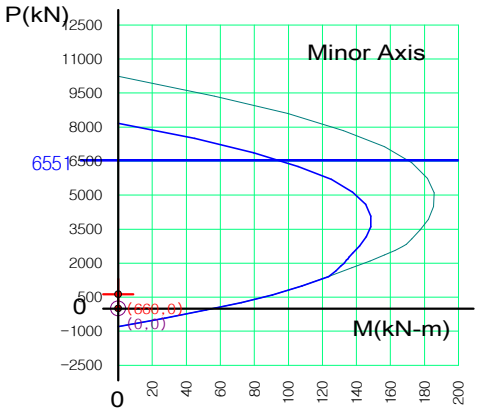


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 6551.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	660.477	660.477
φPn (kN)	6551.18	0.00000
Pu / φPn	0.101 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-43.997	0.00000
φMn (kN-m)	518.155	0.00000
Mc / φMn	0.085 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 28.8057 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 280.006 + 394.426 = 674.432 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.043 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

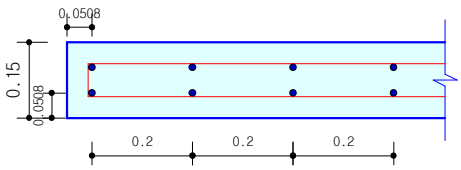
Wall ID : 638 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 5.4*0.15 m

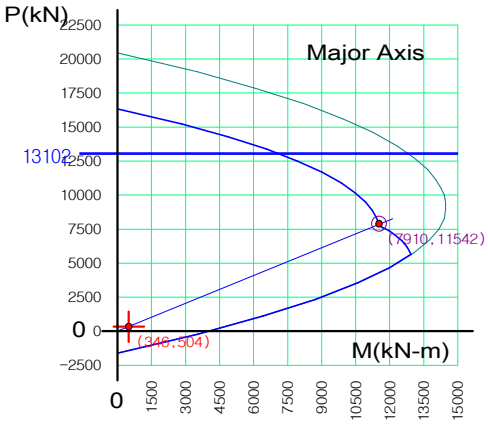
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

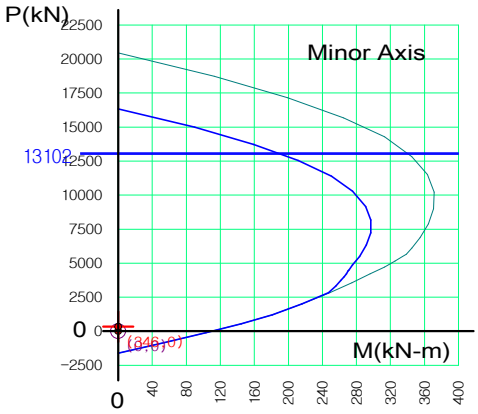


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 13102.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	345.736	345.736
φPn (kN)	7910.04	0.00000
Pu / φPn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-504.47	0.00000
φMn (kN-m)	11541.7	0.00000
Mc / φMn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 114.034 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 807.127 + 788.853 = 1595.98 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.071 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

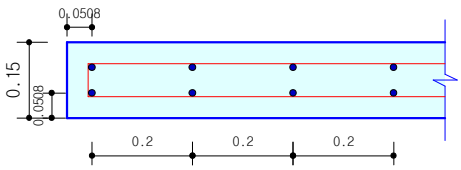
Wall ID : 639 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.26*0.15 m

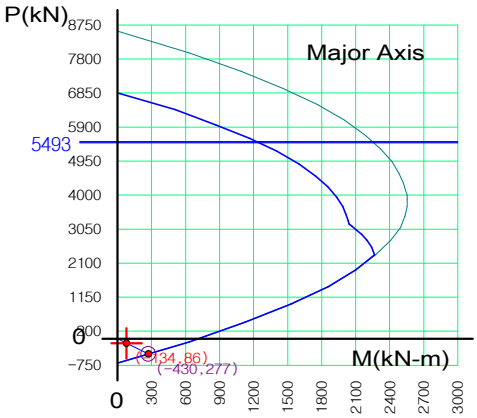
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

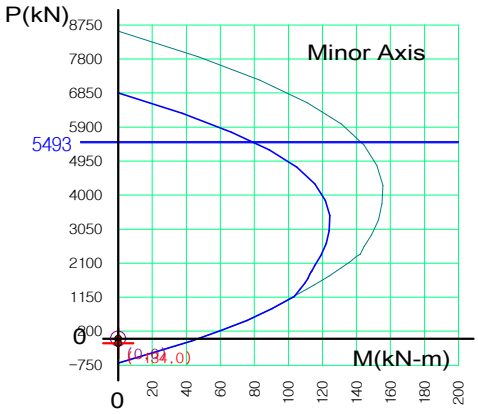


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5493.26 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	-133.87	-133.87
φPn (kN)	-430.41	0.00000
Pu / φPn	0.311 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	86.1207	0.00000
φMn (kN-m)	276.892	0.00000
Mc / φMn	0.311 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 43.4597 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 293.227 + 330.149 = 623.377 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.070 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

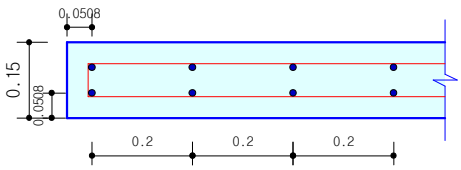
Wall ID : 640 (Wall Mark : W1)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.7*0.15 m

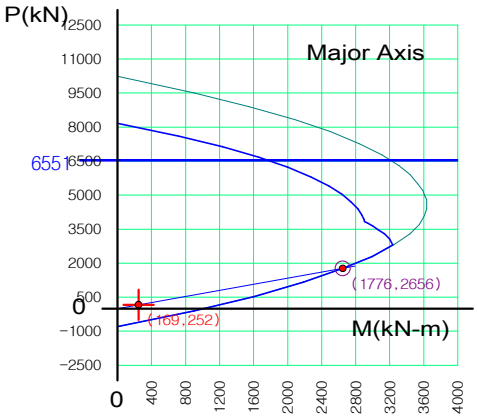
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

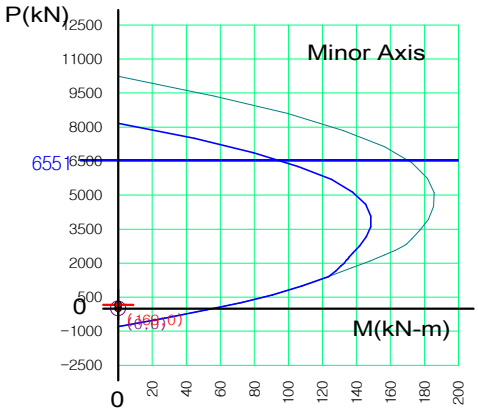


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 6551.18 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	168.806	168.806
φPn (kN)	1776.27	0.00000
Pu / φPn	0.095 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-252.42	0.00000
φMn (kN-m)	2656.07	0.00000
Mc / φMn	0.095 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 131.680 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 402.914 + 394.426 = 797.340 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.165 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

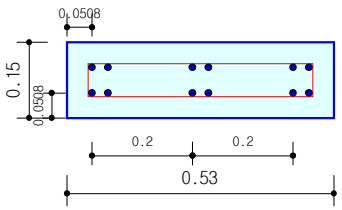
Wall ID : 641 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.15 m

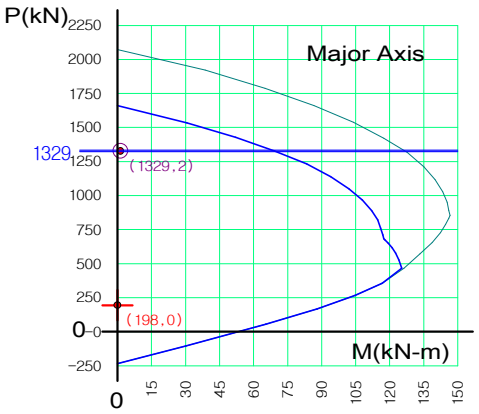
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

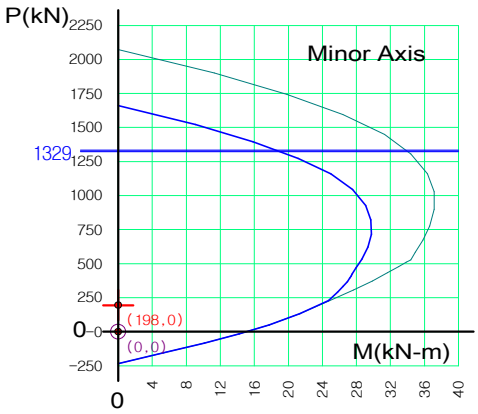


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1329.01 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	197.905	197.905
φPn (kN)	1329.01	0.00000
Pu / φPn	0.149 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.1931	0.00000
φMn (kN-m)	1.61463	0.00000
Mc / φMn	0.120 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.11147 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 20.8110 + 77.4244 = 98.2354 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 642 (Wall Mark : W1)

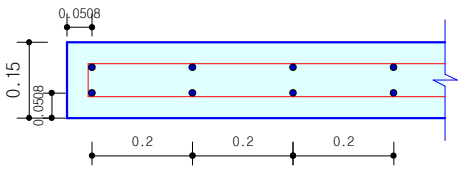
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.79*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

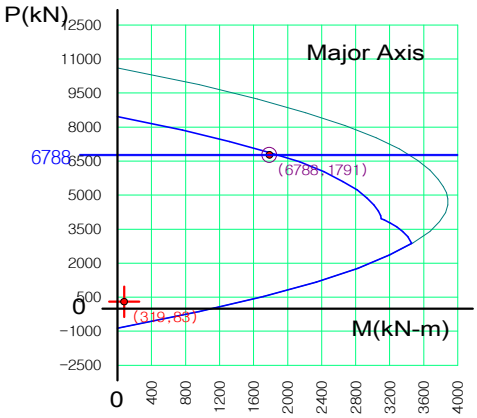
Unit System : kN, m

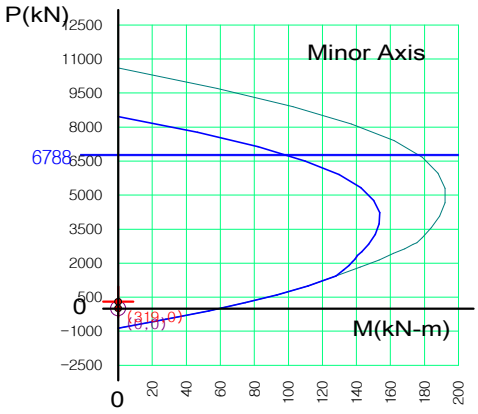


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 6787.89 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	318.554	318.554
φPn (kN)	6787.89	0.00000
Pu / φPn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	82.6156	0.00000
φMn (kN-m)	1790.89	0.00000
Mc / φMn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 39.4781 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 439.403 + 407.574 = 846.977 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.047 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 643 (Wall Mark : W1)

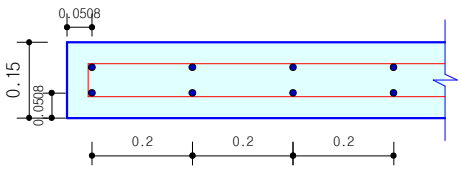
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.025*0.15 m

Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

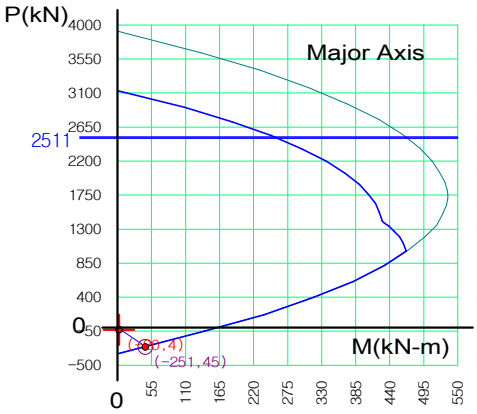
Unit System : kN, m

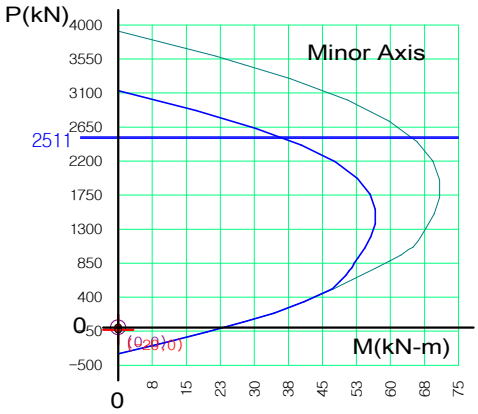


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2510.58 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-20.264	-20.264
φPn (kN)	-251.32	0.00000
Pu / φPn	0.081 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.6472	0.00000
φMn (kN-m)	45.2339	0.00000
Mc / φMn	0.081 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.65129 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 35.7073 + 149.736 = 185.443 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.004 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

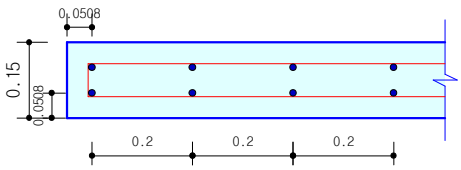
Wall ID : 644 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.025*0.15 m

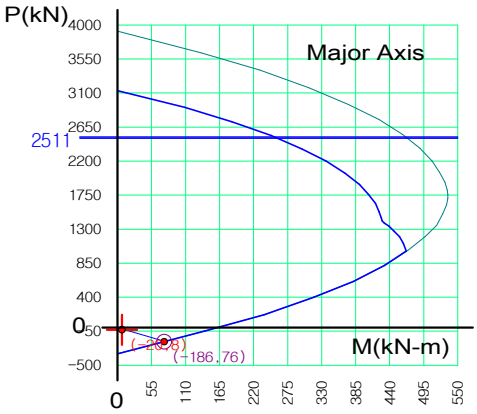
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

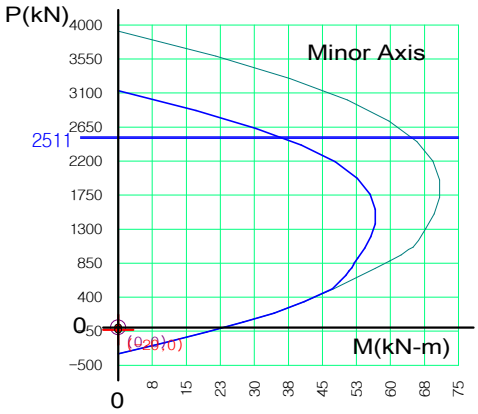


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2510.58 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-20.264	-20.264
φPn (kN)	-186.19	0.00000
Pu / φPn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	8.28355	0.00000
φMn (kN-m)	76.1106	0.00000
Mc / φMn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.47921 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 35.7073 + 149.736 = 185.443 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.008 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

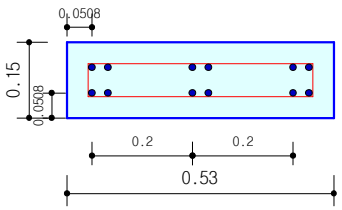
Wall ID : 645 (Wall Mark : W1)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.15 m

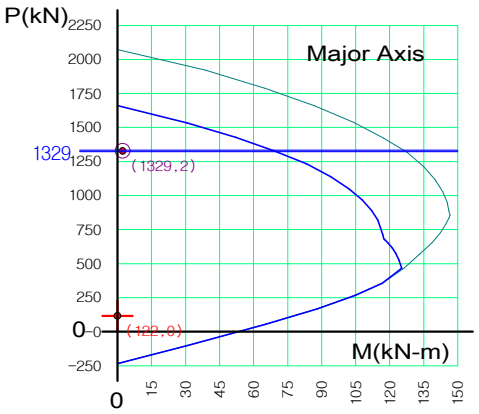
Vertical Rebar : D10 @200 (AsV = 0.00071 m²/m)

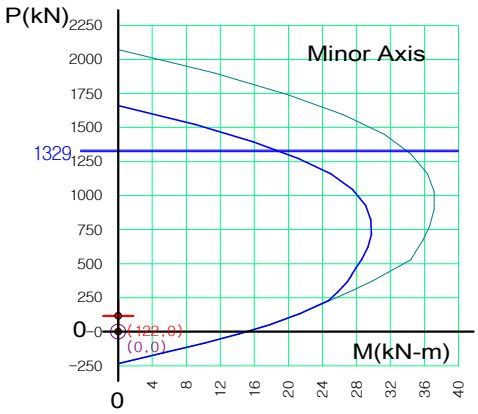


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1329.01 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	121.704	121.704
φPn (kN)	1329.01	0.00000
Pu / φPn	0.092 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.1786	0.00000
φMn (kN-m)	2.42424	0.00000
Mc / φMn	0.074 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.10492 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 19.3268 + 77.4244 = 96.7513 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

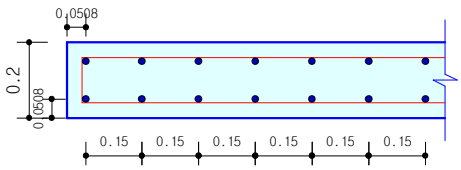
Wall ID : 800 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

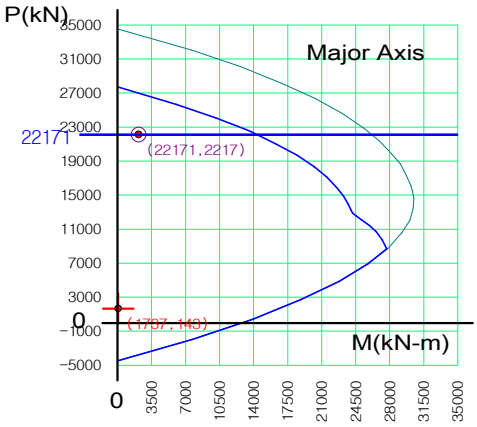
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

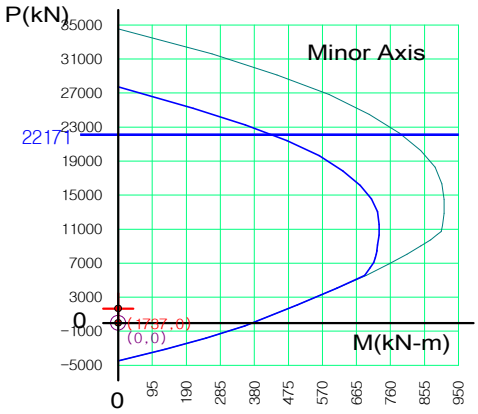


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22170.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1736.96	1736.96
φPn (kN)	22170.6	0.00000
Pu / φPn	0.078 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-142.72	0.00000
φMn (kN-m)	2216.83	0.00000
Mc / φMn	0.064 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 81.9358 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1230.39 + 2108.29 = 3338.68 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.025 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 801 (Wall Mark : 1~2W2)

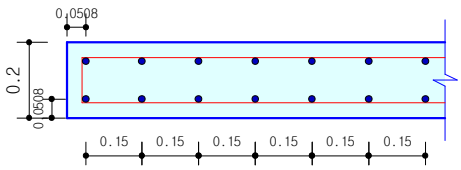
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.2*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

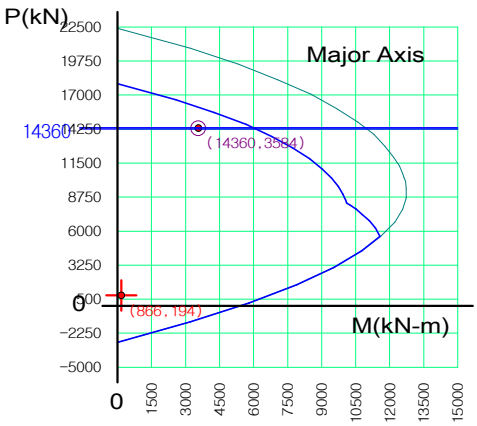
Unit System : kN, m

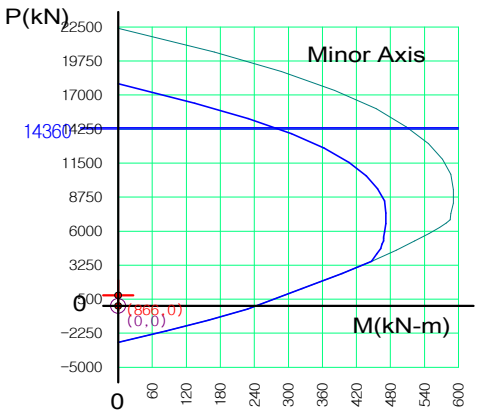


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14360.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	865.592	865.592
φPn (kN)	14360.4	0.00000
Pu / φPn	0.060 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	193.636	0.00000
φMn (kN-m)	3584.25	0.00000
Mc / φMn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 45.7955 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 346.950 + 1362.28 = 1709.23 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.027 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 802 (Wall Mark : 1~2W2)

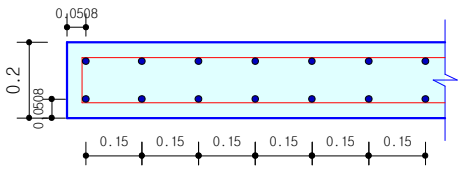
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

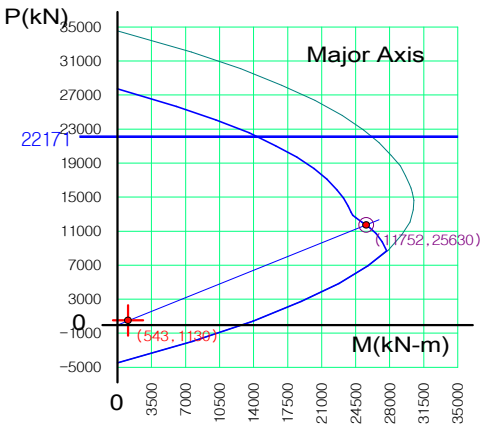
Unit System : kN, m

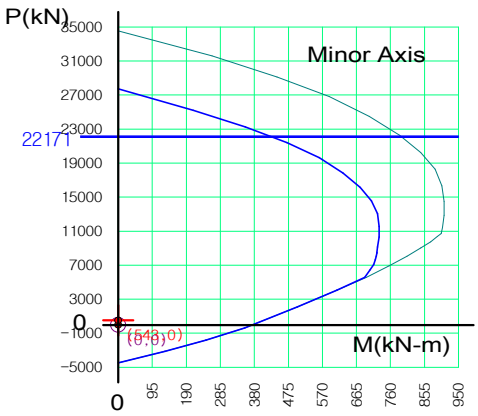


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22170.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	542.802	542.802
φPn (kN)	11751.8	0.00000
Pu / φPn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1129.6	0.00000
φMn (kN-m)	25629.8	0.00000
Mc / φMn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 405.849 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1293.46 + 2108.29 = 3401.74 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.119 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 803 (Wall Mark : 1~2W2)

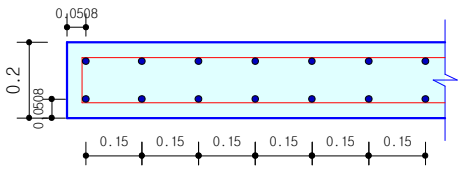
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.6*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

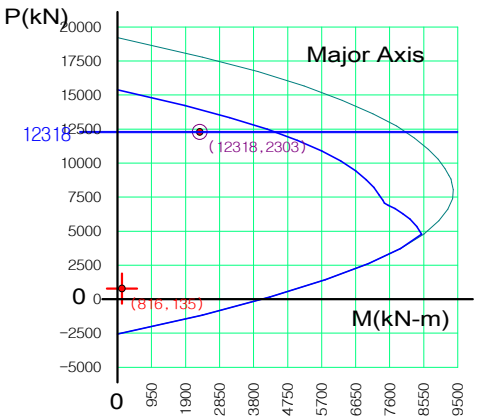
Unit System : kN, m

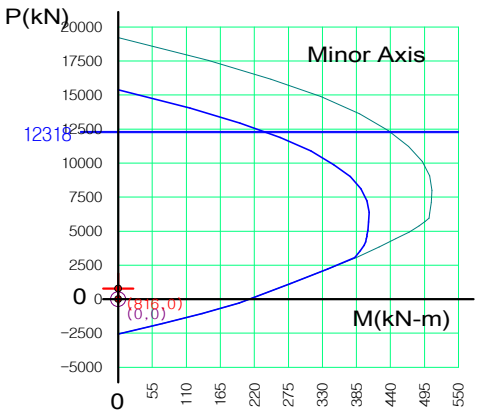


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12317.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	816.294	816.294
φPn (kN)	12317.6	0.00000
Pu / φPn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-134.50	0.00000
φMn (kN-m)	2303.11	0.00000
Mc / φMn	0.058 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 65.2688 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 792.646 + 1167.67 = 1960.31 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.033 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

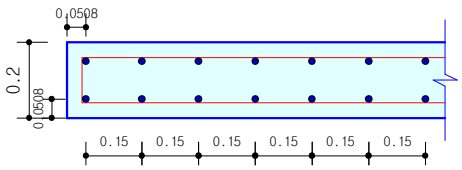
Wall ID : 804 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.54*0.2 m

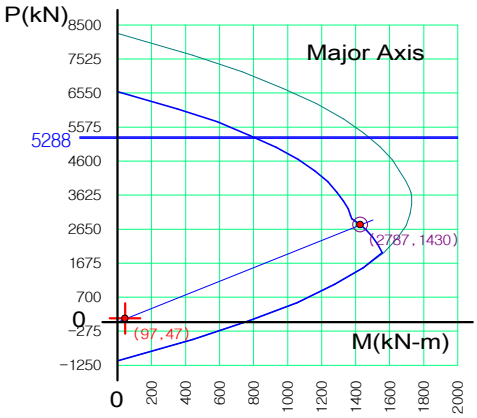
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

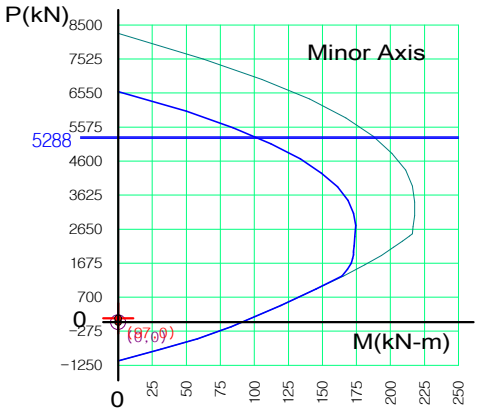


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5287.86 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	97.1322	97.1322
φPn (kN)	2786.86	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-47.326	0.00000
φMn (kN-m)	1429.72	0.00000
Mc / φMn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 11.3279 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 104.106 + 499.502 = 603.608 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

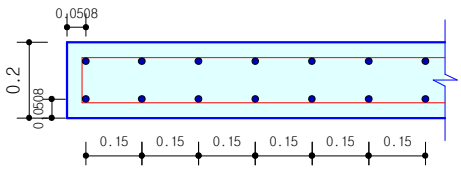
Wall ID : 805 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.97*0.2 m

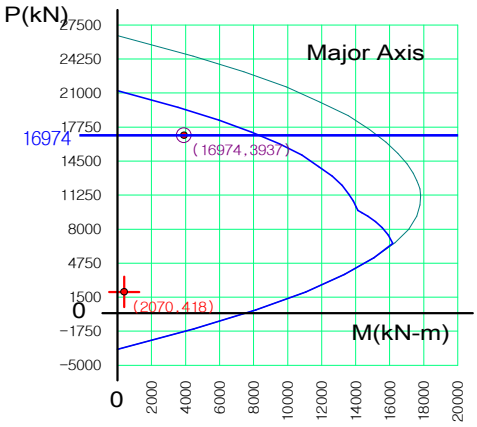
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

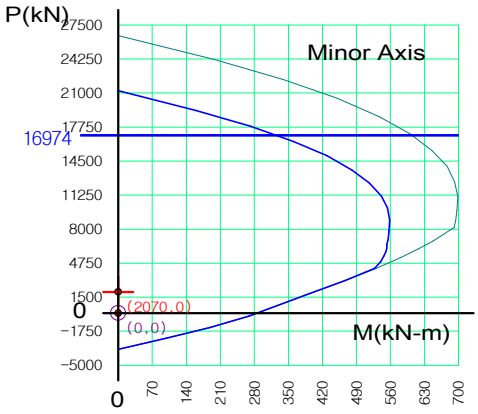


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 16973.7 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	2070.12	2070.12
φPn (kN)	16973.7	0.00000
Pu / φPn	0.122 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	418.248	0.00000
φMn (kN-m)	3937.11	0.00000
Mc / φMn	0.106 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 42.6722 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 390.941 + 1612.03 = 2002.97 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.021 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

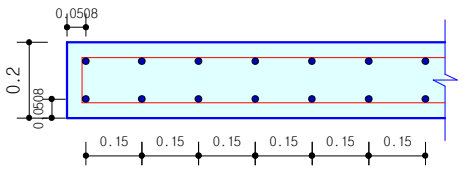
Wall ID : 806 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.73*0.2 m

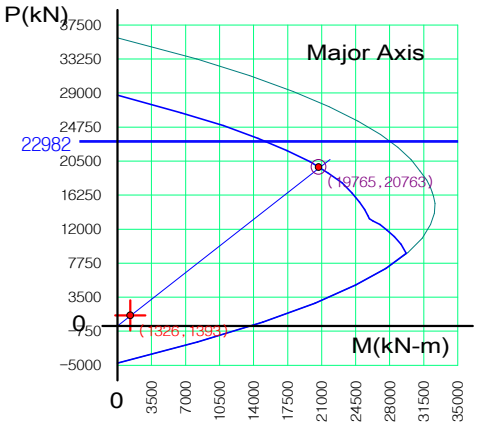
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

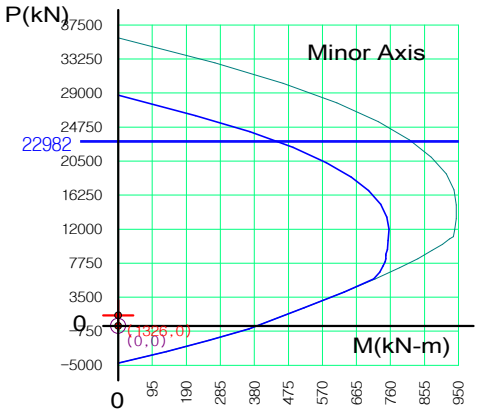


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22982.1 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1325.57	1325.57
φPn (kN)	19765.1	0.00000
Pu / φPn	0.067 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1392.52	0.00000
φMn (kN-m)	20763.4	0.00000
Mc / φMn	0.067 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 496.081 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1461.39 + 2182.89 = 3644.28 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.136 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

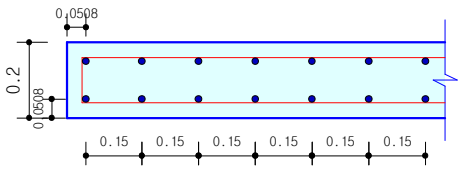
Wall ID : 807 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.375*0.2 m

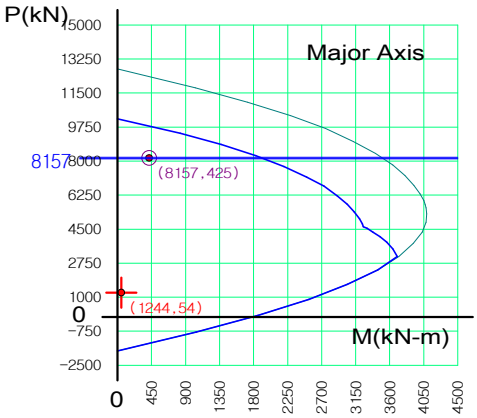
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

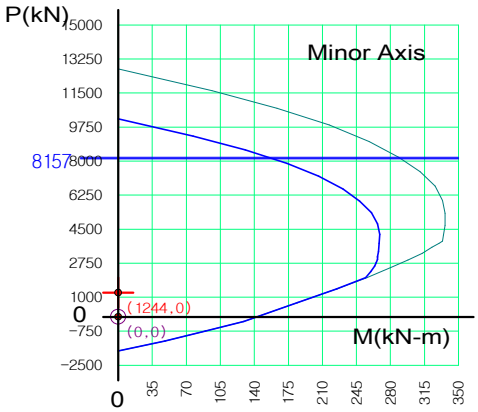


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 8157.15 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1243.90	1243.90
φPn (kN)	8157.15	0.00000
Pu / φPn	0.152 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-53.924	0.00000
φMn (kN-m)	425.349	0.00000
Mc / φMn	0.127 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 23.3391 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 430.907 + 770.336 = 1201.24 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 808 (Wall Mark : 1~2W2)

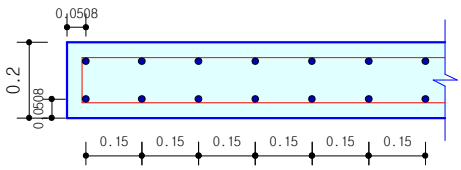
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.2*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

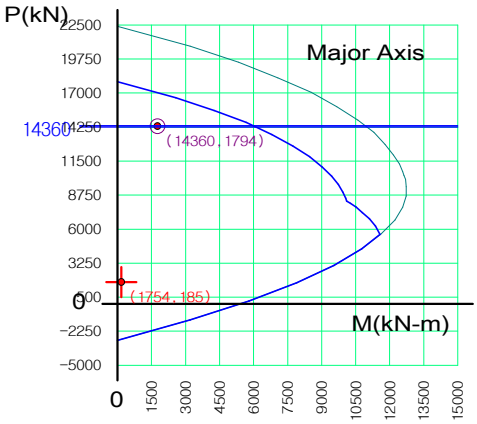
Unit System : kN, m

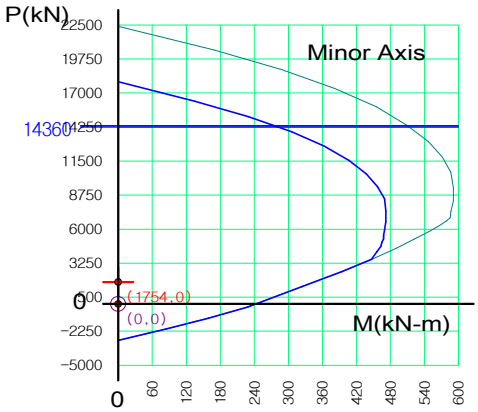


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14360.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1753.82	1753.82
φPn (kN)	14360.4	0.00000
Pu / φPn	0.122 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	184.714	0.00000
φMn (kN-m)	1793.80	0.00000
Mc / φMn	0.103 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 49.3083 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 426.548 + 1362.28 = 1788.83 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.028 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

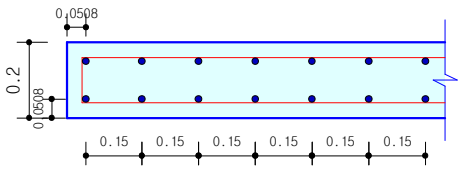
Wall ID : 809 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 8.875*0.2 m

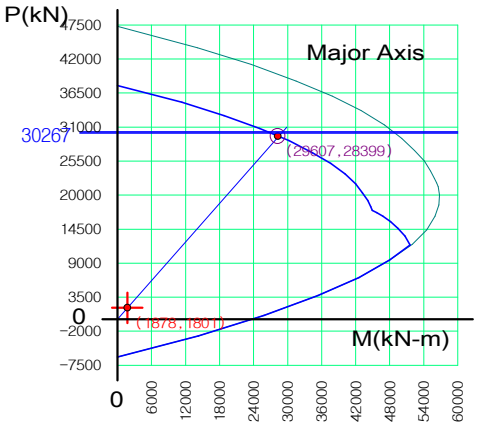
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

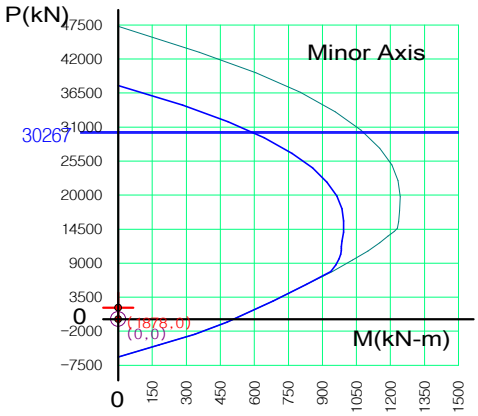


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 30266.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1877.98	1877.98
φPn (kN)	29607.4	0.00000
Pu / φPn	0.063 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1801.4	0.00000
φMn (kN-m)	28399.3	0.00000
Mc / φMn	0.063 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 337.228 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1947.96 + 2878.62 = 4826.58 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.070 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

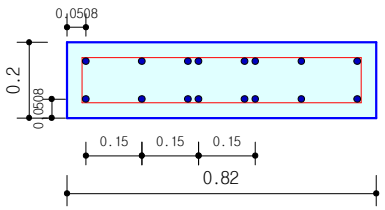
Wall ID : 810 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.82*0.2 m

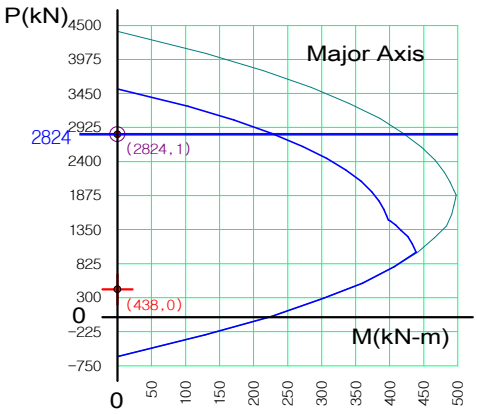
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

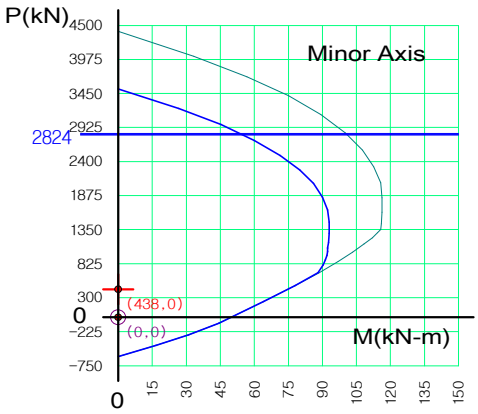


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2824.34 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	438.074	438.074
φPn (kN)	2824.34	0.00000
Pu / φPn	0.155 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.1251	0.00000
φMn (kN-m)	1.00777	0.00000
Mc / φMn	0.124 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.32642 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 46.0383 + 265.969 = 312.007 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

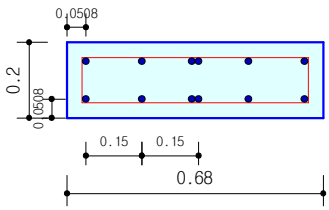
Wall ID : 811 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.68*0.2 m

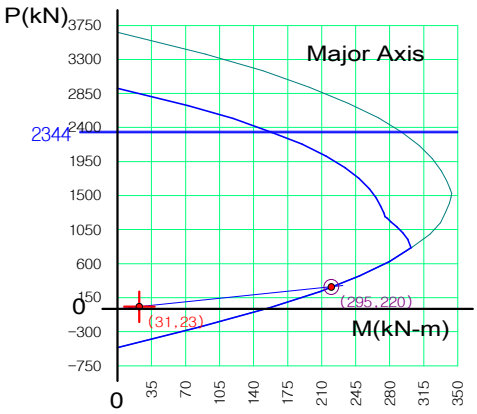
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

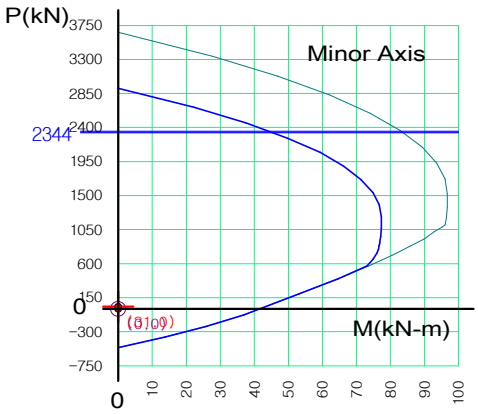


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2343.62 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	30.8490	30.8490
φPn (kN)	295.266	0.00000
Pu / φPn	0.104 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-23.029	0.00000
φMn (kN-m)	220.423	0.00000
Mc / φMn	0.104 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.24925 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 34.7405 + 220.559 = 255.300 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.028 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

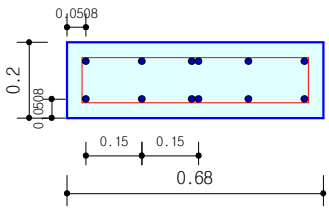
Wall ID : 812 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.68*0.2 m

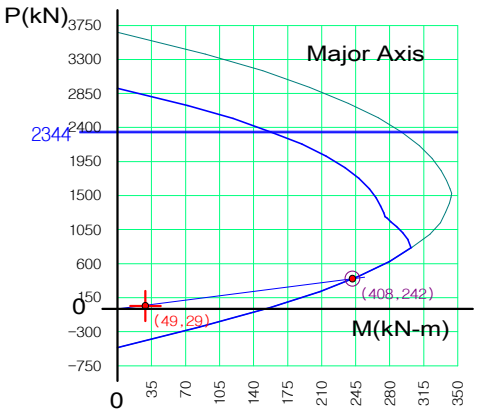
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

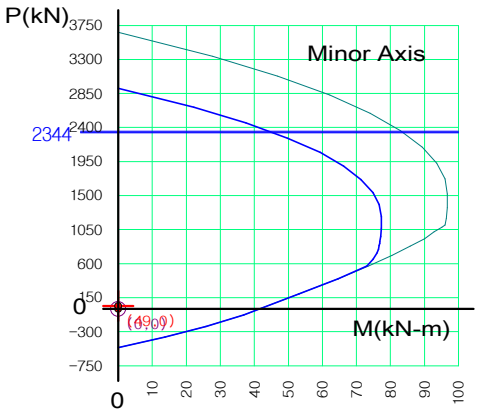


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2343.62 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	49.0833	49.0833
φPn (kN)	407.761	0.00000
Pu / φPn	0.120 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	29.1562	0.00000
φMn (kN-m)	242.216	0.00000
Mc / φMn	0.120 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 8.02855 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 33.5789 + 220.559 = 254.138 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.032 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

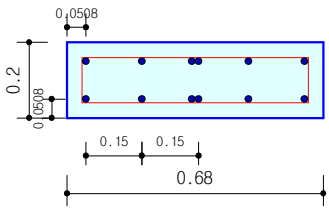
Wall ID : 813 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.68*0.2 m

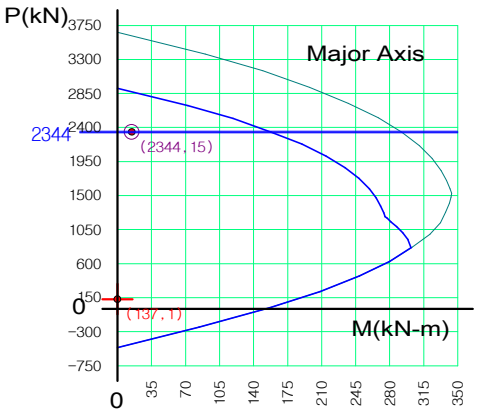
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

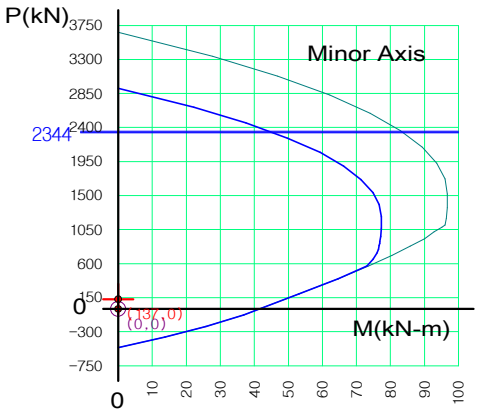


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2343.62 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	136.966	136.966
φPn (kN)	2343.62	0.00000
Pu / φPn	0.058 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.71629	0.00000
φMn (kN-m)	15.0709	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.60752 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 31.4477 + 220.559 = 252.007 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

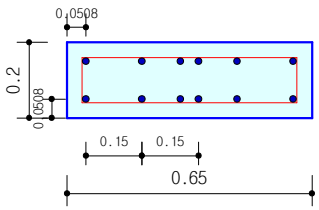
Wall ID : 814 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.65*0.2 m

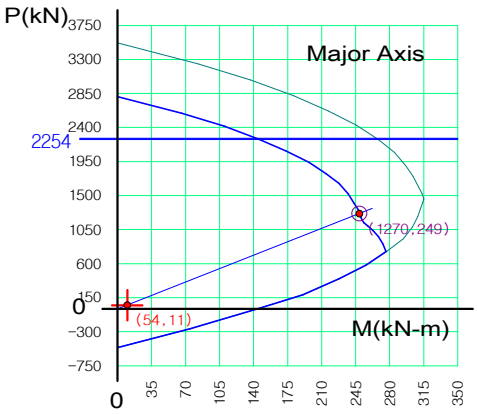
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

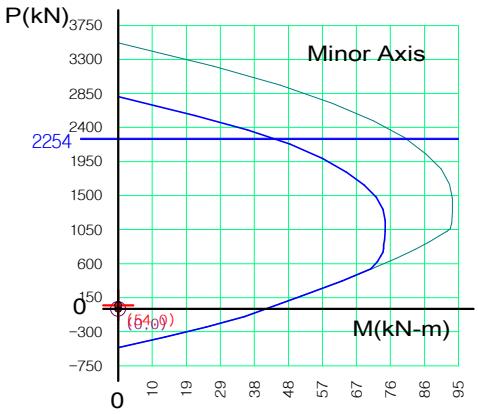


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2253.70 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	54.1581	54.1581
φPn (kN)	1269.71	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-10.630	0.00000
φMn (kN-m)	249.212	0.00000
Mc / φMn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.90337 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 31.6940 + 210.829 = 242.523 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

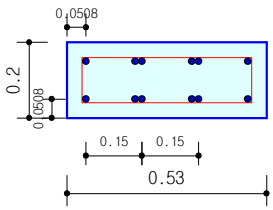
Wall ID : 815 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

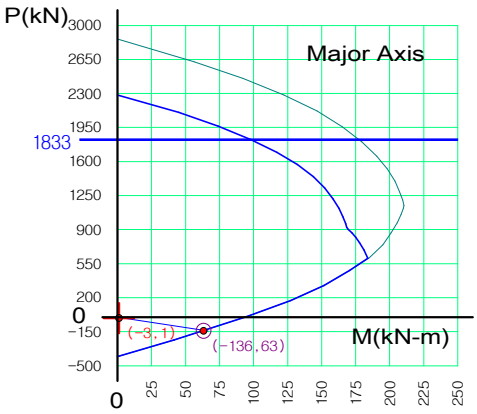
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

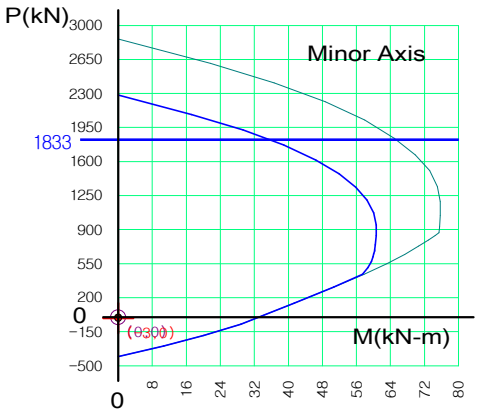


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1832.93 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-3.1776	-3.1776
φPn (kN)	-135.56	0.00000
Pu / φPn	0.023 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.48746	0.00000
φMn (kN-m)	63.4568	0.00000
Mc / φMn	0.023 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.46031 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 24.0932 + 171.907 = 196.000 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.002 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

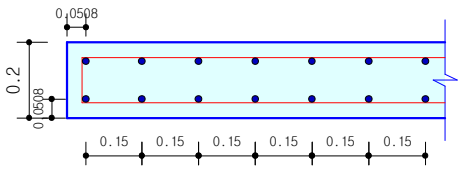
Wall ID : 816 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

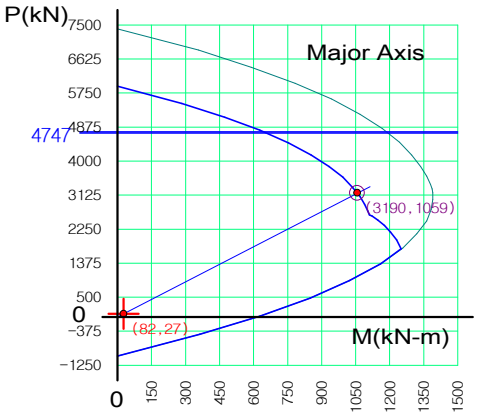
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

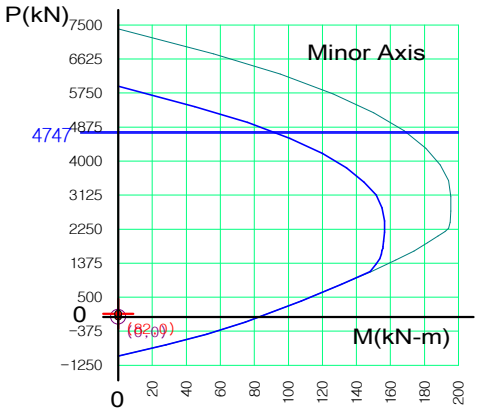


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4747.19 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	81.6748	81.6748
φPn (kN)	3189.59	0.00000
Pu / φPn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	27.1139	0.00000
φMn (kN-m)	1058.86	0.00000
Mc / φMn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.84009 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 89.8441 + 447.606 = 537.450 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.013 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

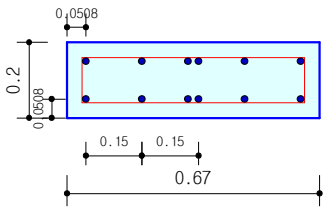
Wall ID : 817 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.67*0.2 m

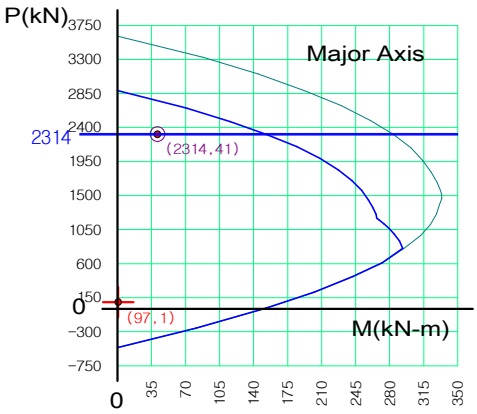
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

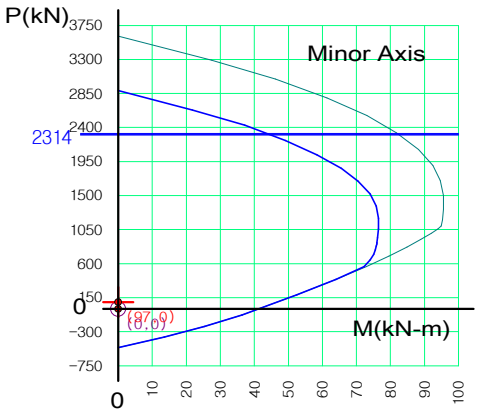


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2313.65 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	97.3100	97.3100
φPn (kN)	2313.65	0.00000
Pu / φPn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.4629	0.00000
φMn (kN-m)	41.4728	0.00000
Mc / φMn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.82094 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 33.1271 + 217.316 = 250.443 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

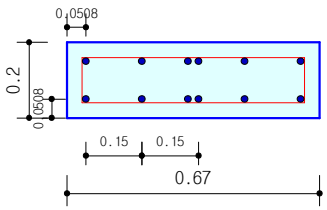
Wall ID : 818 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.67*0.2 m

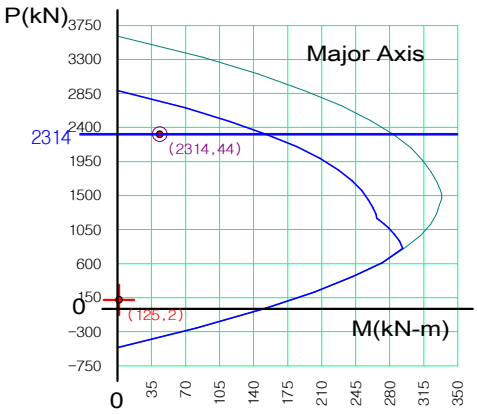
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

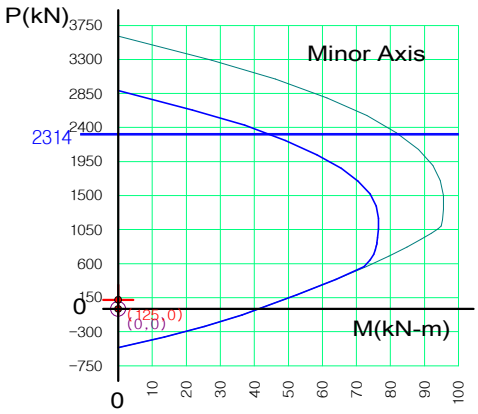


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2313.65 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	125.480	125.480
φPn (kN)	2313.65	0.00000
Pu / φPn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-2.0225	0.00000
φMn (kN-m)	44.3165	0.00000
Mc / φMn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.81658 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 36.6399 + 217.316 = 253.956 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

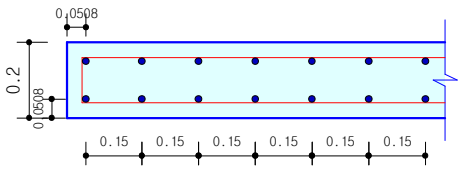
Wall ID : 819 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.79*0.2 m

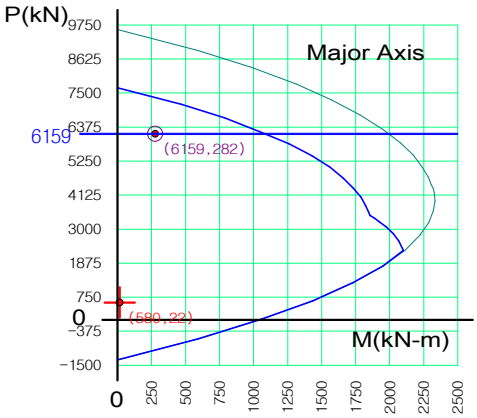
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

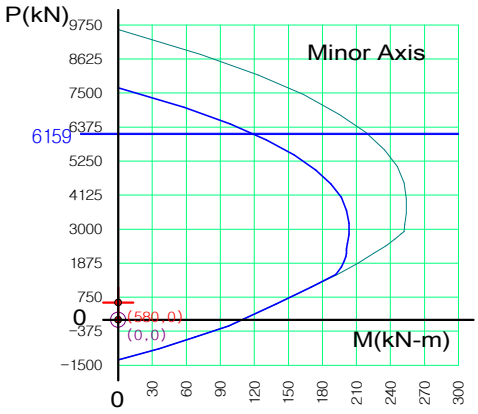


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 6159.36 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	580.321	580.321
φPn (kN)	6159.36	0.00000
Pu / φPn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-22.222	0.00000
φMn (kN-m)	281.870	0.00000
Mc / φMn	0.079 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 25.3907 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 148.234 + 580.590 = 728.824 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.035 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

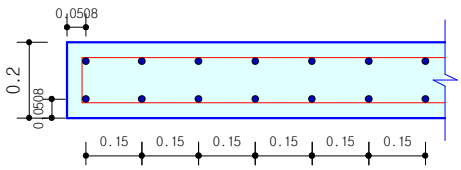
Wall ID : 820 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

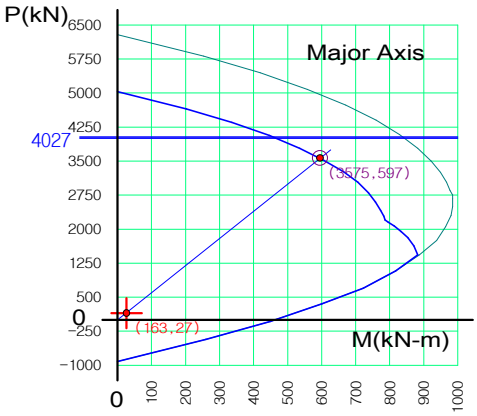
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

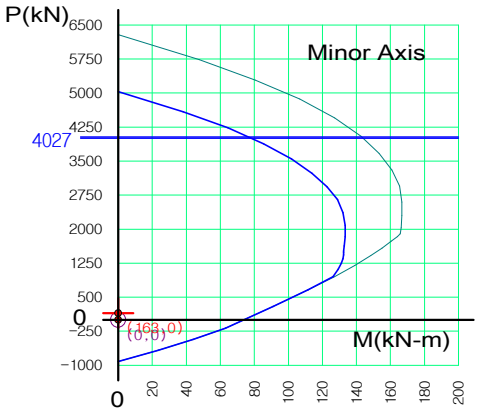


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	163.446	163.446
φPn (kN)	3575.07	0.00000
Pu / φPn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-27.279	0.00000
φMn (kN-m)	596.664	0.00000
Mc / φMn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 10.5599 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 96.2112 + 376.248 = 472.459 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.022 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

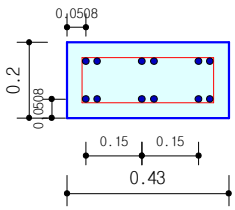
Wall ID : 821 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

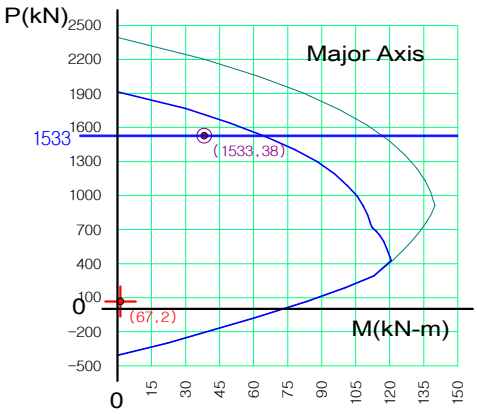
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

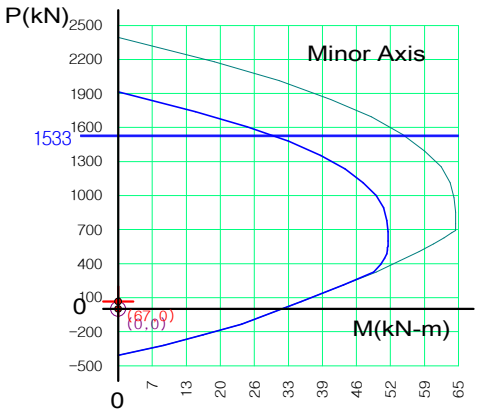


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1533.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	67.4995	67.4995
φPn (kN)	1533.19	0.00000
Pu / φPn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.5082	0.00000
φMn (kN-m)	38.3373	0.00000
Mc / φMn	0.039 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.79974 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 24.1027 + 139.471 = 163.574 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.005 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 822 (Wall Mark : 1~2W2)

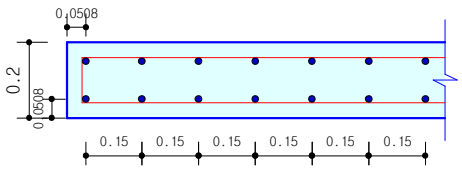
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

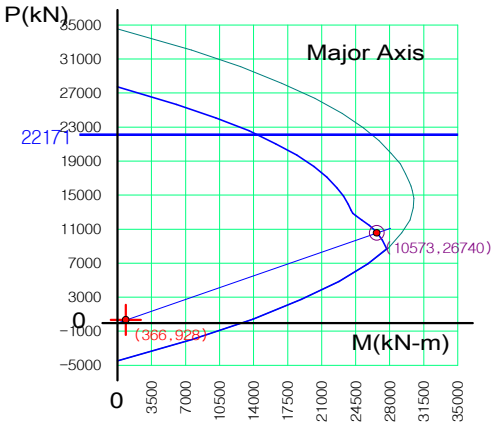
Unit System : kN, m

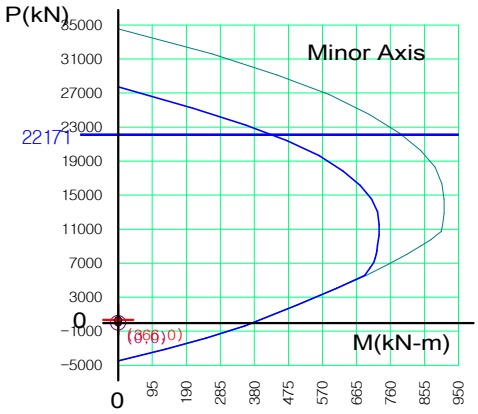


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22170.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	365.540	365.540
φPn (kN)	10572.7	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-927.94	0.00000
φMn (kN-m)	26740.2	0.00000
Mc / φMn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 135.904 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1096.71 + 2108.29 = 3205.00 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.042 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

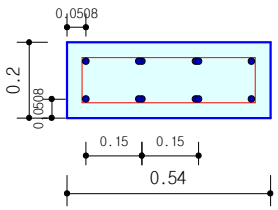
Wall ID : 823 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.54*0.2 m

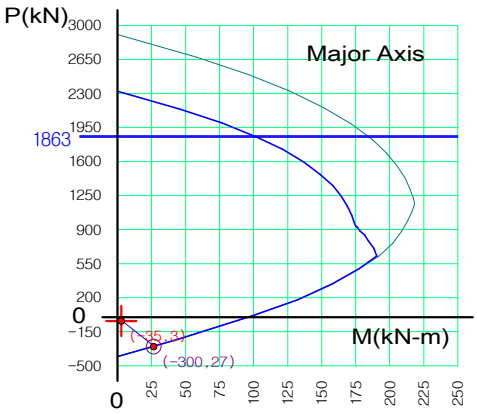
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

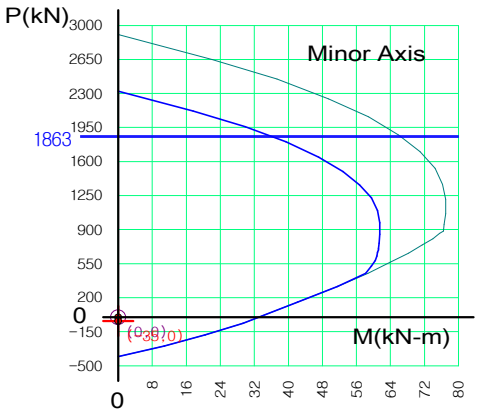


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1862.91 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-34.751	-34.751
φPn (kN)	-300.24	0.00000
Pu / φPn	0.116 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	3.13239	0.00000
φMn (kN-m)	27.0629	0.00000
Mc / φMn	0.116 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 2.12532 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 29.5583 + 175.150 = 204.708 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.010 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

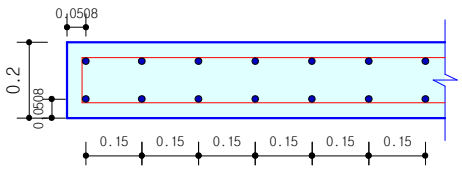
Wall ID : 824 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

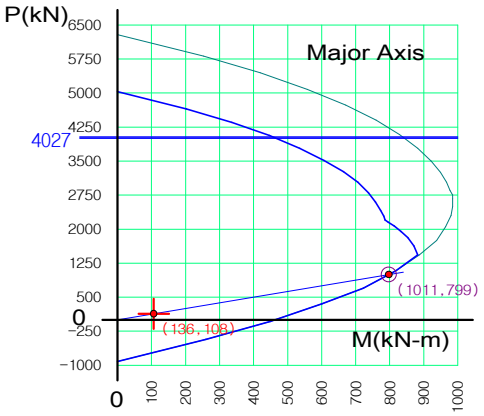
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

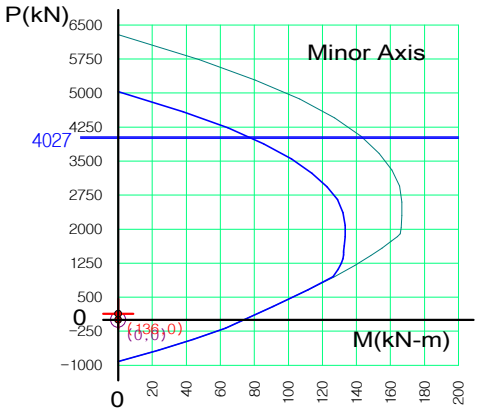


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	136.450	136.450
φPn (kN)	1010.77	0.00000
Pu / φPn	0.135 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	107.875	0.00000
φMn (kN-m)	799.101	0.00000
Mc / φMn	0.135 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 51.4265 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 111.885 + 376.248 = 488.133 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.105 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

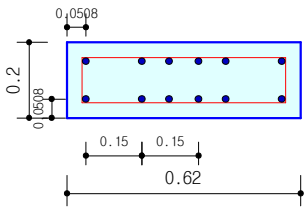
Wall ID : 825 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.62*0.2 m

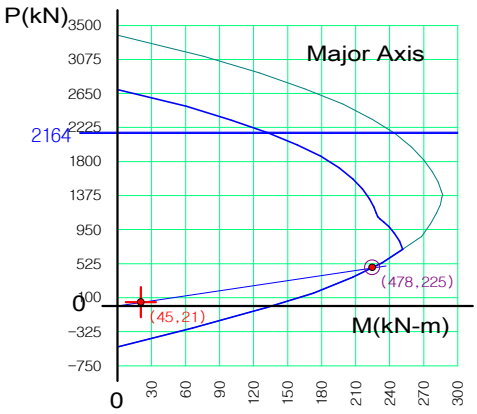
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

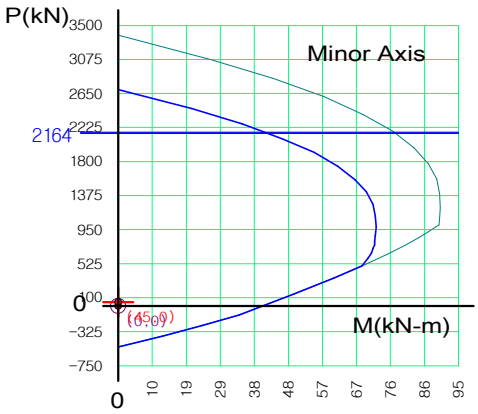


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2163.78 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	44.7749	44.7749
φPn (kN)	478.330	0.00000
Pu / φPn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-21.075	0.00000
φMn (kN-m)	225.143	0.00000
Mc / φMn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 12.7012 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 42.6012 + 201.098 = 243.699 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.052 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

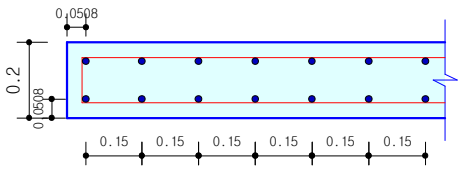
Wall ID : 826 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.68*0.2 m

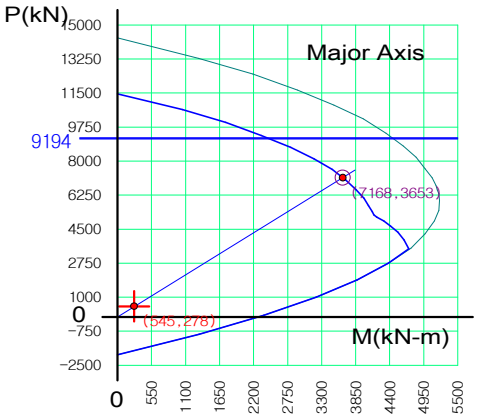
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

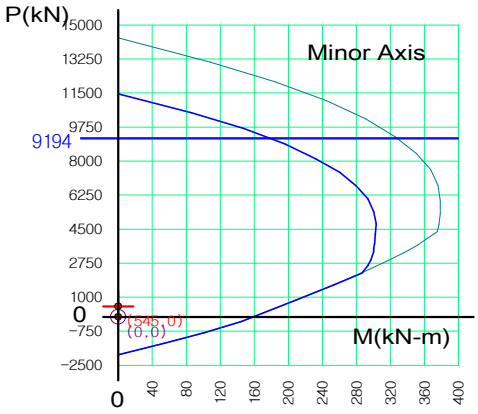


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 9193.52 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	545.058	545.058
φPn (kN)	7167.51	0.00000
Pu / φPn	0.076 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	277.776	0.00000
φMn (kN-m)	3652.76	0.00000
Mc / φMn	0.076 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 71.5397 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 353.327 + 869.263 = 1222.59 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.059 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

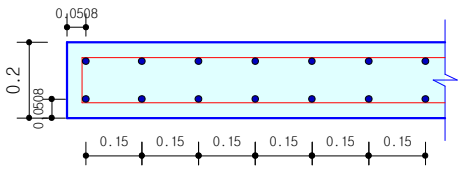
Wall ID : 827 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 7.16*0.2 m

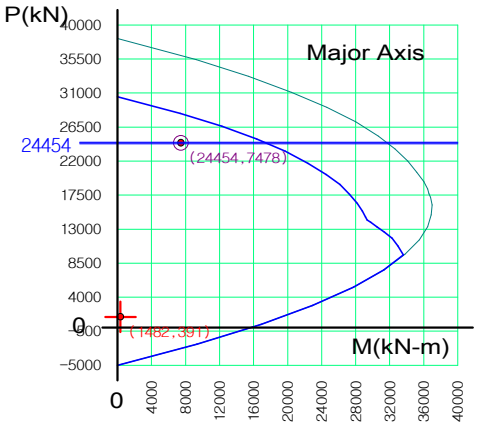
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

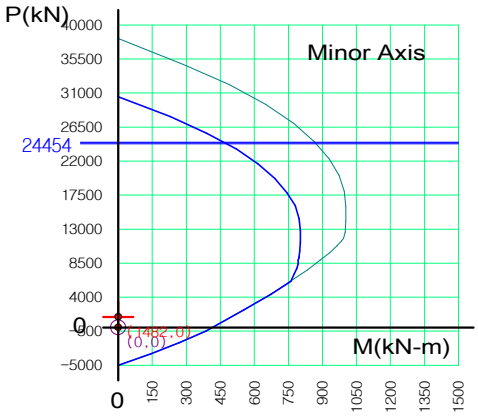


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 24454.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1481.75	1481.75
φPn (kN)	24454.2	0.00000
Pu / φPn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-391.31	0.00000
φMn (kN-m)	7478.22	0.00000
Mc / φMn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 24.8317 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 500.910 + 2322.36 = 2823.27 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

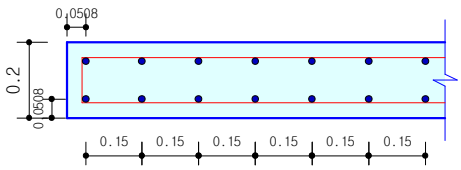
Wall ID : 828 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.57*0.2 m

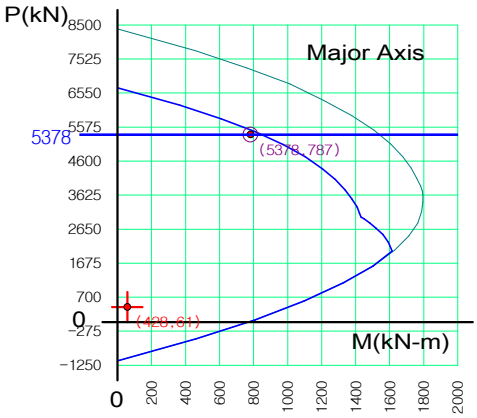
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

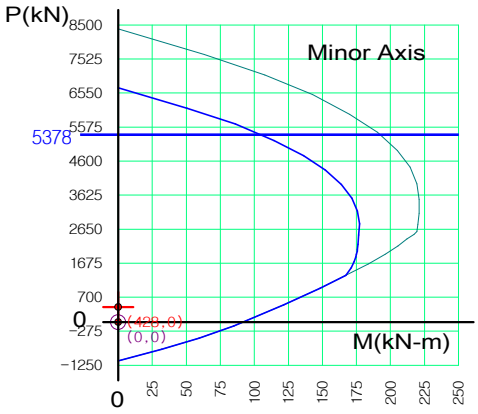


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5377.78 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	427.903	427.903
φPn (kN)	5377.78	0.00000
Pu / φPn	0.080 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	61.2628	0.00000
φMn (kN-m)	786.537	0.00000
Mc / φMn	0.078 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 26.3855 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 216.450 + 509.233 = 725.683 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.036 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

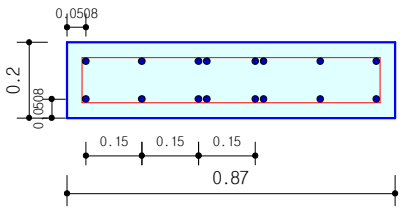
Wall ID : 829 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.87*0.2 m

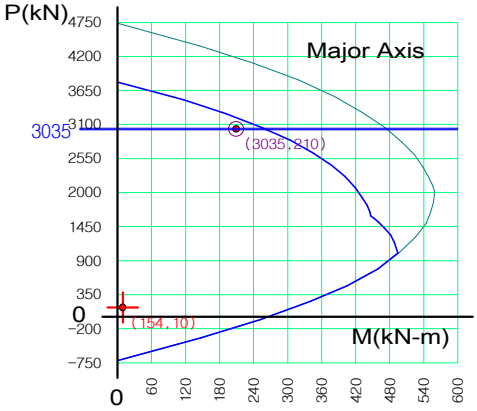
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

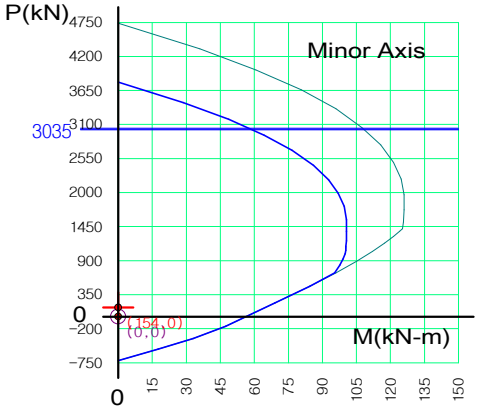


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3035.28 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	154.378	154.378
φPn (kN)	3035.28	0.00000
Pu / φPn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	10.0551	0.00000
φMn (kN-m)	209.789	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 5.71096 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 80.5533 + 282.186 = 362.740 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

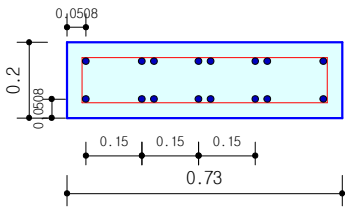
Wall ID : 830 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.73*0.2 m

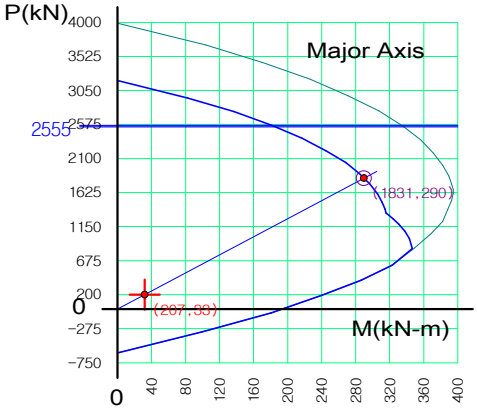
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

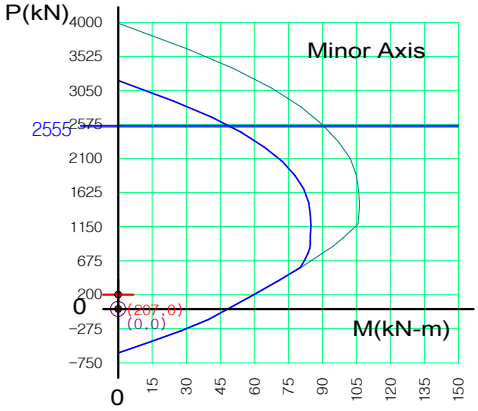


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2554.57 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	207.122	207.122
φPn (kN)	1831.41	0.00000
Pu / φPn	0.113 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	32.8502	0.00000
φMn (kN-m)	290.467	0.00000
Mc / φMn	0.113 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 20.0280 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 66.3028 + 236.777 = 303.080 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.066 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

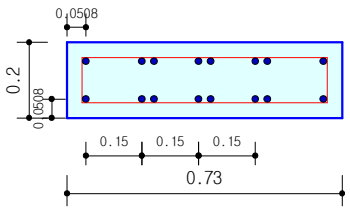
Wall ID : 831 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.73*0.2 m

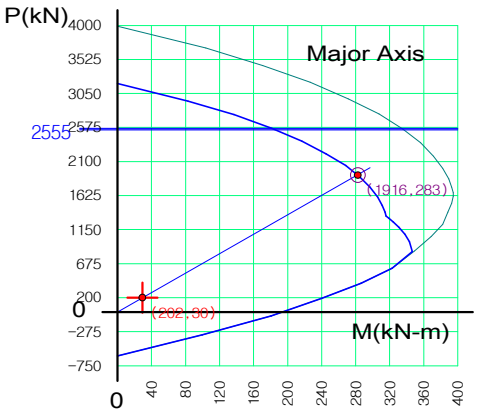
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

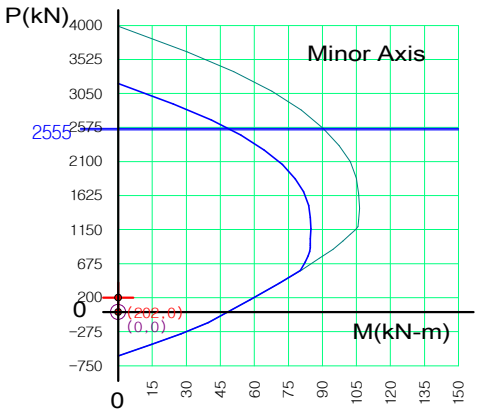


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2554.57 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	202.461	202.461
φPn (kN)	1916.01	0.00000
Pu / φPn	0.106 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	29.8765	0.00000
φMn (kN-m)	282.740	0.00000
Mc / φMn	0.106 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 17.5790 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 65.5255 + 236.777 = 302.302 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.058 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 832 (Wall Mark : 1~2W2)

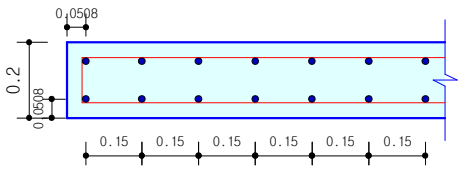
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.7*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

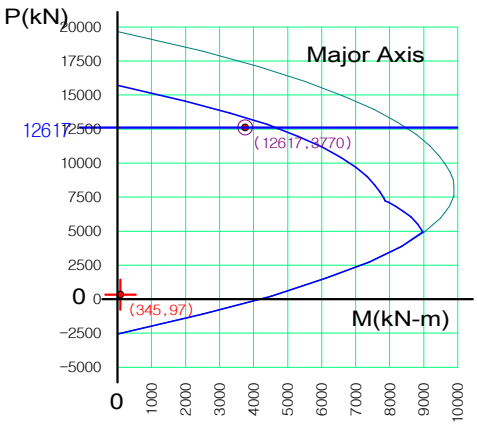
Unit System : kN, m

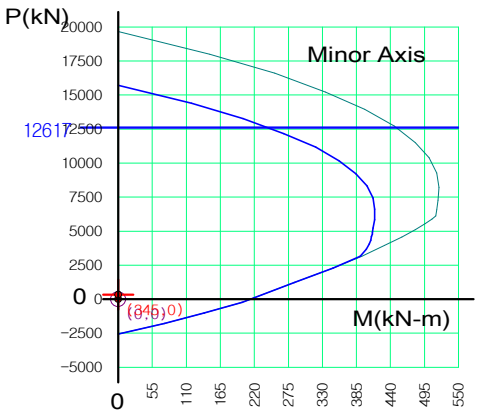


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12617.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	345.228	345.228
φPn (kN)	12617.3	0.00000
Pu / φPn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-97.487	0.00000
φMn (kN-m)	3769.64	0.00000
Mc / φMn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 7.74152 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 225.128 + 1200.10 = 1425.23 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.005 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

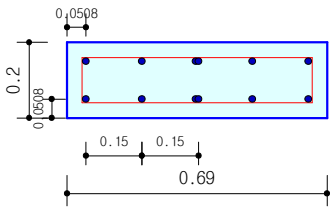
Wall ID : 833 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.69*0.2 m

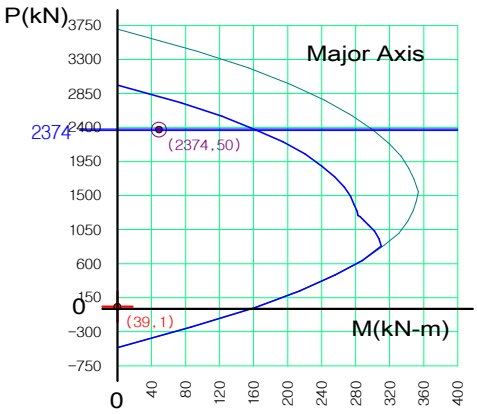
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

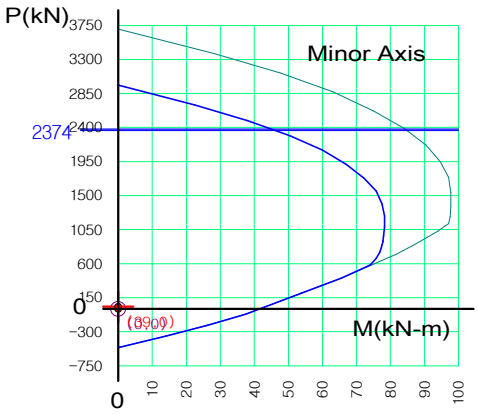


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2373.60 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	38.5468	38.5468
φPn (kN)	2373.60	0.00000
Pu / φPn	0.016 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.6796	0.00000
φMn (kN-m)	49.5801	0.00000
Mc / φMn	0.014 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.24288 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 36.9289 + 223.803 = 260.732 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

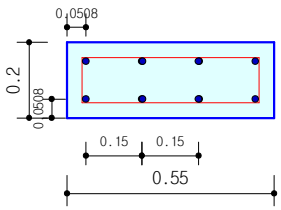
Wall ID : 834 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.55*0.2 m

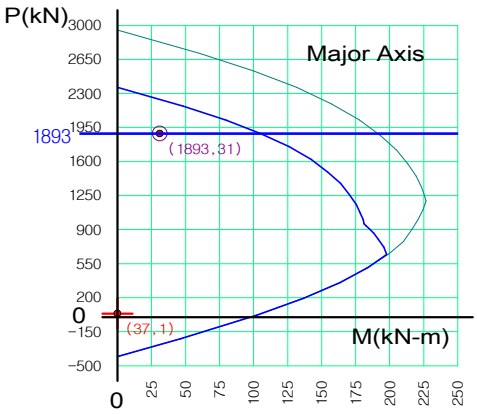
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

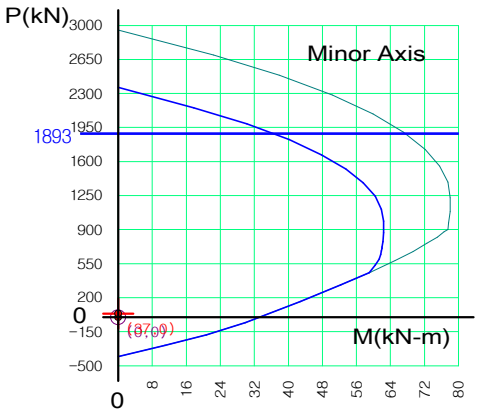


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1892.88 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	36.9808	36.9808
φPn (kN)	1892.88	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.5139	0.00000
φMn (kN-m)	31.1730	0.00000
Mc / φMn	0.016 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.21597 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 25.9124 + 178.394 = 204.306 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 835 (Wall Mark : 1~2W2)

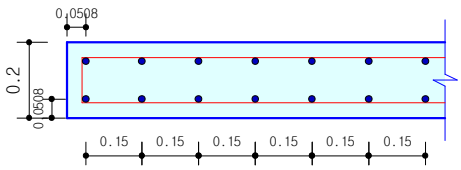
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

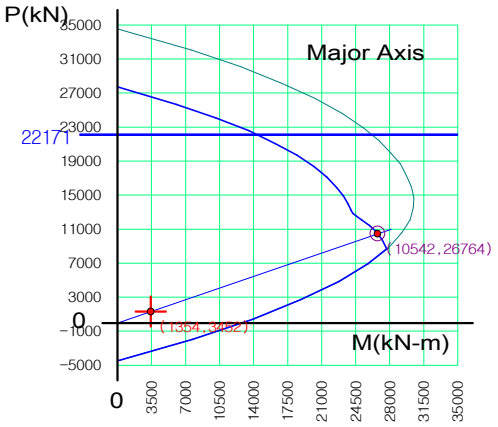
Unit System : kN, m

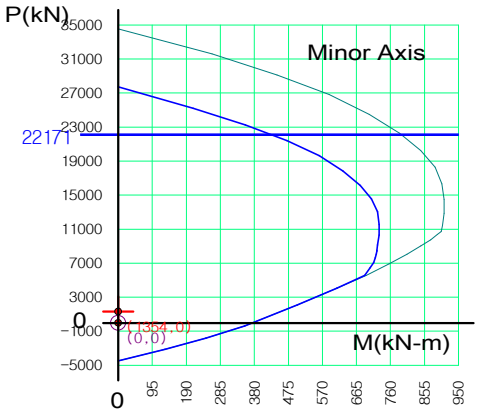


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 22170.6 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1353.90	1353.90
φPn (kN)	10541.6	0.00000
Pu / φPn	0.128 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	3452.38	0.00000
φMn (kN-m)	26763.6	0.00000
Mc / φMn	0.129 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 993.473 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1423.23 + 2108.29 = 3531.52 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.281 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 836 (Wall Mark : 1~2W2)

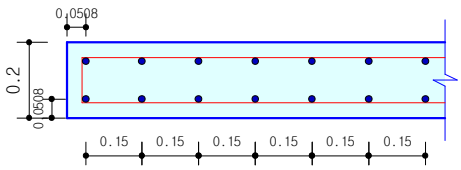
Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.2*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

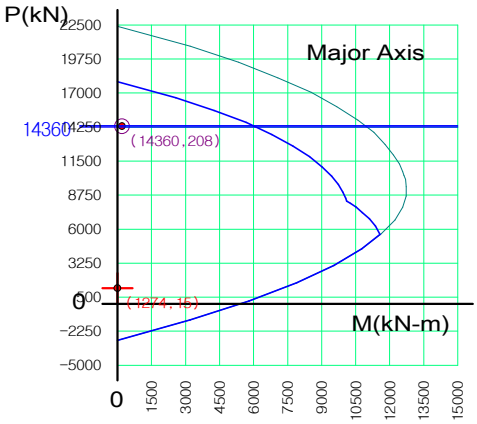
Unit System : kN, m

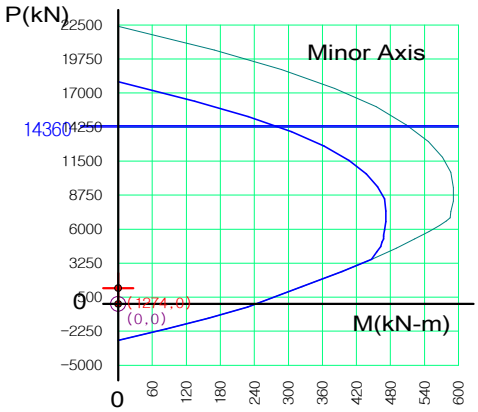


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14360.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1273.83	1273.83
φPn (kN)	14360.4	0.00000
Pu / φPn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	14.8240	0.00000
φMn (kN-m)	207.657	0.00000
Mc / φMn	0.071 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 31.9141 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 597.749 + 1362.28 = 1960.03 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

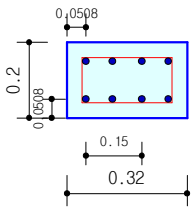
Wall ID : 837 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.32*0.2 m

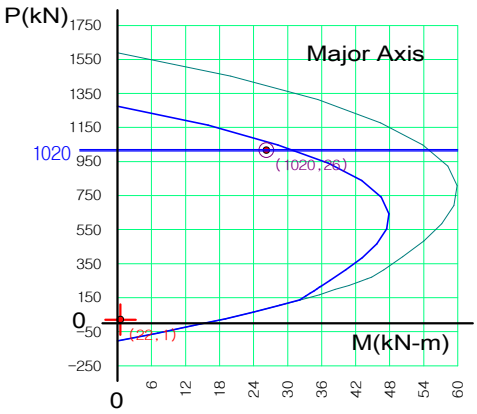
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

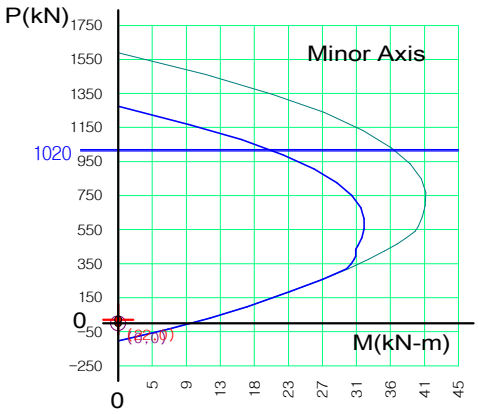


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1020.25 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	21.8937	21.8937
φPn (kN)	1020.25	0.00000
Pu / φPn	0.021 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.53858	0.00000
φMn (kN-m)	26.3193	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.00129 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 10.7785 + 103.793 = 114.571 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.000 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

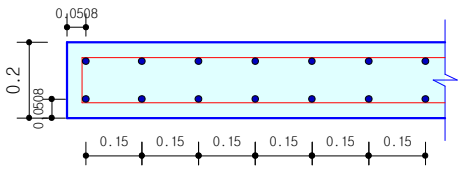
Wall ID : 838 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.31*0.2 m

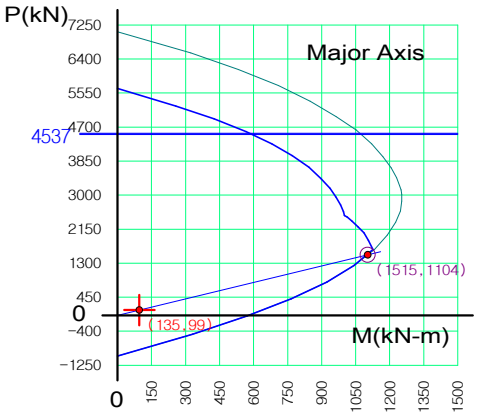
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

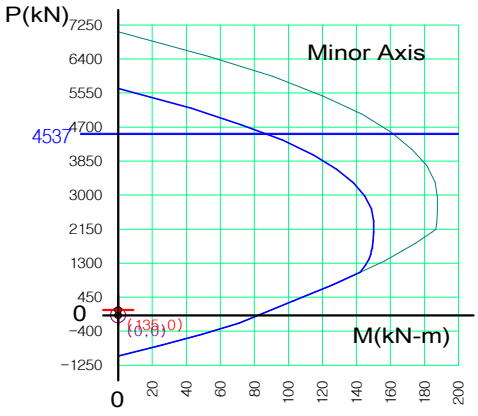


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4537.37 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	134.635	134.635
φPn (kN)	1514.65	0.00000
Pu / φPn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-98.730	0.00000
φMn (kN-m)	1104.35	0.00000
Mc / φMn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 16.4779 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 69.8406 + 424.901 = 494.742 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.033 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

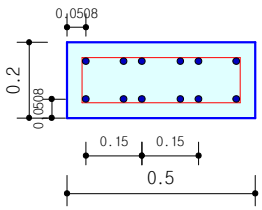
Wall ID : 839 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.5*0.2 m

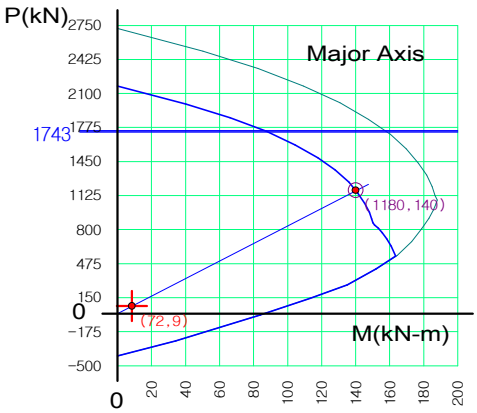
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

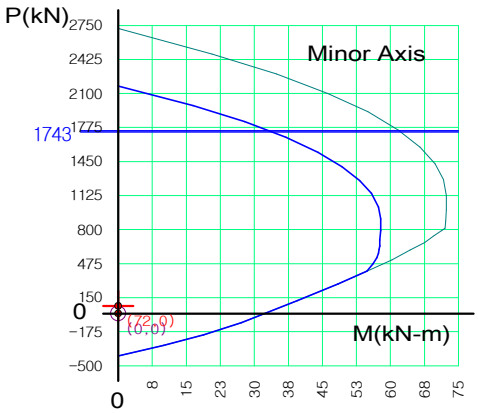


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1743.01 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	71.8108	71.8108
φPn (kN)	1179.61	0.00000
Pu / φPn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	8.54047	0.00000
φMn (kN-m)	140.291	0.00000
Mc / φMn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 4.75055 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 30.6173 + 162.176 = 192.793 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.025 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

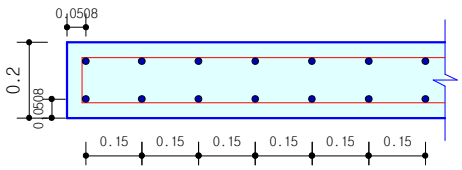
Wall ID : 840 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 9.25*0.2 m

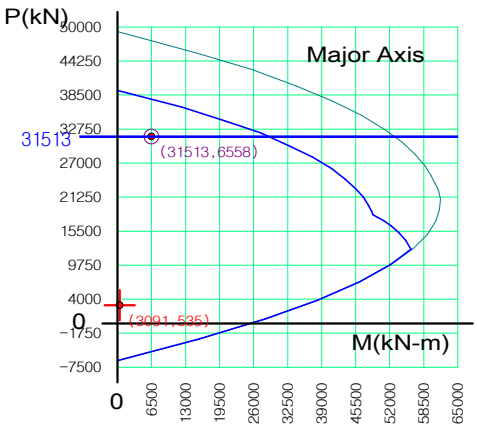
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

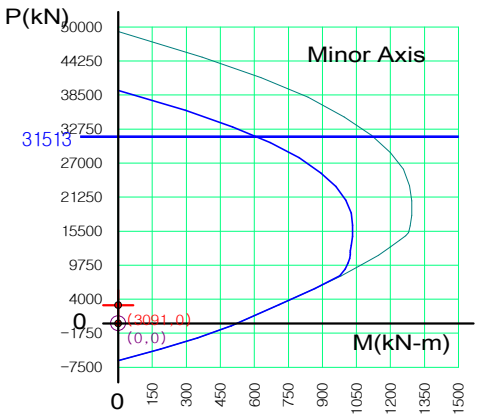


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 31512.8 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	3091.29	3091.29
φPn (kN)	31512.8	0.00000
Pu / φPn	0.098 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	535.368	0.00000
φMn (kN-m)	6557.75	0.00000
Mc / φMn	0.082 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 64.6907 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 2195.68 + 3000.26 = 5195.93 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

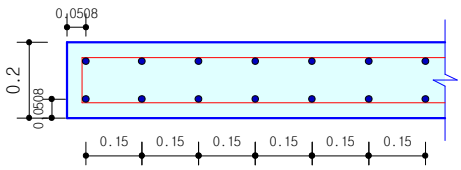
Wall ID : 841 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

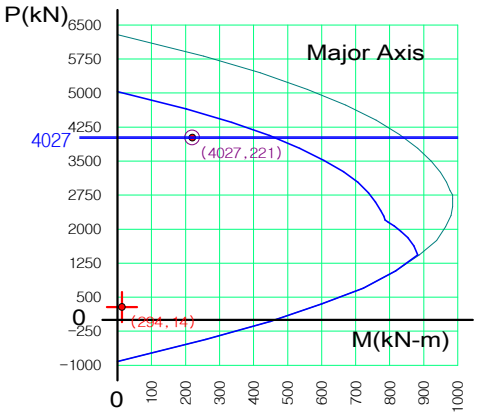
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

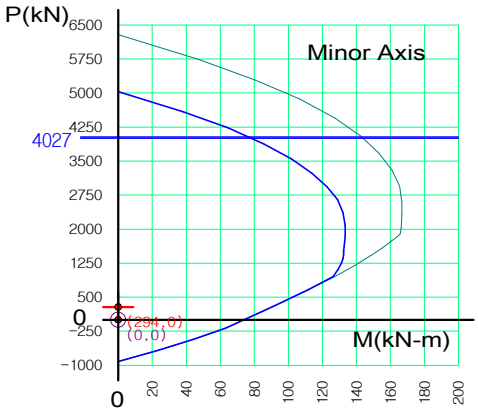


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	294.084	294.084
φPn (kN)	4026.68	0.00000
Pu / φPn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	14.0517	0.00000
φMn (kN-m)	220.693	0.00000
Mc / φMn	0.064 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 8.01856 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 153.322 + 376.248 = 529.570 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.015 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

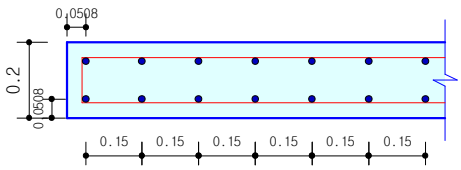
Wall ID : 842 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.26*0.2 m

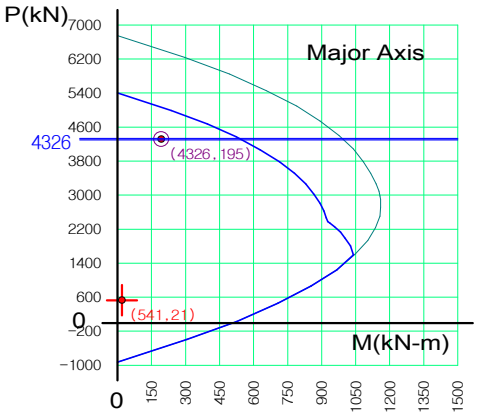
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

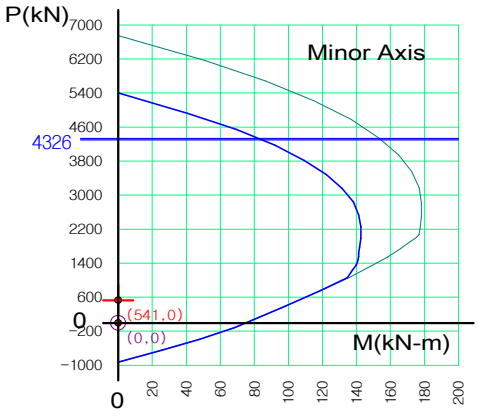


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4326.43 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	541.153	541.153
φPn (kN)	4326.43	0.00000
Pu / φPn	0.125 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	20.8019	0.00000
φMn (kN-m)	195.079	0.00000
Mc / φMn	0.107 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.13410 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 112.564 + 408.684 = 521.247 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

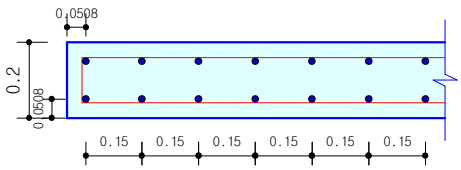
Wall ID : 843 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

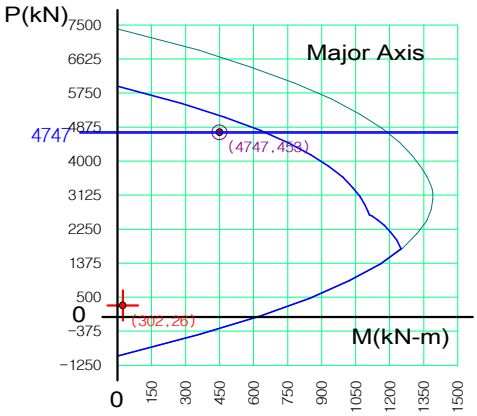
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

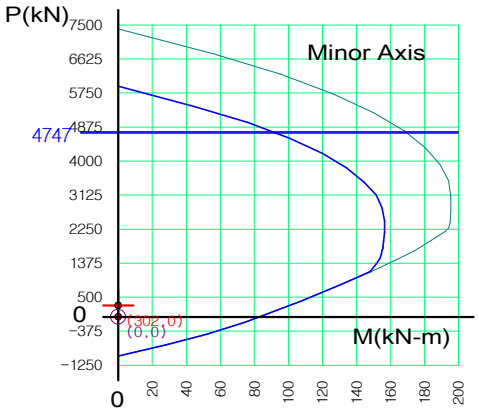


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4747.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	301.968	301.968
φPn (kN)	4747.19	0.00000
Pu / φPn	0.064 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	26.4156	0.00000
φMn (kN-m)	453.055	0.00000
Mc / φMn	0.058 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 9.48465 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 132.887 + 447.606 = 580.492 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

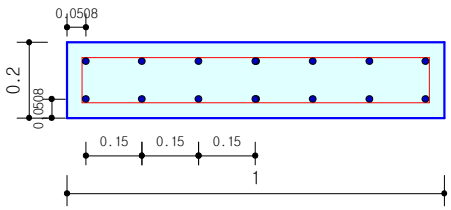
Wall ID : 844 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1*0.2 m

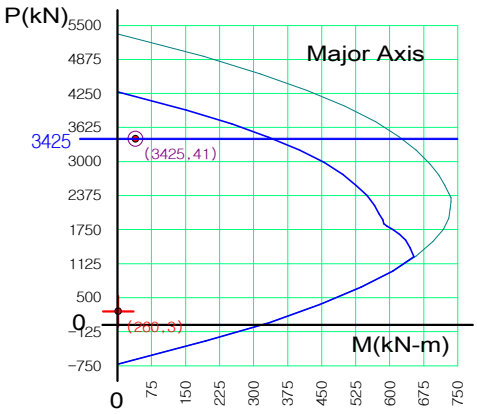
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

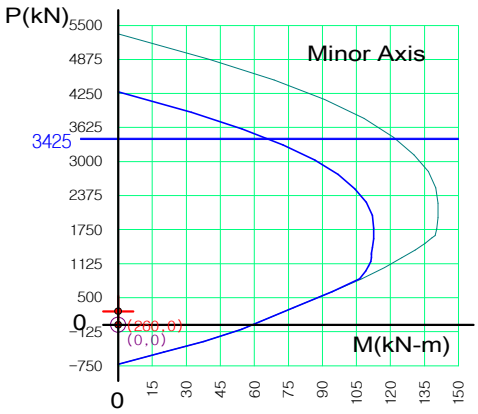


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3424.95 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	259.740	259.740
φPn (kN)	3424.95	0.00000
Pu / φPn	0.076 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2.51295	0.00000
φMn (kN-m)	40.5752	0.00000
Mc / φMn	0.062 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.16858 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 49.0997 + 324.352 = 373.452 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

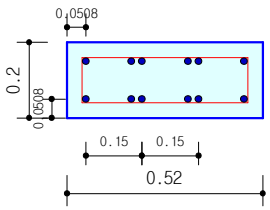
Wall ID : 845 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.52*0.2 m

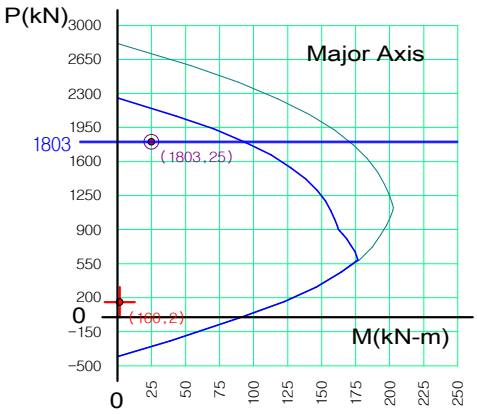
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

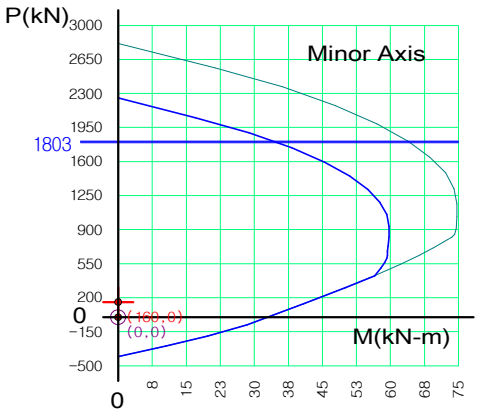


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1802.96 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	160.394	160.394
φPn (kN)	1802.96	0.00000
Pu / φPn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.8882	0.00000
φMn (kN-m)	25.2942	0.00000
Mc / φMn	0.075 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.91745 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 33.5082 + 168.663 = 202.171 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.005 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

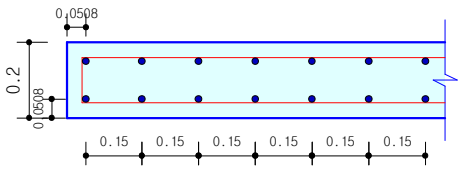
Wall ID : 846 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

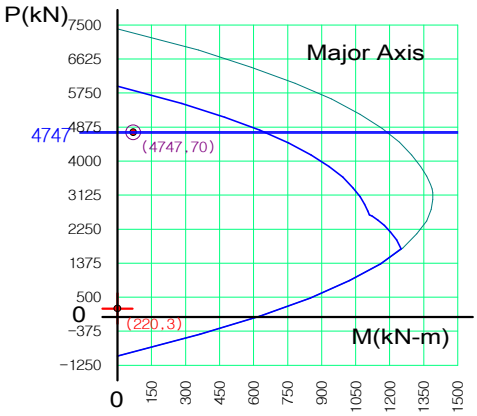
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

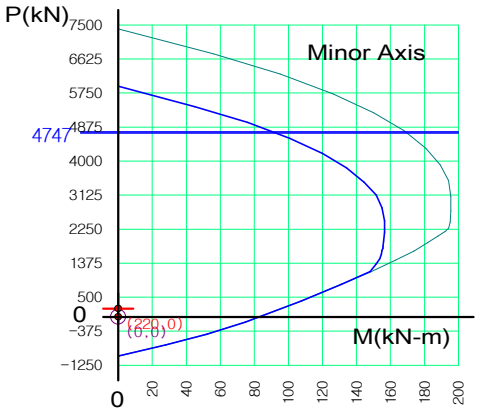


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4747.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	220.012	220.012
φPn (kN)	4747.19	0.00000
Pu / φPn	0.046 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-2.6523	0.00000
φMn (kN-m)	70.2178	0.00000
Mc / φMn	0.038 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.55379 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 87.0502 + 447.606 = 534.656 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

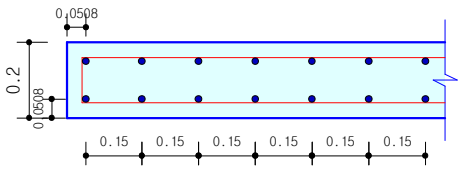
Wall ID : 847 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.685*0.2 m

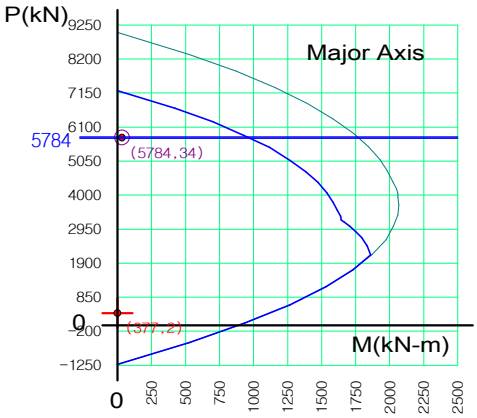
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

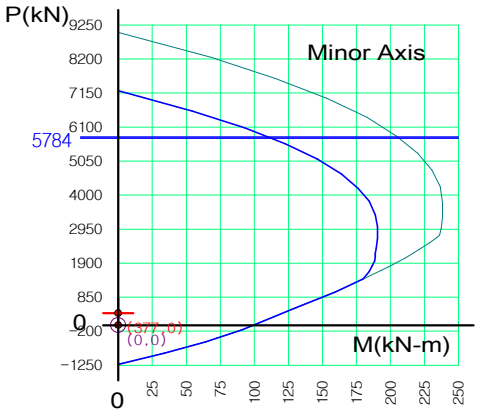


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5783.56 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	377.337	377.337
φPn (kN)	5783.56	0.00000
Pu / φPn	0.065 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.75923	0.00000
φMn (kN-m)	33.5061	0.00000
Mc / φMn	0.053 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 5.86767 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 115.503 + 546.533 = 662.036 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

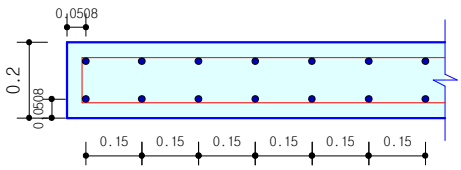
Wall ID : 848 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

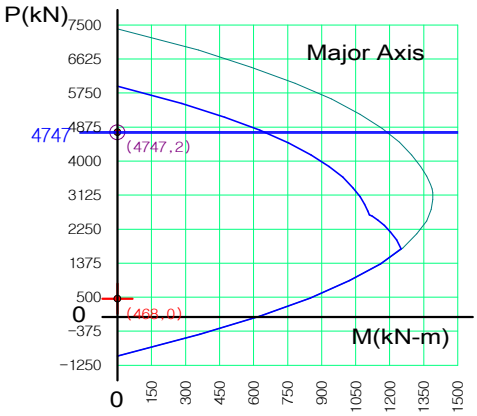
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

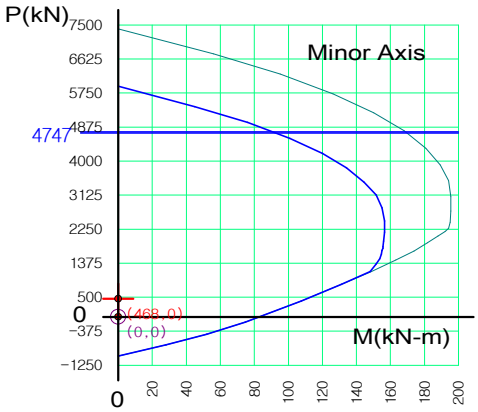


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4747.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	468.233	468.233
φPn (kN)	4747.19	0.00000
Pu / φPn	0.099 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.17489	0.00000
φMn (kN-m)	2.21515	0.00000
Mc / φMn	0.079 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 5.86841 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 88.2061 + 447.606 = 535.812 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.011 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

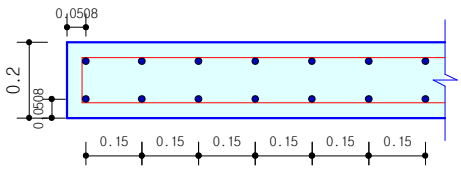
Wall ID : 849 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

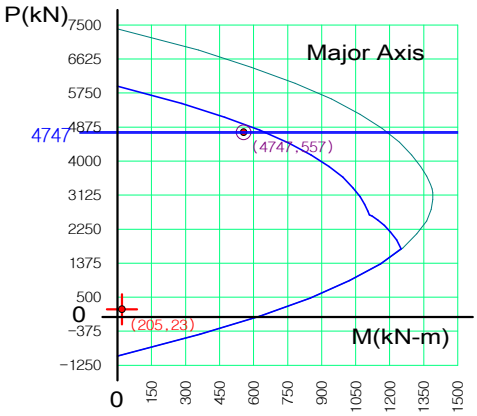
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

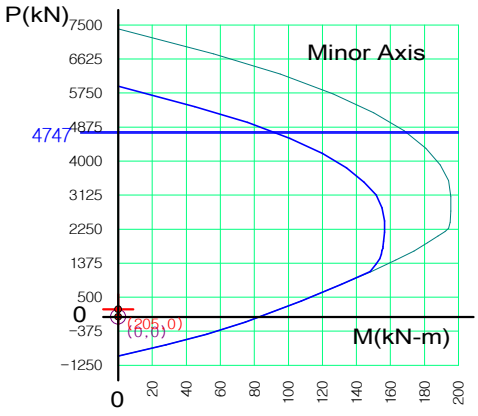


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4747.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	205.177	205.177
φPn (kN)	4747.19	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	23.0317	0.00000
φMn (kN-m)	556.889	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 8.96484 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 133.733 + 447.606 = 581.339 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.015 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

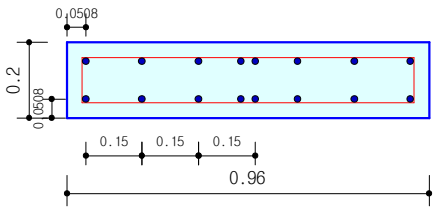
Wall ID : 850 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.96*0.2 m

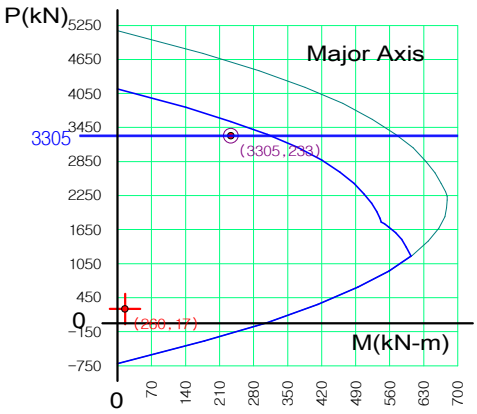
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

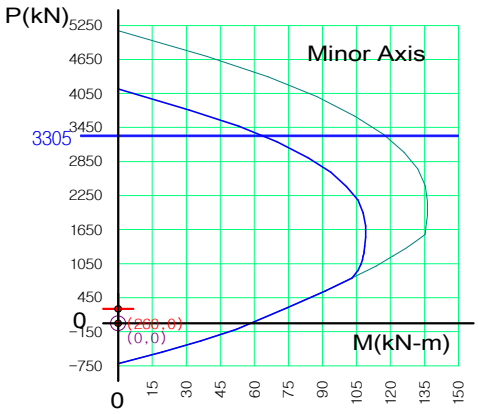


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3305.05 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	259.933	259.933
φPn (kN)	3305.05	0.00000
Pu / φPn	0.079 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	16.9941	0.00000
φMn (kN-m)	233.334	0.00000
Mc / φMn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 7.09379 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 81.2447 + 311.378 = 392.623 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.018 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

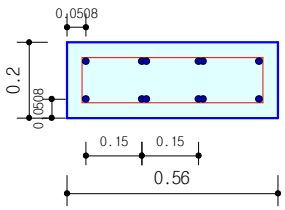
Wall ID : 851 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.56*0.2 m

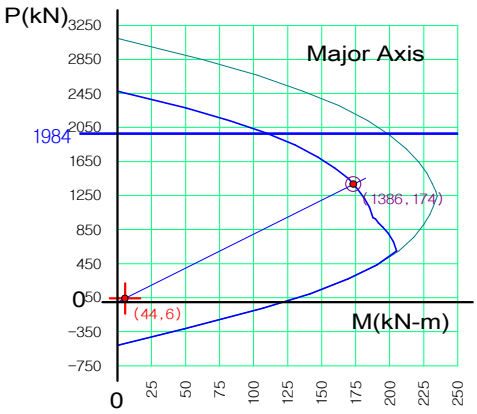
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

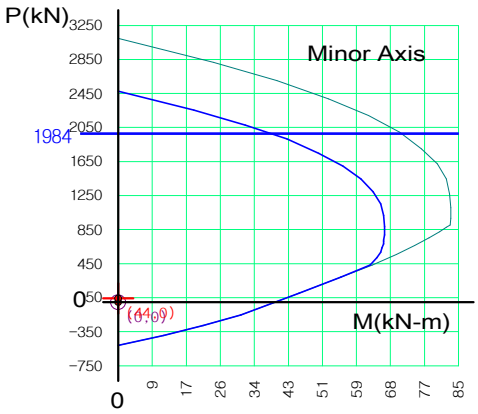


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1983.93 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	44.4033	44.4033
φPn (kN)	1386.43	0.00000
Pu / φPn	0.032 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	5.55735	0.00000
φMn (kN-m)	173.521	0.00000
Mc / φMn	0.032 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.99641 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 28.4983 + 181.637 = 210.135 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.010 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

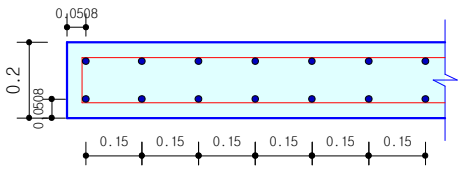
Wall ID : 852 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.51*0.2 m

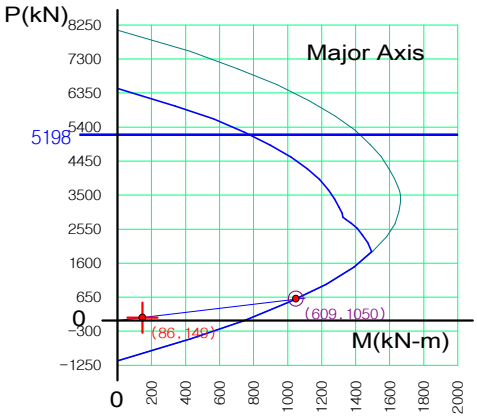
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

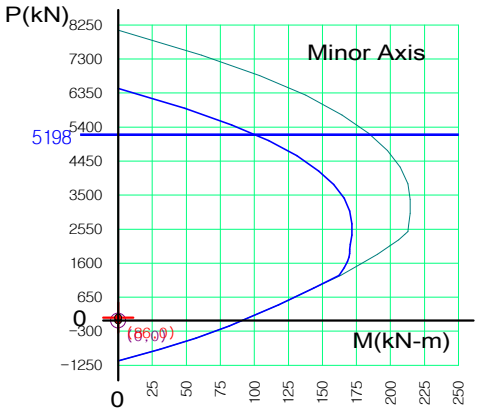


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5197.93 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	86.4528	86.4528
φPn (kN)	608.818	0.00000
Pu / φPn	0.142 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-149.08	0.00000
φMn (kN-m)	1049.84	0.00000
Mc / φMn	0.142 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 66.3700 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 164.661 + 489.772 = 654.432 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.101 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

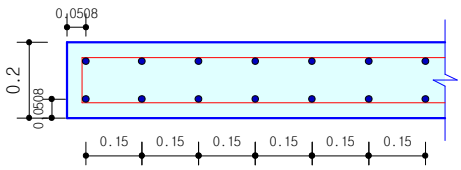
Wall ID : 853 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.03*0.2 m

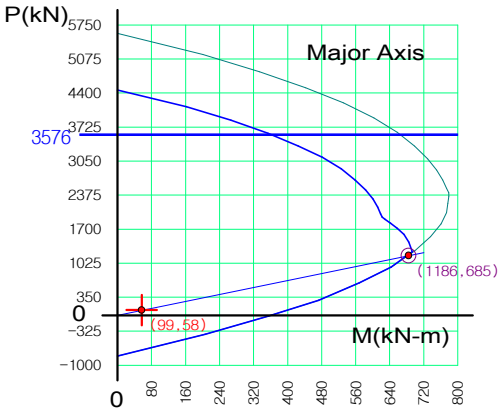
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

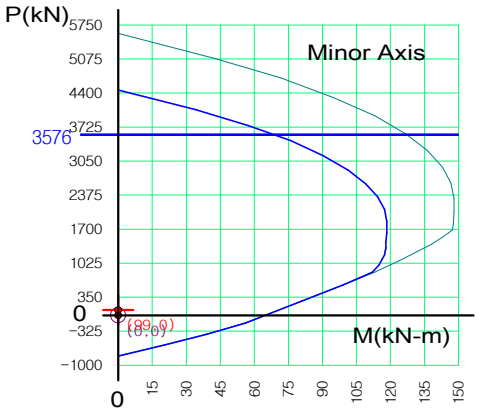


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3575.94 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	99.2912	99.2912
φPn (kN)	1186.21	0.00000
Pu / φPn	0.084 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	57.5699	0.00000
φMn (kN-m)	684.574	0.00000
Mc / φMn	0.084 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 27.5632 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 88.2122 + 334.083 = 422.295 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.065 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

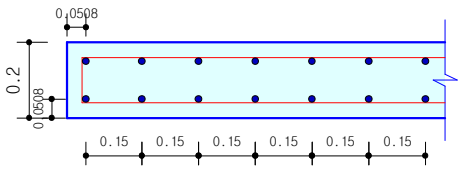
Wall ID : 854 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.73*0.2 m

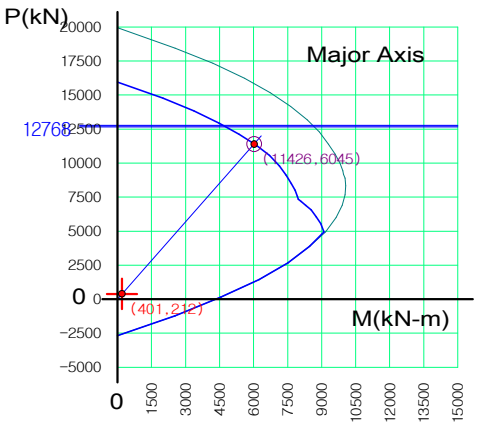
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

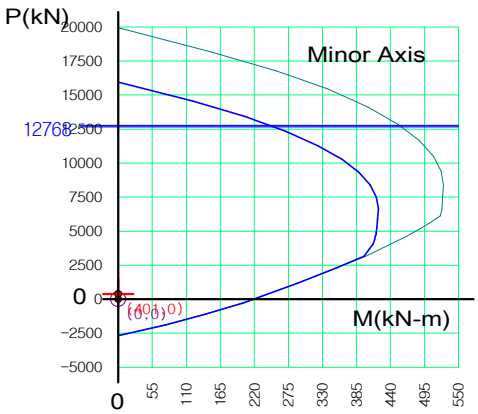


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12768.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	400.871	400.871
φPn (kN)	11426.4	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-212.09	0.00000
φMn (kN-m)	6045.33	0.00000
Mc / φMn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 28.6950 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 329.082 + 1209.83 = 1538.91 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

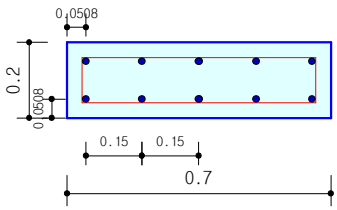
Wall ID : 855 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.7*0.2 m

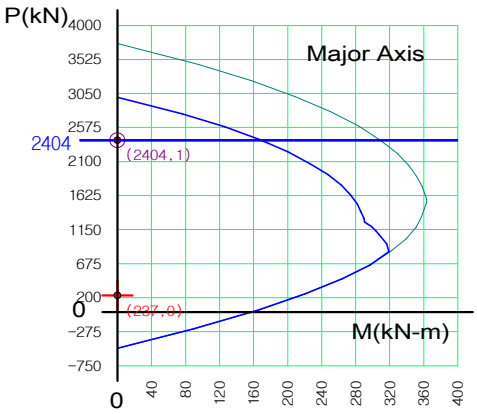
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

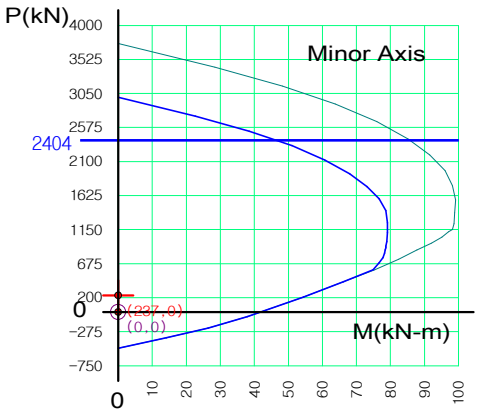


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2403.57 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	236.957	236.957
φPn (kN)	2403.57	0.00000
Pu / φPn	0.099 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.0601	0.00000
φMn (kN-m)	0.76100	0.00000
Mc / φMn	0.079 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.18132 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 32.9209 + 227.046 = 259.967 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 856 (Wall Mark : 1~2W2)

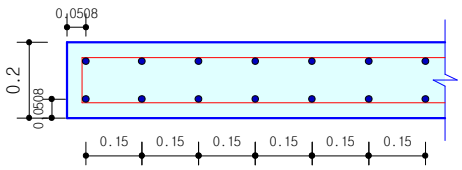
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 5.445*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

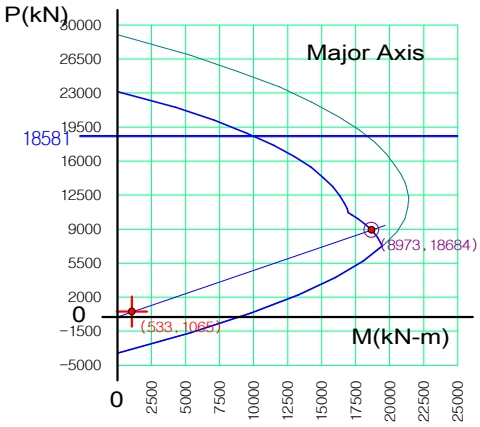
Unit System : kN, m

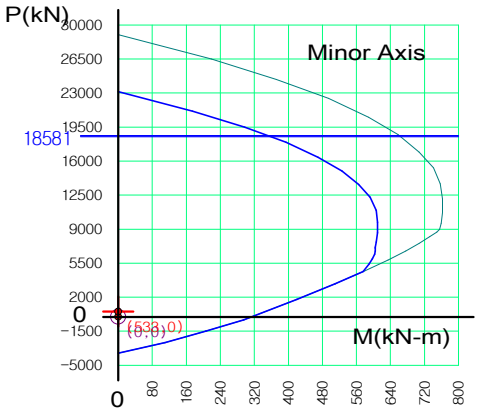


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 18580.7 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	532.979	532.979
φPn (kN)	8972.79	0.00000
Pu / φPn	0.059 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1065.0	0.00000
φMn (kN-m)	18683.7	0.00000
Mc / φMn	0.057 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 259.411 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1109.58 + 1766.10 = 2875.67 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.090 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

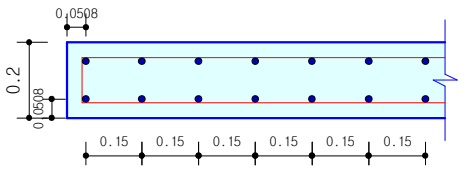
Wall ID : 857 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.5*0.2 m

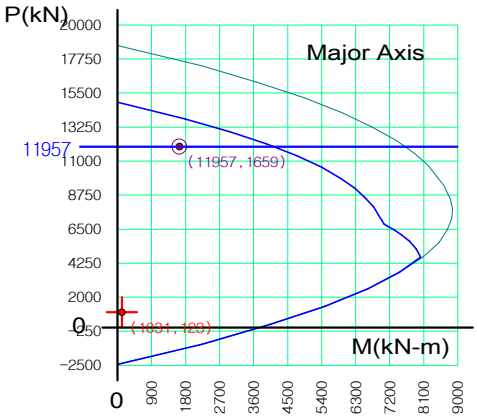
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

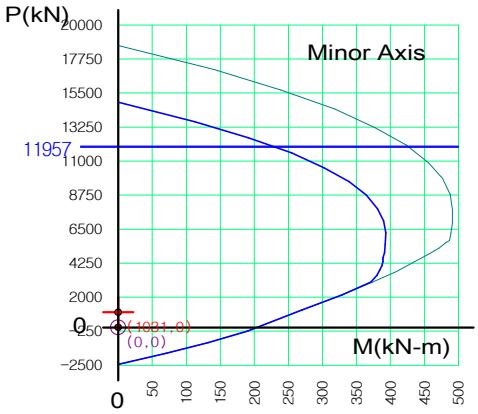


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 11956.8 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1030.74	1030.74
φPn (kN)	11956.8	0.00000
Pu / φPn	0.086 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	122.818	0.00000
φMn (kN-m)	1659.36	0.00000
Mc / φMn	0.074 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 15.9641 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 225.294 + 1135.23 = 1360.53 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 858 (Wall Mark : 1~2W2)

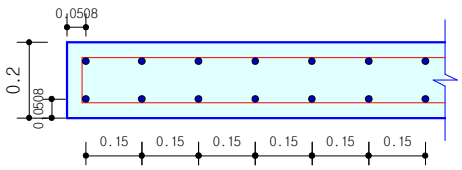
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.95*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

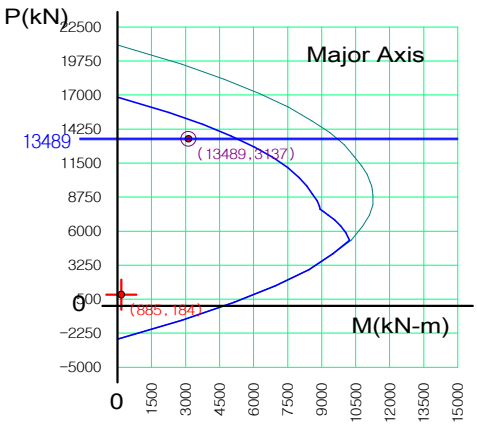
Unit System : kN, m

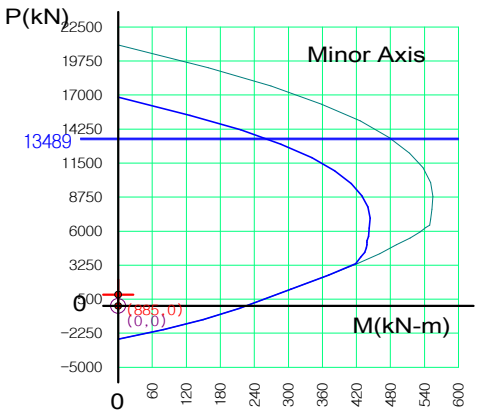


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 13488.8 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	885.161	885.161
φPn (kN)	13488.8	0.00000
Pu / φPn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-184.29	0.00000
φMn (kN-m)	3137.44	0.00000
Mc / φMn	0.059 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 88.7766 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 874.872 + 1281.19 = 2156.06 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.041 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

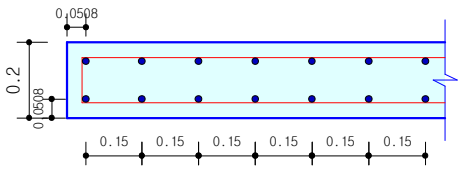
Wall ID : 859 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.74*0.2 m

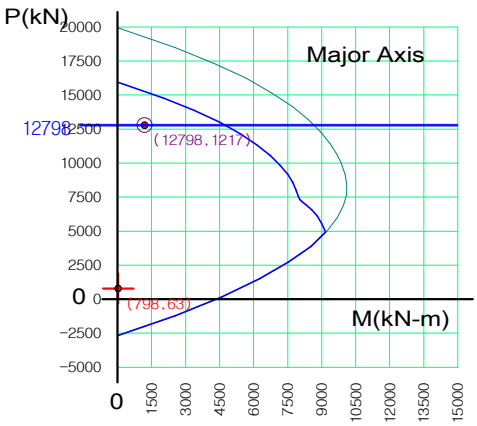
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

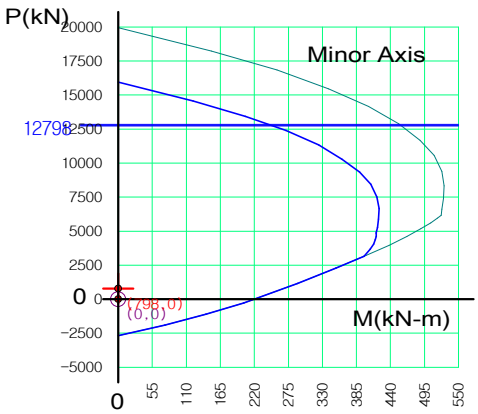


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12798.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	797.702	797.702
φPn (kN)	12798.3	0.00000
Pu / φPn	0.062 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	63.4795	0.00000
φMn (kN-m)	1217.38	0.00000
Mc / φMn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 24.3431 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 815.417 + 1213.08 = 2028.49 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

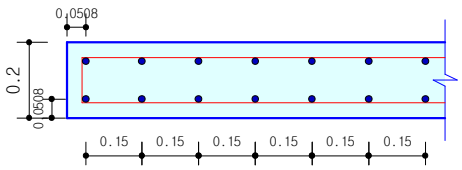
Wall ID : 860 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.3*0.2 m

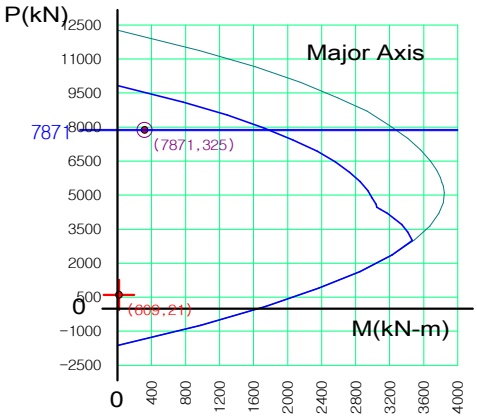
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

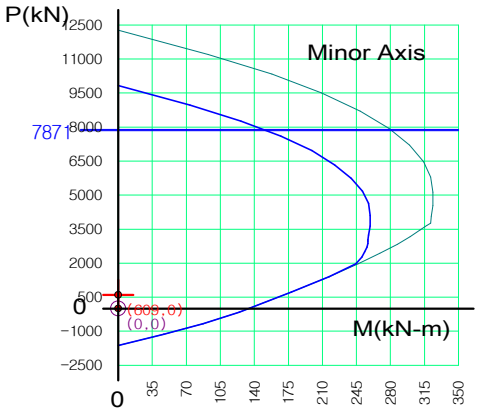


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7871.27 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	609.153	609.153
φPn (kN)	7871.27	0.00000
Pu / φPn	0.077 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	20.7776	0.00000
φMn (kN-m)	325.231	0.00000
Mc / φMn	0.064 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 7.52400 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 383.390 + 746.010 = 1129.40 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.007 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

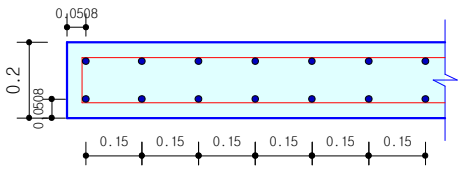
Wall ID : 861 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.4*0.2 m

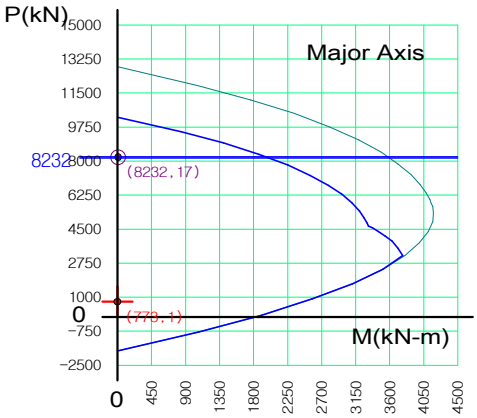
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

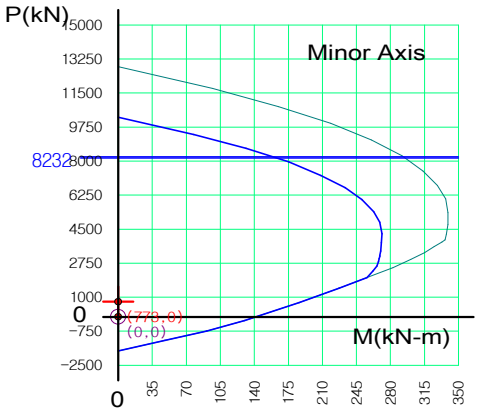


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 8232.09 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	773.185	773.185
φPn (kN)	8232.09	0.00000
Pu / φPn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.29982	0.00000
φMn (kN-m)	17.2730	0.00000
Mc / φMn	0.075 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.30122 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 211.980 + 778.445 = 990.425 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

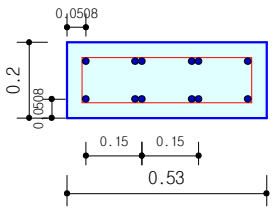
Wall ID : 862 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

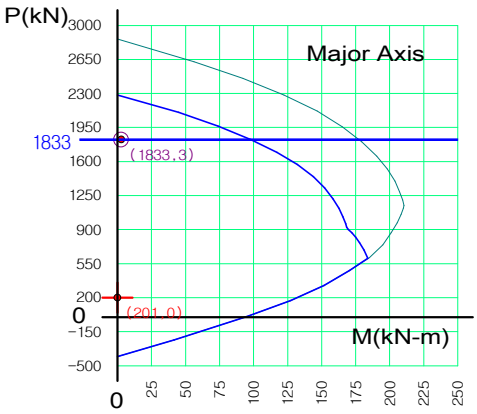
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

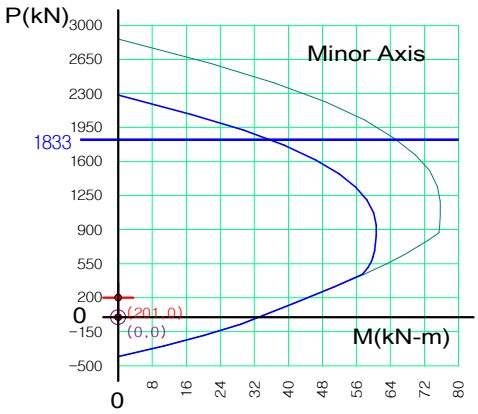


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1832.93 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	200.510	200.510
φPn (kN)	1832.93	0.00000
Pu / φPn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.27818	0.00000
φMn (kN-m)	3.16083	0.00000
Mc / φMn	0.088 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.10062 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 30.0702 + 171.907 = 201.977 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.000 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

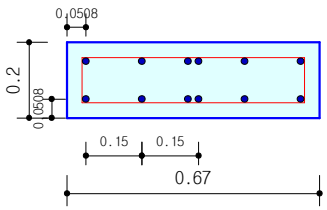
Wall ID : 863 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.67*0.2 m

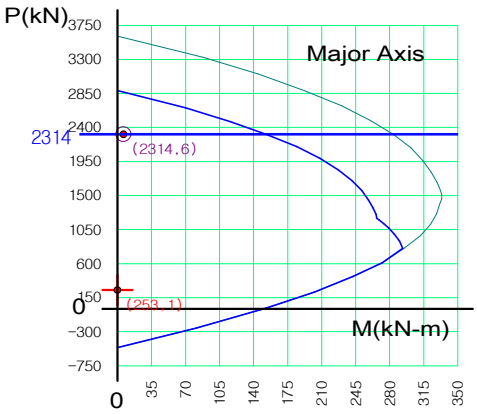
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

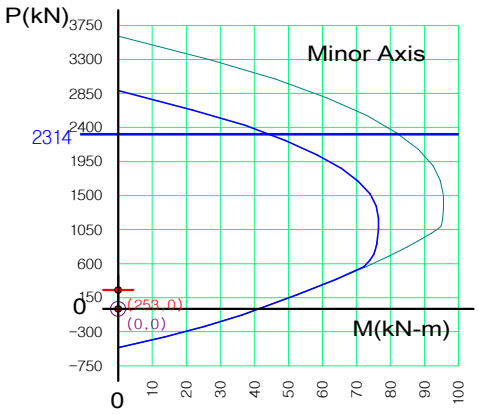


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2313.65 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	252.679	252.679
φPn (kN)	2313.65	0.00000
Pu / φPn	0.109 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.55883	0.00000
φMn (kN-m)	6.35089	0.00000
Mc / φMn	0.088 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.20204 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 42.6403 + 217.316 = 259.956 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

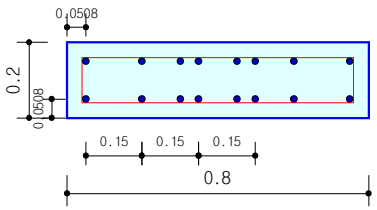
Wall ID : 864 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.8*0.2 m

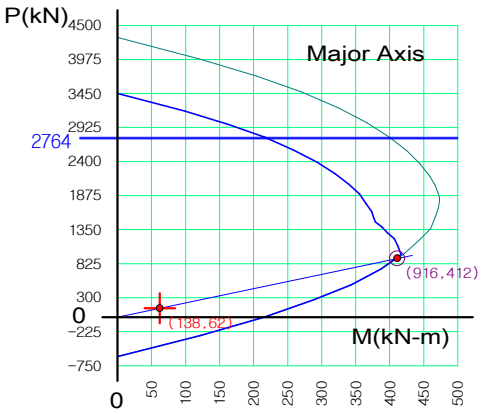
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

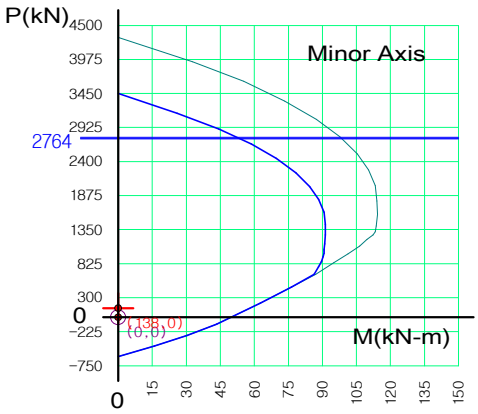


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2764.39 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	138.110	138.110
φPn (kN)	915.500	0.00000
Pu / φPn	0.151 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	62.4200	0.00000
φMn (kN-m)	412.035	0.00000
Mc / φMn	0.151 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 32.6979 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 64.7408 + 259.482 = 324.222 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.101 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

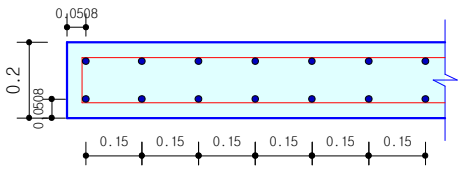
Wall ID : 865 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.73*0.2 m

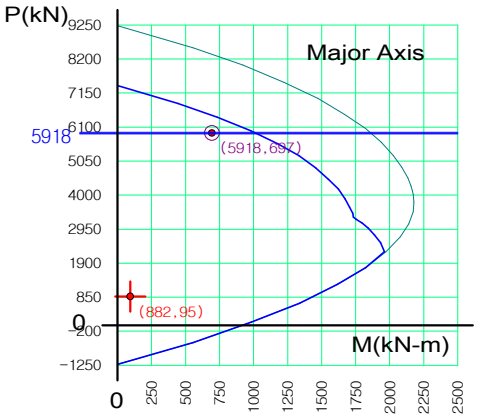
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

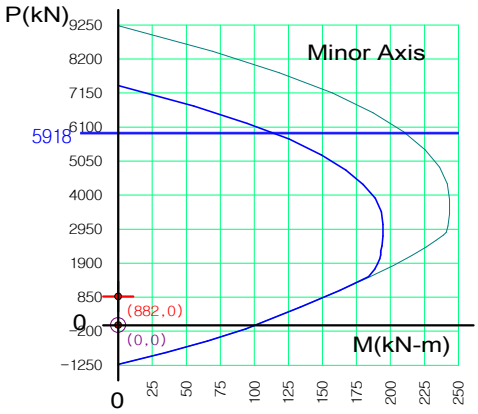


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5918.44 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	881.779	881.779
φPn (kN)	5918.44	0.00000
Pu / φPn	0.149 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-94.981	0.00000
φMn (kN-m)	697.409	0.00000
Mc / φMn	0.136 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 37.1101 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 292.019 + 561.129 = 853.148 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.043 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

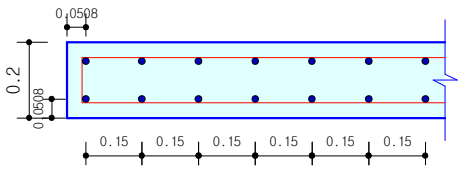
Wall ID : 866 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.52*0.2 m

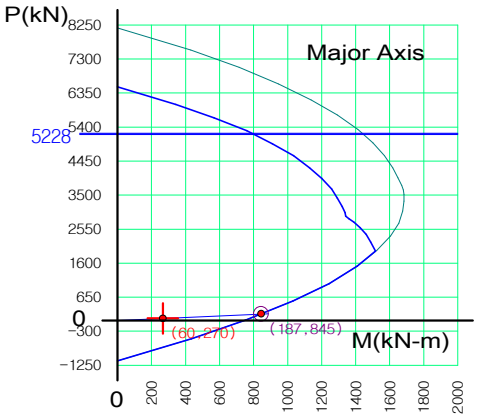
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

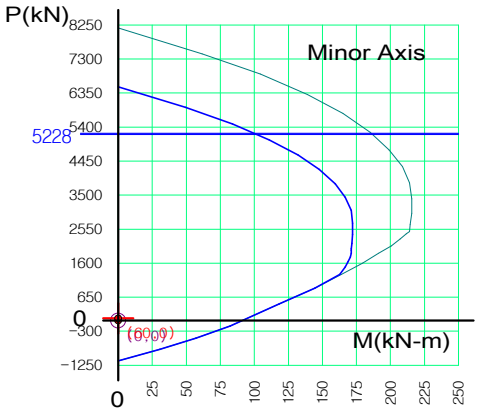


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5227.91 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	59.5926	59.5926
φPn (kN)	186.715	0.00000
Pu / φPn	0.319 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-269.58	0.00000
φMn (kN-m)	844.635	0.00000
Mc / φMn	0.319 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 121.892 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 165.981 + 493.015 = 658.996 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.185 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

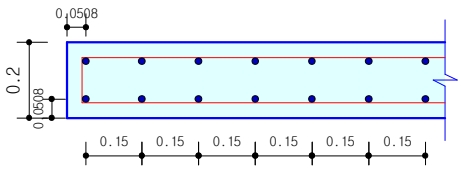
Wall ID : 867 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.505*0.2 m

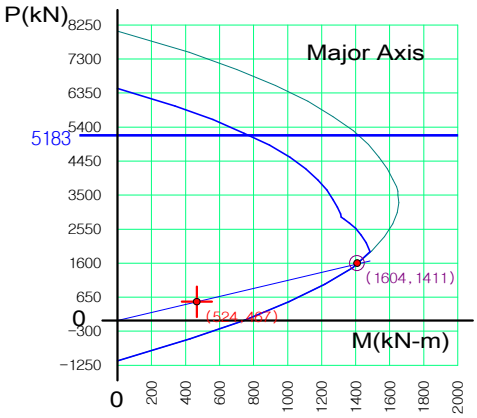
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

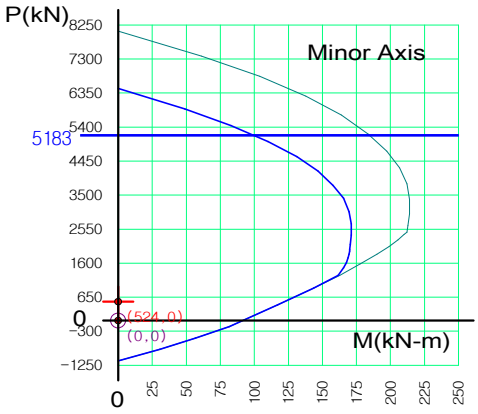


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5182.95 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	523.753	523.753
φPn (kN)	1603.61	0.00000
Pu / φPn	0.327 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	467.283	0.00000
φMn (kN-m)	1411.03	0.00000
Mc / φMn	0.331 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 199.443 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 209.676 + 488.150 = 697.826 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.286 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

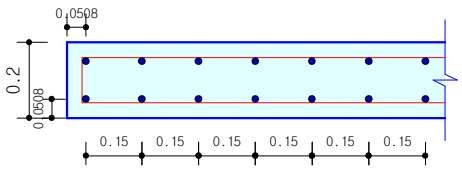
Wall ID : 868 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

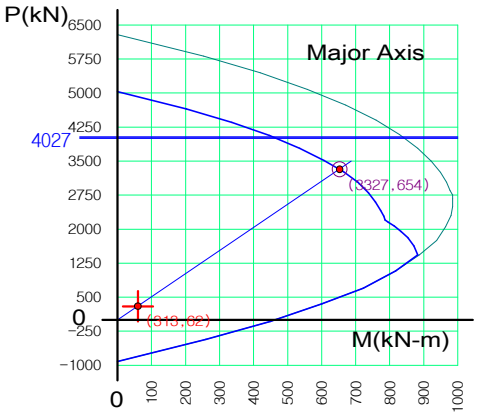
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

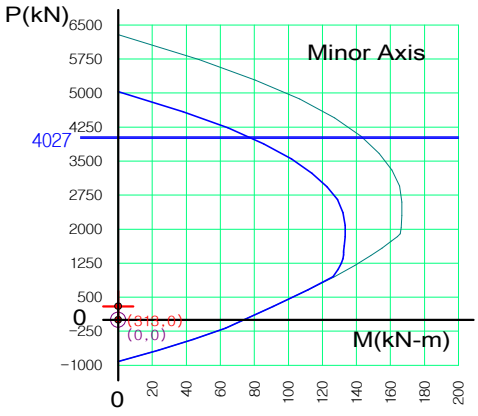


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	313.500	313.500
φPn (kN)	3326.87	0.00000
Pu / φPn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-61.601	0.00000
φMn (kN-m)	653.711	0.00000
Mc / φMn	0.094 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 35.1315 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 155.677 + 376.248 = 531.925 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.066 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

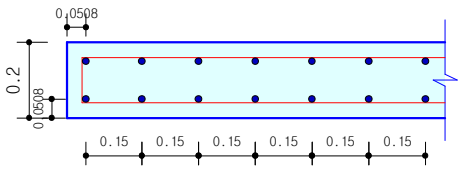
Wall ID : 869 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.46*0.2 m

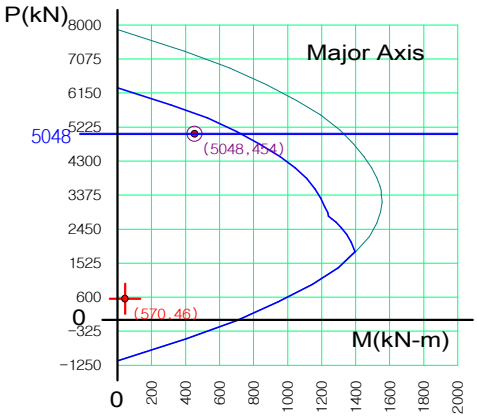
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

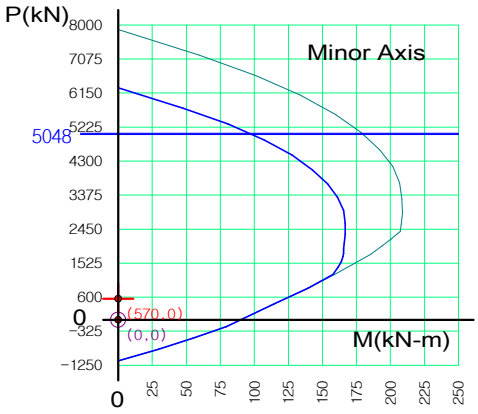


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5048.06 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	569.737	569.737
φPn (kN)	5048.06	0.00000
Pu / φPn	0.113 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-46.208	0.00000
φMn (kN-m)	454.445	0.00000
Mc / φMn	0.102 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 31.4064 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 272.437 + 473.554 = 745.991 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.042 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

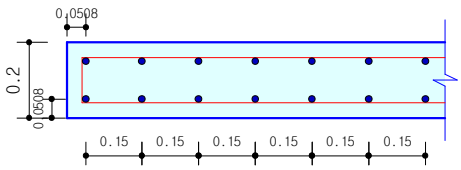
Wall ID : 870 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

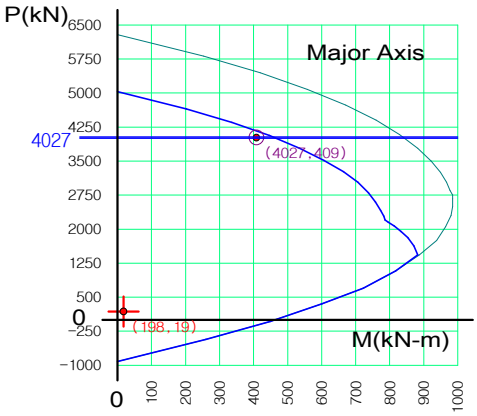
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

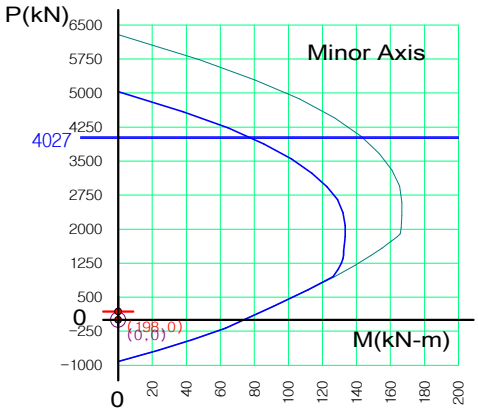


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	198.219	198.219
φPn (kN)	4026.68	0.00000
Pu / φPn	0.049 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-19.446	0.00000
φMn (kN-m)	409.366	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.05674 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 94.0464 + 376.248 = 470.295 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.015 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

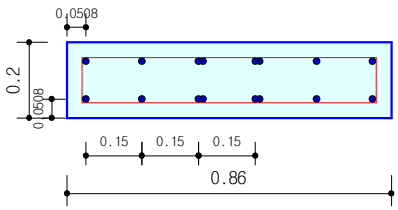
Wall ID : 871 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.86*0.2 m

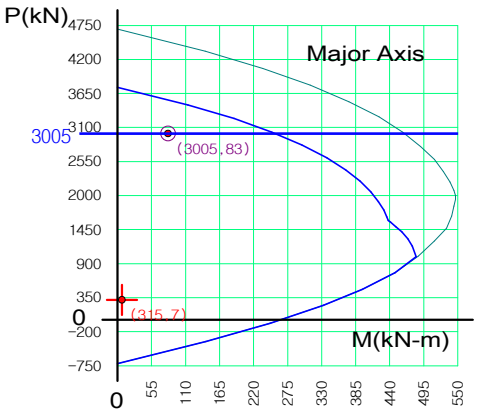
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

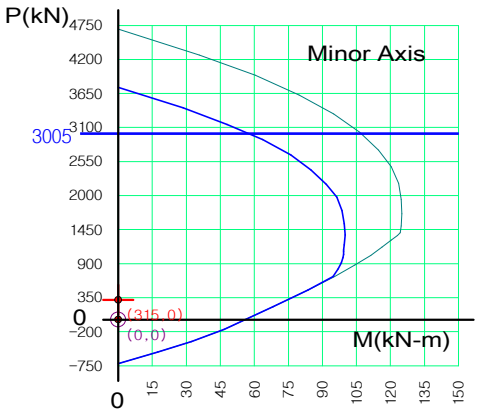


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3005.31 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	315.153	315.153
φPn (kN)	3005.31	0.00000
Pu / φPn	0.105 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-7.3389	0.00000
φMn (kN-m)	82.6654	0.00000
Mc / φMn	0.089 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.16639 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 92.2648 + 278.943 = 371.208 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.011 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

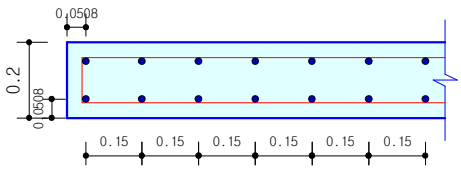
Wall ID : 872 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

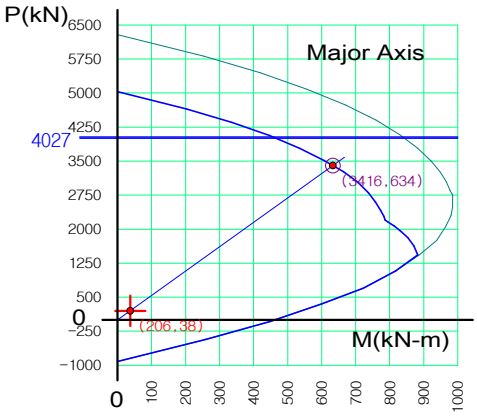
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

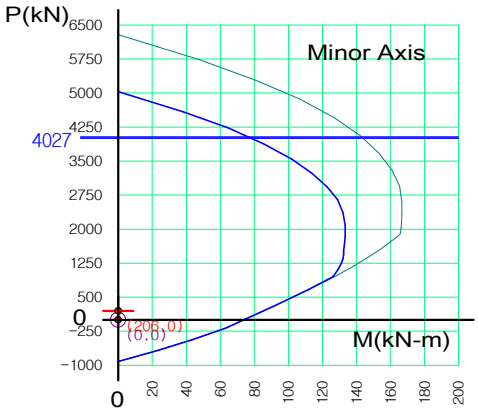


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	206.422	206.422
φPn (kN)	3416.40	0.00000
Pu / φPn	0.060 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-38.302	0.00000
φMn (kN-m)	633.923	0.00000
Mc / φMn	0.060 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 15.9183 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 105.255 + 376.248 = 481.503 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.033 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

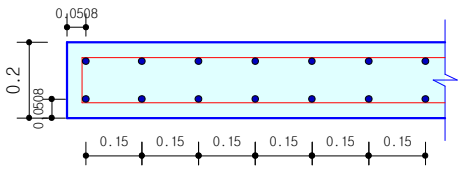
Wall ID : 873 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.31*0.2 m

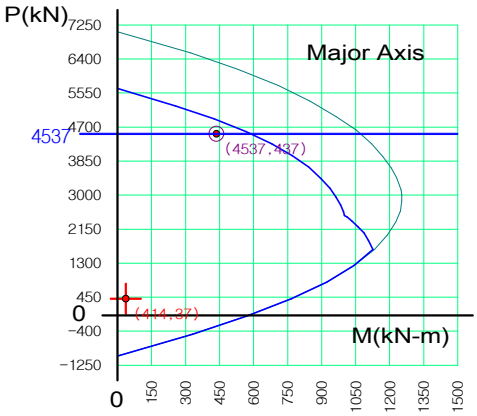
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

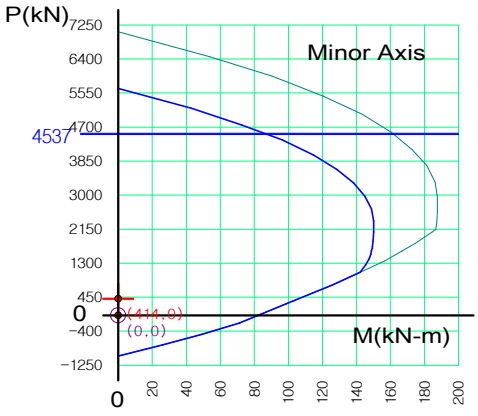


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4537.37 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	414.055	414.055
φPn (kN)	4537.37	0.00000
Pu / φPn	0.091 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-36.969	0.00000
φMn (kN-m)	436.975	0.00000
Mc / φMn	0.085 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 21.2951 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 214.886 + 424.901 = 639.787 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.033 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

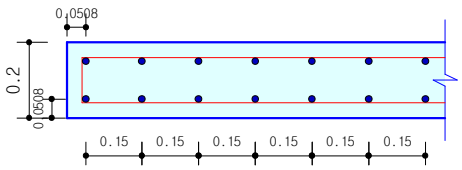
Wall ID : 874 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.12*0.2 m

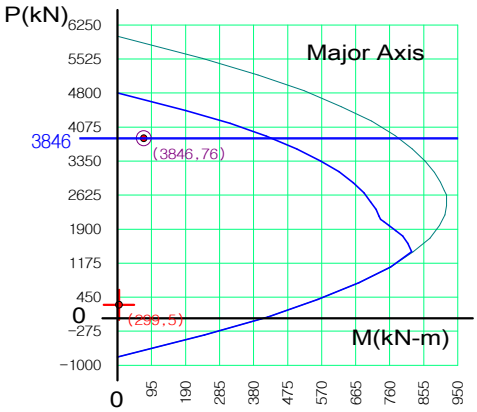
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

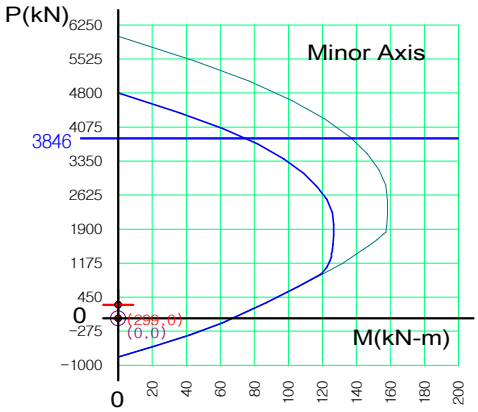


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3845.71 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	299.116	299.116
φPn (kN)	3845.71	0.00000
Pu / φPn	0.078 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	4.87368	0.00000
φMn (kN-m)	75.9550	0.00000
Mc / φMn	0.064 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.41862 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 63.8405 + 363.274 = 427.115 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

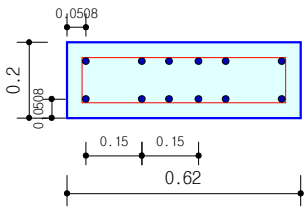
Wall ID : 875 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.62*0.2 m

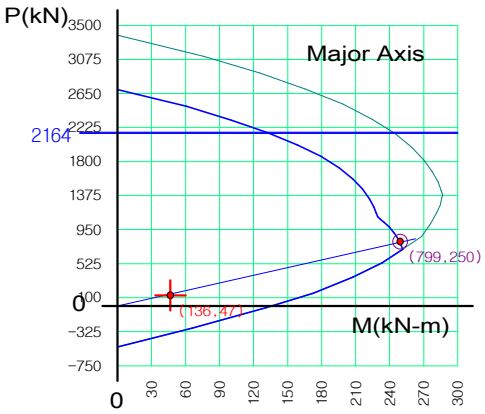
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

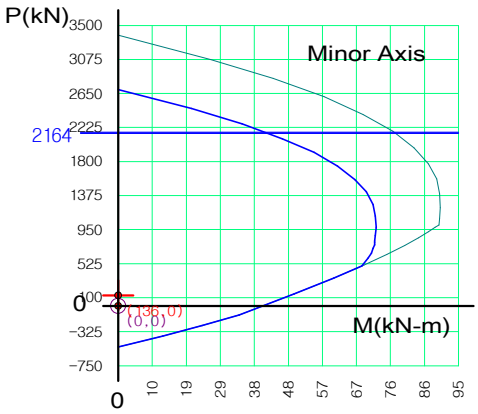


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2163.78 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	135.518	135.518
φPn (kN)	798.983	0.00000
Pu / φPn	0.170 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-47.140	0.00000
φMn (kN-m)	249.763	0.00000
Mc / φMn	0.189 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 25.6285 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 44.7461 + 201.098 = 245.844 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.104 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

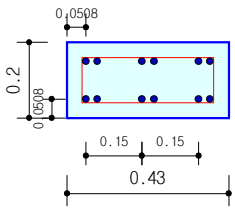
Wall ID : 876 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

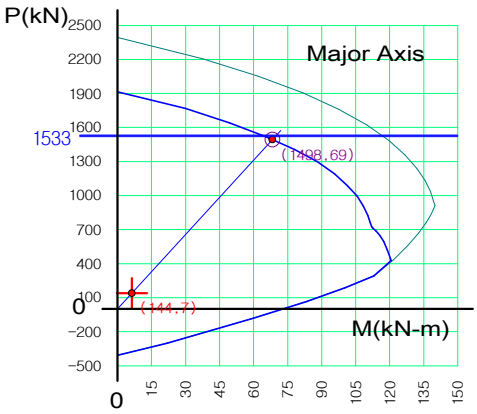
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

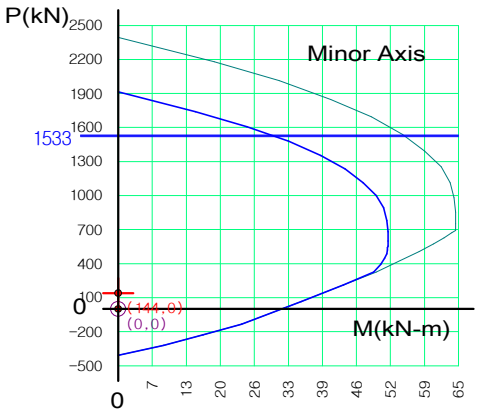


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1533.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	144.227	144.227
φPn (kN)	1497.54	0.00000
Pu / φPn	0.096 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-6.6108	0.00000
φMn (kN-m)	68.6411	0.00000
Mc / φMn	0.096 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 3.35552 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 26.0455 + 139.471 = 165.517 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.020 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 877 (Wall Mark : 1~2W2)

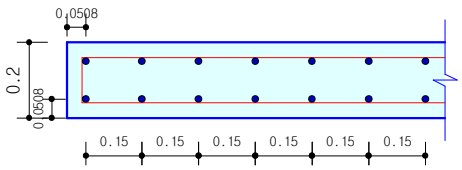
Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.16*0.2 m

Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

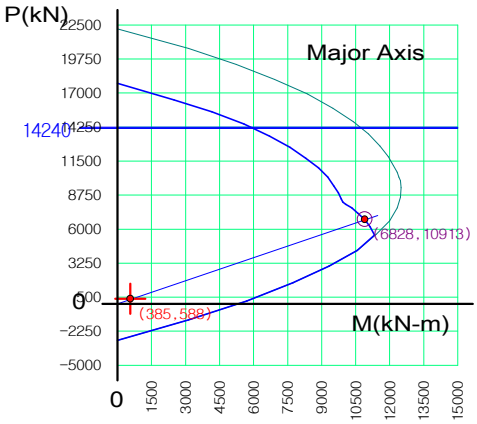
Unit System : kN, m

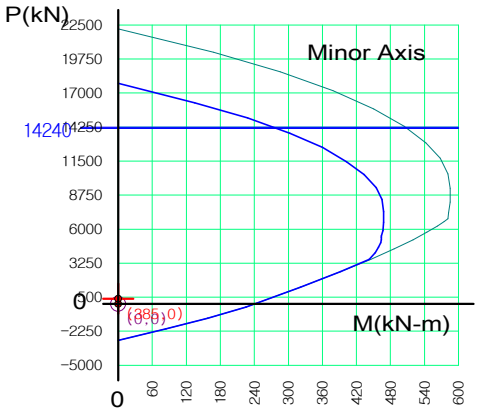


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14240.5 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	385.358	385.358
φPn (kN)	6828.23	0.00000
Pu / φPn	0.056 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	587.774	0.00000
φMn (kN-m)	10912.9	0.00000
Mc / φMn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 195.311 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 833.886 + 1349.30 = 2183.19 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.089 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

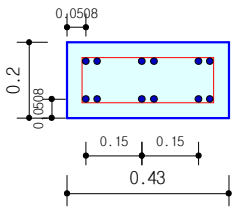
Wall ID : 878 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

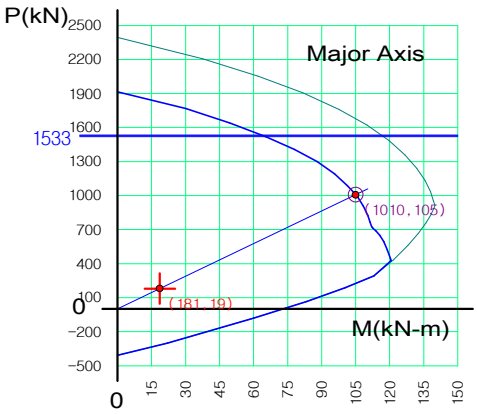
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

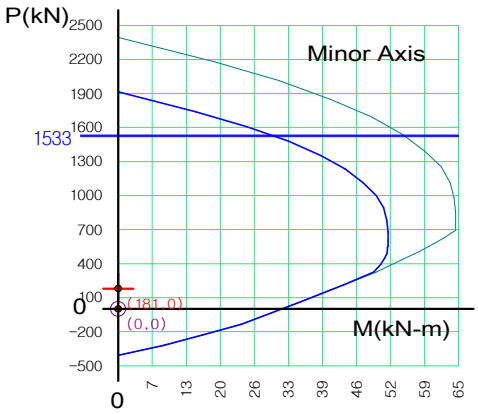


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1533.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	180.901	180.901
φPn (kN)	1010.22	0.00000
Pu / φPn	0.179 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	18.8147	0.00000
φMn (kN-m)	105.068	0.00000
Mc / φMn	0.179 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 10.8892 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 29.2377 + 139.471 = 168.709 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.065 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

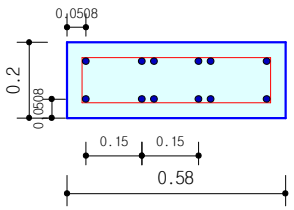
Wall ID : 879 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.58*0.2 m

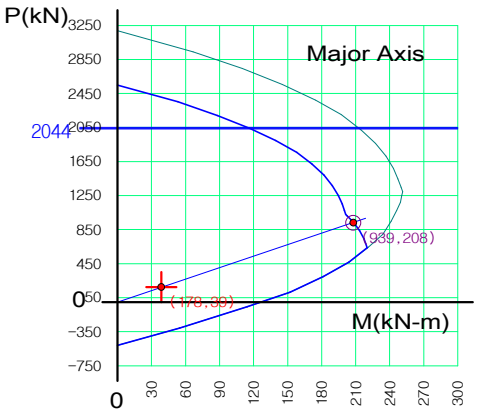
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

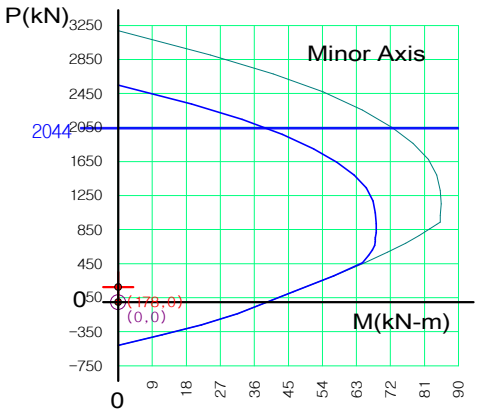


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2043.88 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	178.211	178.211
φPn (kN)	938.779	0.00000
Pu / φPn	0.190 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-39.026	0.00000
φMn (kN-m)	208.224	0.00000
Mc / φMn	0.187 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 21.3681 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 42.8060 + 188.124 = 230.930 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.093 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

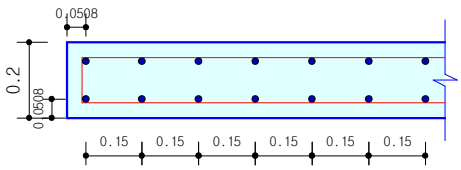
Wall ID : 880 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

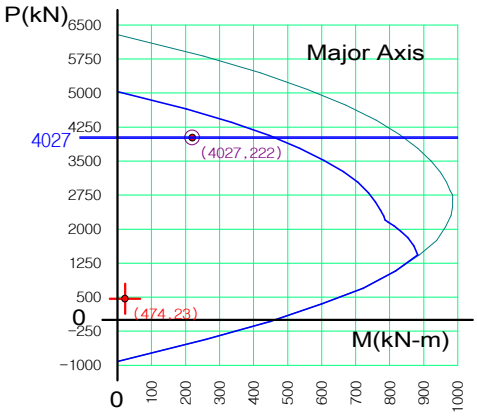
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

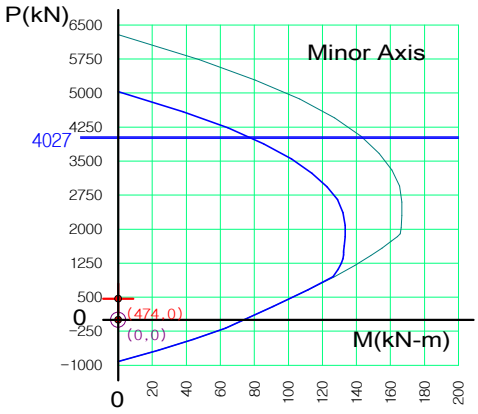


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	474.094	474.094
φPn (kN)	4026.68	0.00000
Pu / φPn	0.118 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	22.7762	0.00000
φMn (kN-m)	221.779	0.00000
Mc / φMn	0.103 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.39598 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 73.9144 + 376.248 = 450.163 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.010 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

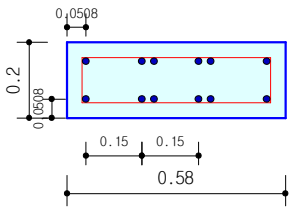
Wall ID : 881 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.58*0.2 m

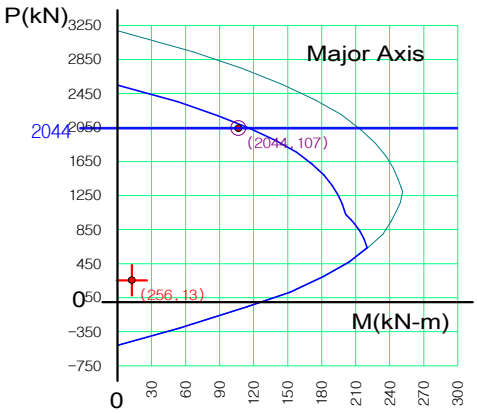
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

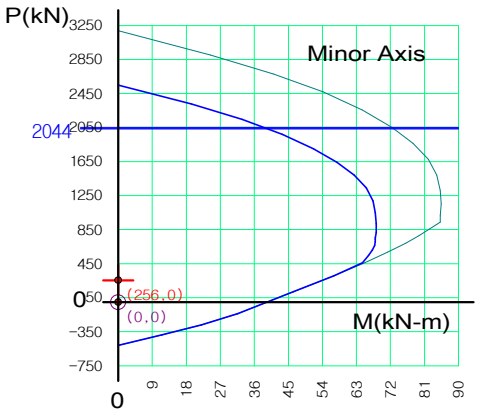


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2043.88 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	256.155	256.155
φPn (kN)	2043.88	0.00000
Pu / φPn	0.125 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	13.0341	0.00000
φMn (kN-m)	106.863	0.00000
Mc / φMn	0.122 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.57090 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 48.5544 + 188.124 = 236.679 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.032 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

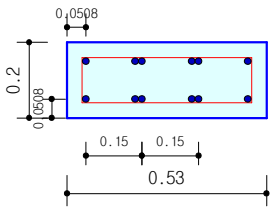
Wall ID : 882 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

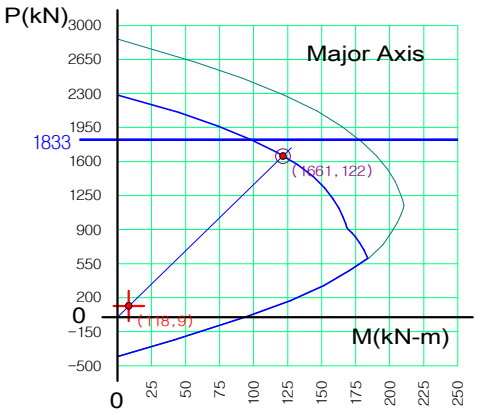
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

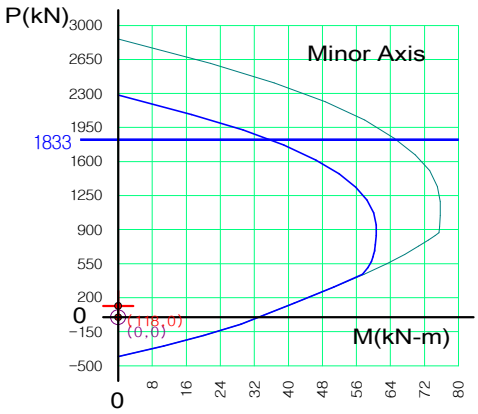


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1832.93 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	118.463	118.463
φPn (kN)	1661.19	0.00000
Pu / φPn	0.071 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-8.6847	0.00000
φMn (kN-m)	121.784	0.00000
Mc / φMn	0.071 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 4.57517 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 34.2798 + 171.907 = 206.186 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.022 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

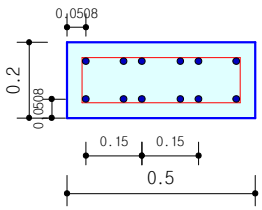
Wall ID : 883 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.5*0.2 m

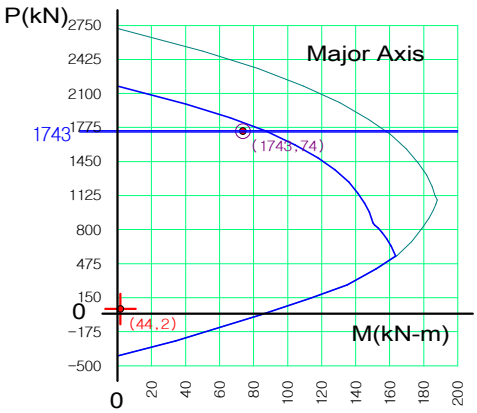
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

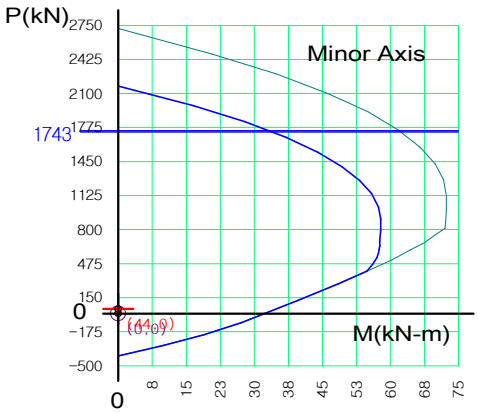


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1743.01 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	44.4424	44.4424
φPn (kN)	1743.01	0.00000
Pu / φPn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.80098	0.00000
φMn (kN-m)	73.9419	0.00000
Mc / φMn	0.024 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.49801 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 22.6305 + 162.176 = 184.806 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

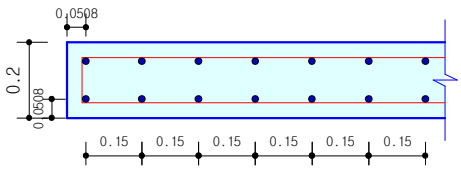
Wall ID : 884 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

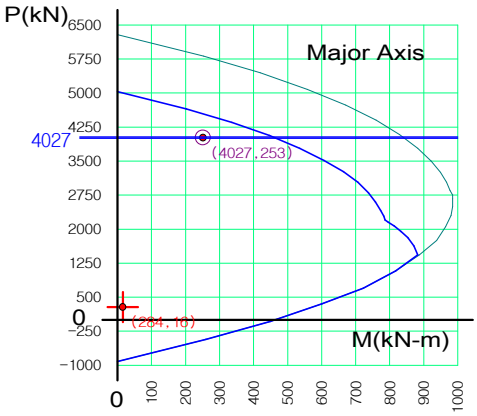
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

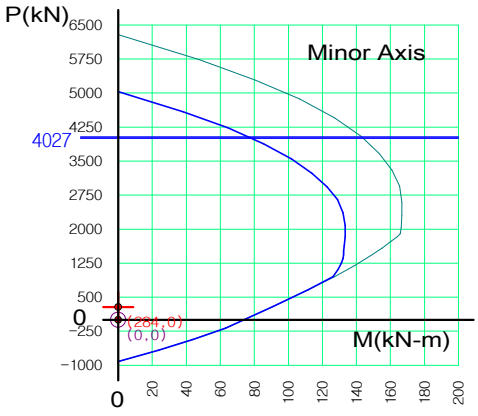


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	284.248	284.248
φPn (kN)	4026.68	0.00000
Pu / φPn	0.071 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-15.795	0.00000
φMn (kN-m)	252.729	0.00000
Mc / φMn	0.062 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 5.66608 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 99.0333 + 376.248 = 475.282 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.012 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

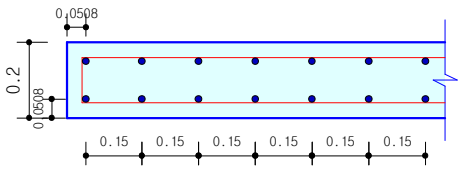
Wall ID : 885 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

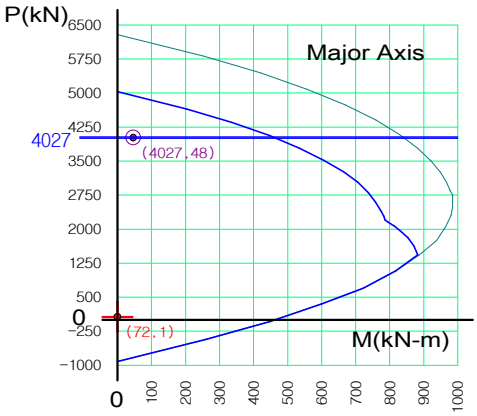
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

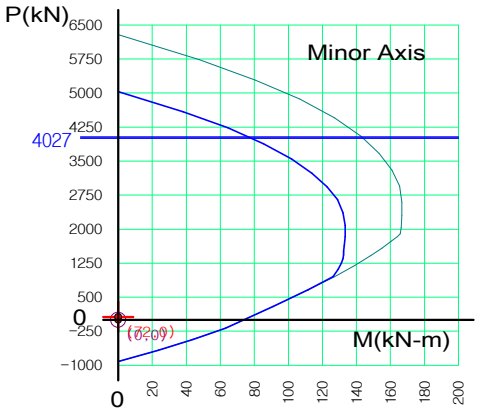


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	72.0403	72.0403
φPn (kN)	4026.68	0.00000
Pu / φPn	0.018 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.7039	0.00000
φMn (kN-m)	48.3035	0.00000
Mc / φMn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 1.16500 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 68.5761 + 376.248 = 444.824 kN
		(As-H_req = 0.00127 m²/m, D13 @200)
Shear Ratio	Vu/φVn	= 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

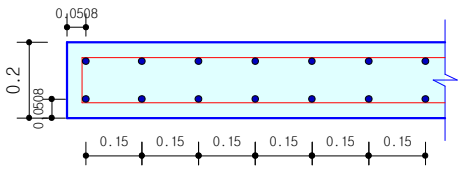
Wall ID : 886 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

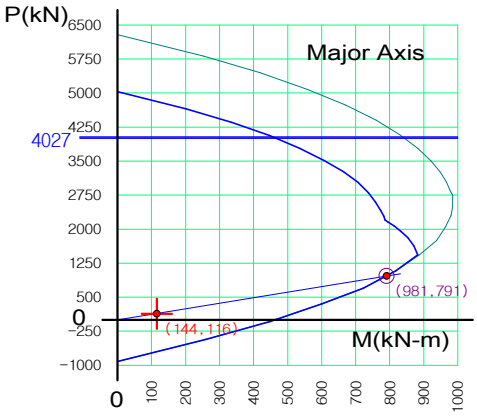
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

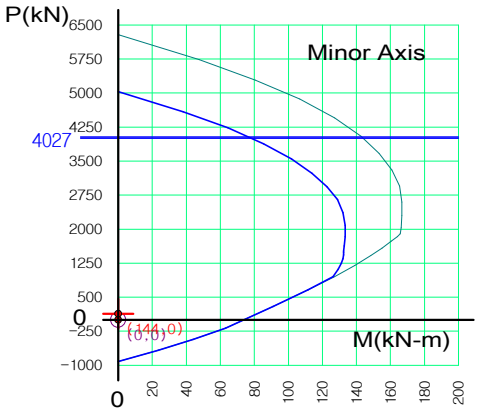


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4026.68 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	144.112	144.112
φPn (kN)	981.060	0.00000
Pu / φPn	0.147 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	116.258	0.00000
φMn (kN-m)	791.442	0.00000
Mc / φMn	0.147 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 48.0235 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 99.7005 + 376.248 = 475.949 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.101 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

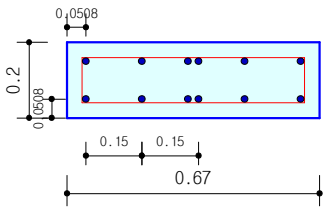
Wall ID : 887 (Wall Mark : 1~2W2)

Story : 1F (Height = 5.6 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.67*0.2 m

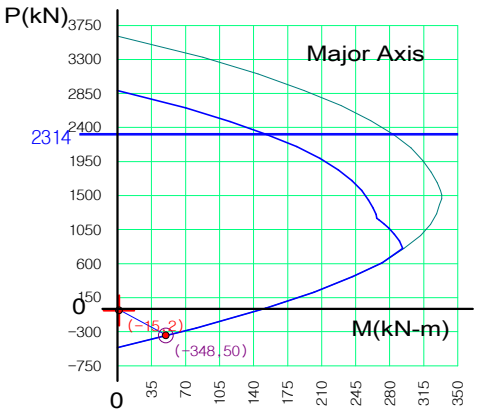
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

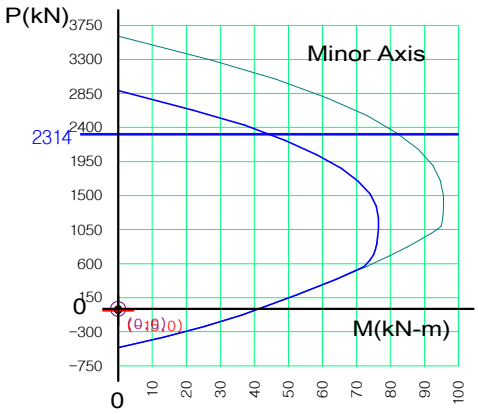


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2313.65 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-15.479	-15.479
φPn (kN)	-347.55	0.00000
Pu / φPn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2.22498	0.00000
φMn (kN-m)	49.9585	0.00000
Mc / φMn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.54132 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 30.1438 + 217.316 = 247.460 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.002 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

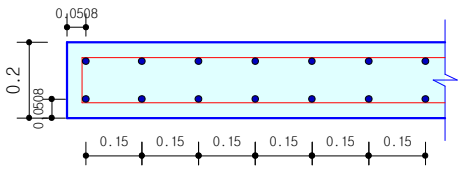
Wall ID : 888 (Wall Mark : 1~2W2)

Story : 2F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.2*0.2 m

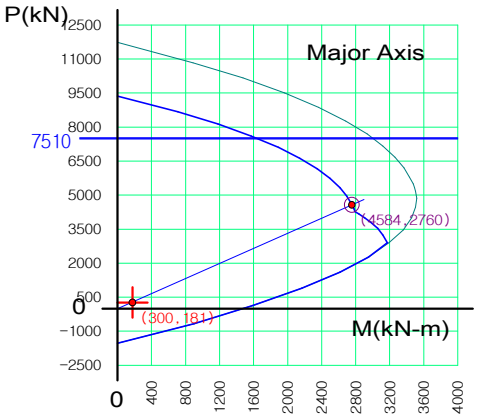
Vertical Rebar : D13 @150 (AsV = 0.00169 m²/m)

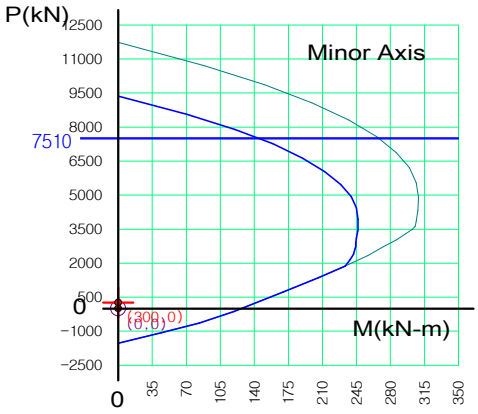


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7510.46 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	299.986	299.986
φPn (kN)	4584.13	0.00000
Pu / φPn	0.065 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	180.599	0.00000
φMn (kN-m)	2759.76	0.00000
Mc / φMn	0.065 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 95.4663 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 456.388 + 713.574 = 1169.96 kN

(As-H_req = 0.00127 m²/m, D13 @200)

Shear Ratio Vu/φVn = 0.082 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

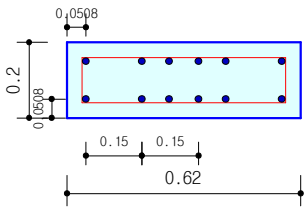
Wall ID : 900 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.62*0.2 m

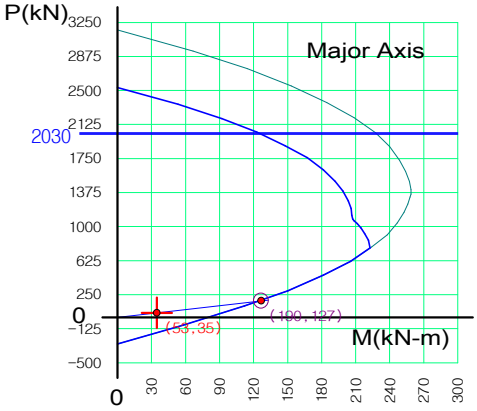
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

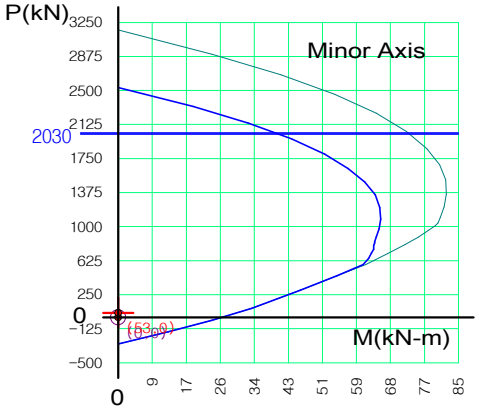


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2030.33 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	52.9190	52.9190
φPn (kN)	189.771	0.00000
Pu / φPn	0.279 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	35.3247	0.00000
φMn (kN-m)	126.677	0.00000
Mc / φMn	0.279 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 20.3698 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 41.9100 + 90.5720 = 132.482 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.154 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

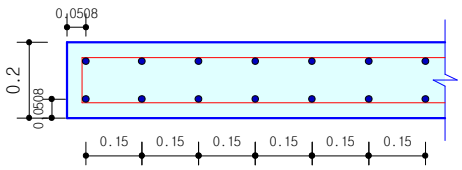
Wall ID : 901 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.12*0.2 m

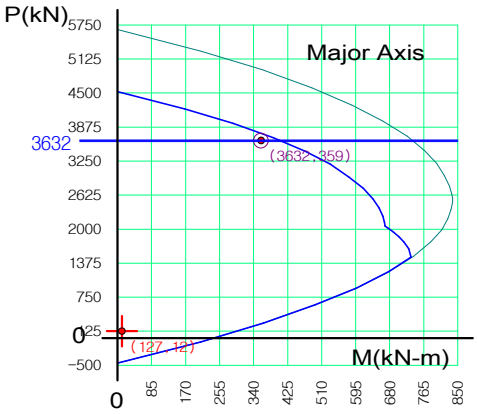
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

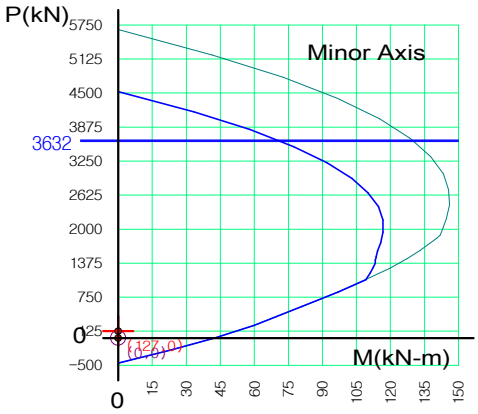


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3632.20 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	127.400	127.400
φPn (kN)	3632.20	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-12.173	0.00000
φMn (kN-m)	359.431	0.00000
Mc / φMn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.87826 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 121.351 + 163.614 = 284.965 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.028 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

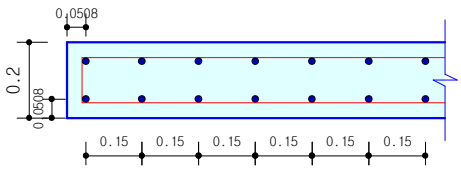
Wall ID : 902 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.31*0.2 m

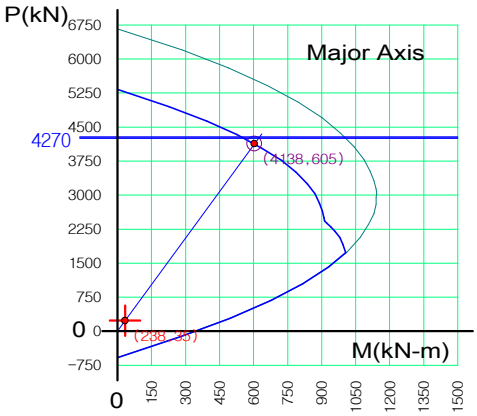
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

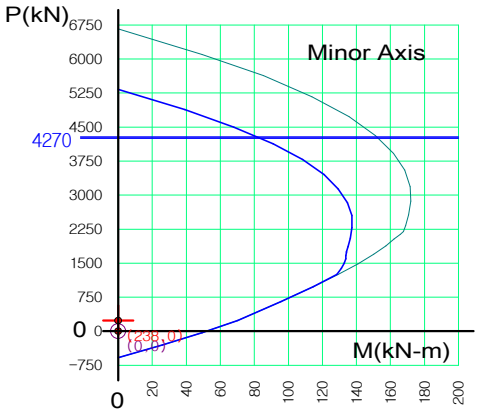


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4270.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	237.675	237.675
φPn (kN)	4138.21	0.00000
Pu / φPn	0.057 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-34.739	0.00000
φMn (kN-m)	604.854	0.00000
Mc / φMn	0.057 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 19.7683 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 184.752 + 191.370 = 376.122 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.053 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

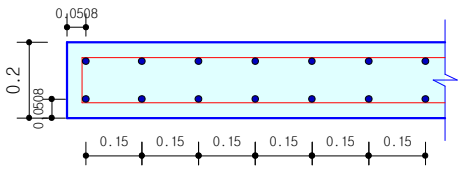
Wall ID : 903 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

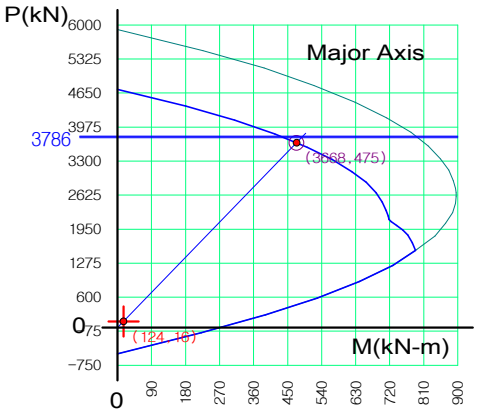
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

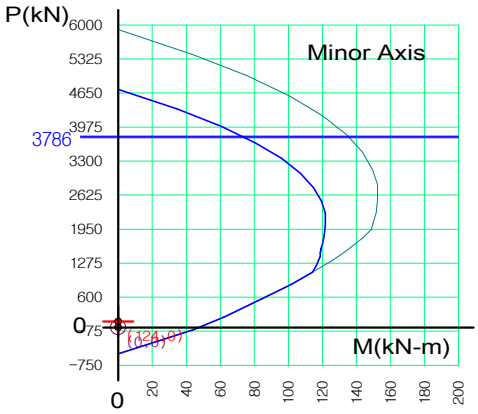


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	123.863	123.863
φPn (kN)	3668.38	0.00000
Pu / φPn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-16.025	0.00000
φMn (kN-m)	474.604	0.00000
Mc / φMn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 9.65801 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 111.678 + 169.457 = 281.135 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.034 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

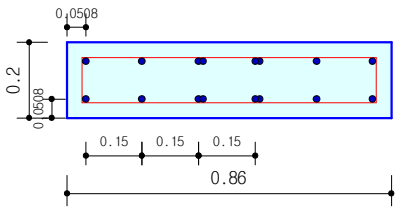
Wall ID : 904 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.86*0.2 m

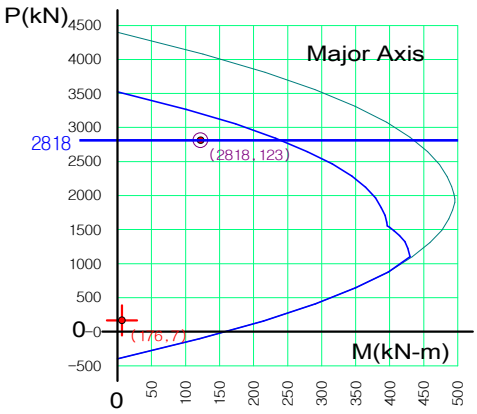
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

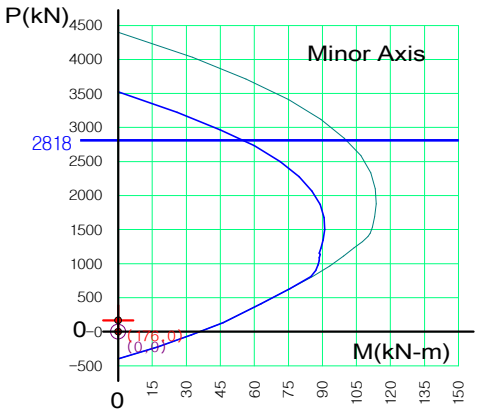


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2818.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	175.960	175.960
φPn (kN)	2818.48	0.00000
Pu / φPn	0.062 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-6.7208	0.00000
φMn (kN-m)	122.514	0.00000
Mc / φMn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.01780 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 84.4590 + 125.632 = 210.091 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.019 < 1.000 ..... O.K

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

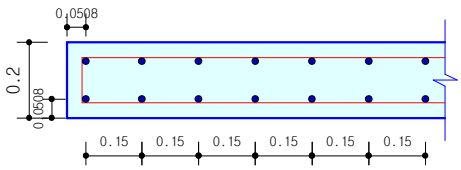
Wall ID : 905 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

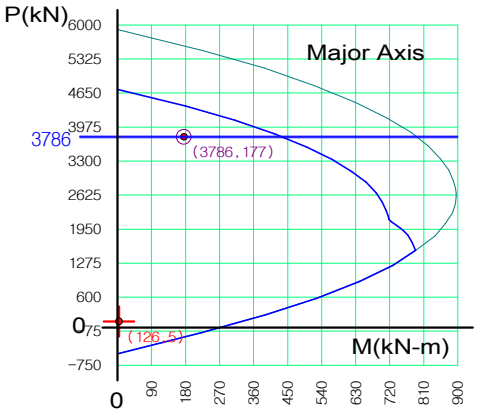
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

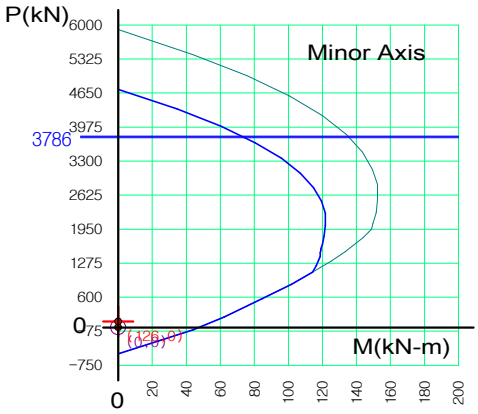


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	125.915	125.915
φPn (kN)	3786.48	0.00000
Pu / φPn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.0521	0.00000
φMn (kN-m)	176.795	0.00000
Mc / φMn	0.029 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 6.03829 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 94.6124 + 169.457 = 264.070 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.023 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 906 (Wall Mark : 3~RW2)

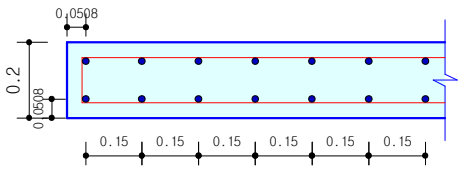
Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.46*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

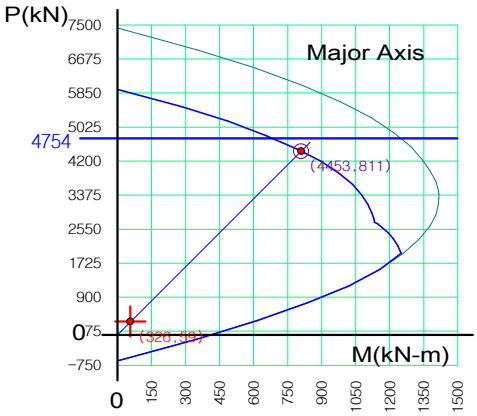
Unit System : kN, m

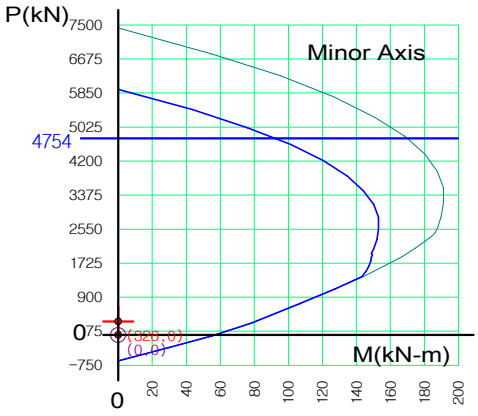


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4754.47 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	325.933	325.933
φPn (kN)	4452.98	0.00000
Pu / φPn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-59.334	0.00000
φMn (kN-m)	810.638	0.00000
Mc / φMn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 29.9758 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 212.421 + 213.282 = 425.703 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.070 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

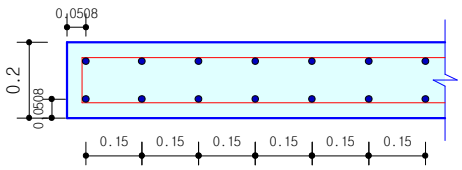
Wall ID : 907 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

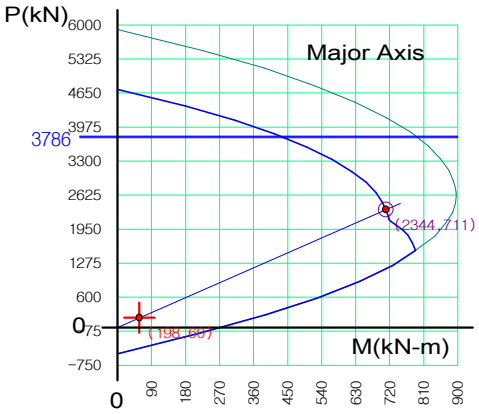
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

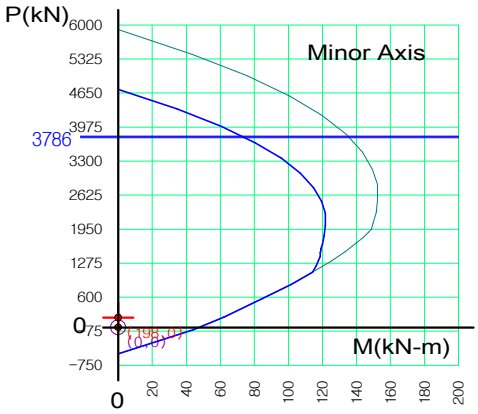


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	197.636	197.636
φPn (kN)	2343.94	0.00000
Pu / φPn	0.084 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-59.951	0.00000
φMn (kN-m)	711.017	0.00000
Mc / φMn	0.084 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 26.1412 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 108.858 + 169.457 = 278.315 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.094 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

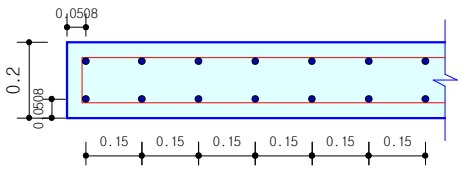
Wall ID : 908 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.73*0.2 m

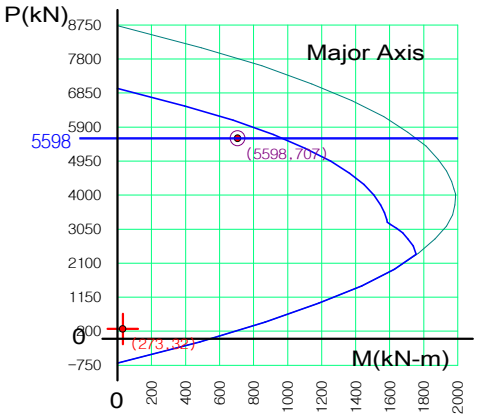
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

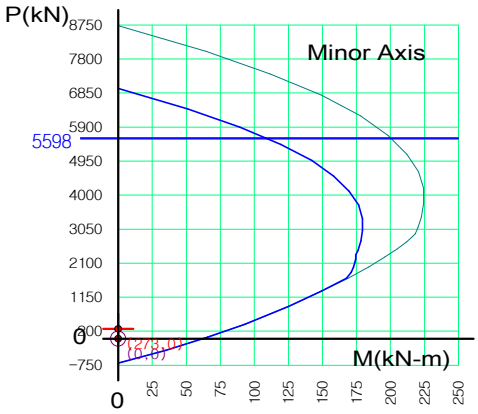


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5598.17 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	272.544	272.544
φPn (kN)	5598.17	0.00000
Pu / φPn	0.049 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-31.836	0.00000
φMn (kN-m)	706.755	0.00000
Mc / φMn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 22.1589 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 279.818 + 252.725 = 532.543 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.042 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

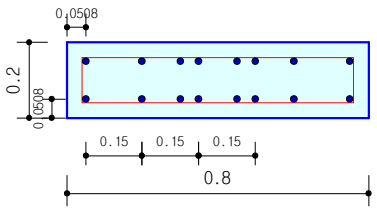
Wall ID : 909 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.8*0.2 m

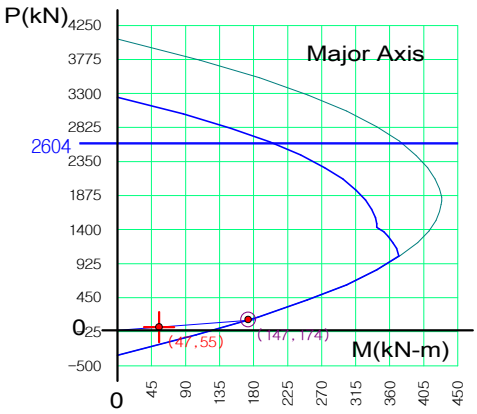
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

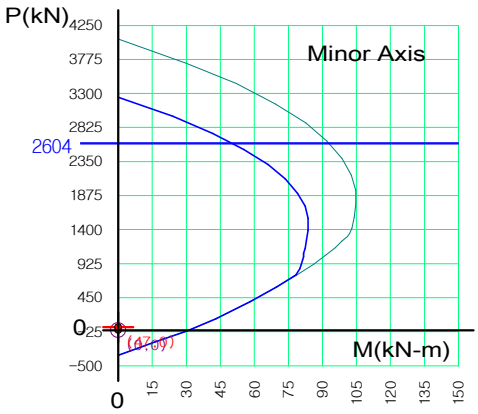


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2604.25 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	46.7461	46.7461
φPn (kN)	146.876	0.00000
Pu / φPn	0.318 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-55.360	0.00000
φMn (kN-m)	173.941	0.00000
Mc / φMn	0.318 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 31.0410 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 61.4144 + 116.867 = 178.281 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.174 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

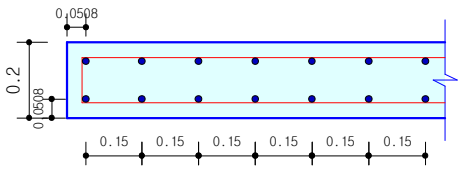
Wall ID : 910 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

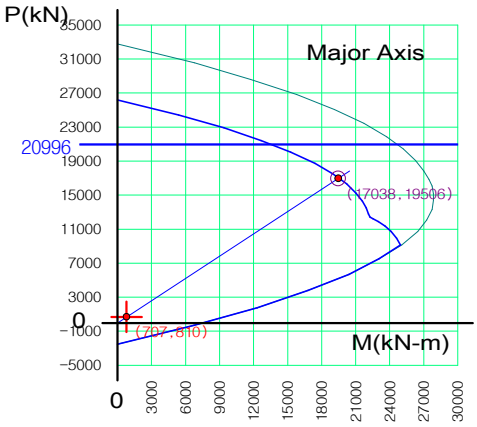
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

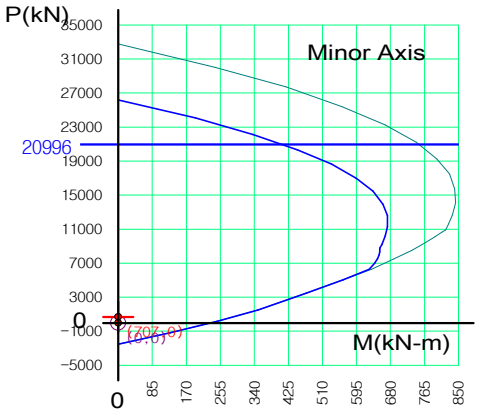


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	707.433	707.433
φPn (kN)	17038.1	0.00000
Pu / φPn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-809.89	0.00000
φMn (kN-m)	19505.8	0.00000
Mc / φMn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 238.694 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1319.80 + 949.545 = 2269.34 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.105 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

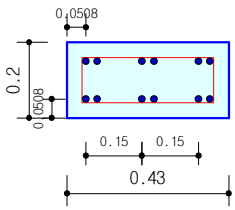
Wall ID : 911 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

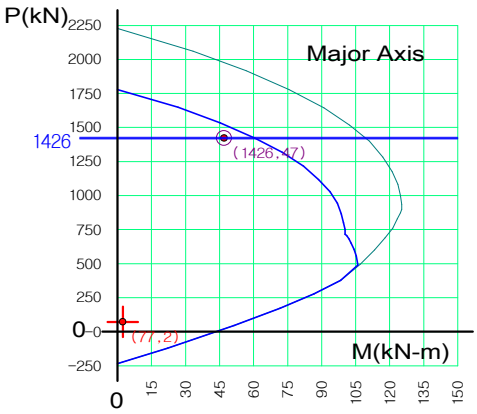
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

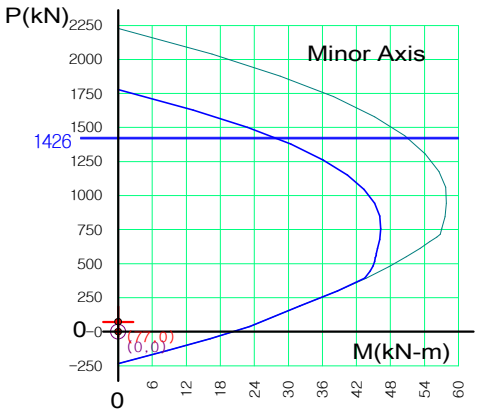


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1426.43 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	77.0569	77.0569
φPn (kN)	1426.43	0.00000
Pu / φPn	0.054 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-2.3903	0.00000
φMn (kN-m)	47.2444	0.00000
Mc / φMn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 2.42045 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 22.9241 + 62.8161 = 85.7401 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.028 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

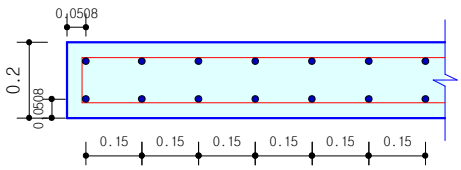
Wall ID : 912 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.16*0.2 m

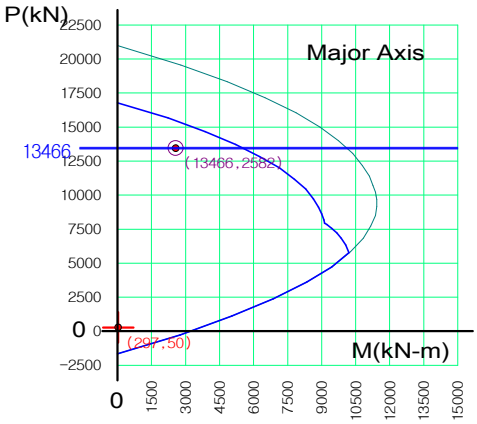
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

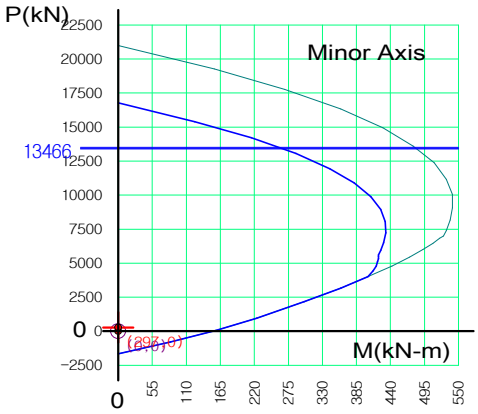


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 13466.5 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	297.242	297.242
φPn (kN)	13466.5	0.00000
Pu / φPn	0.022 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	49.6098	0.00000
φMn (kN-m)	2582.47	0.00000
Mc / φMn	0.019 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 36.7310 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 819.788 + 607.709 = 1427.50 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.026 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

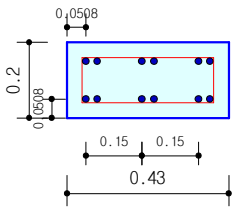
Wall ID : 913 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

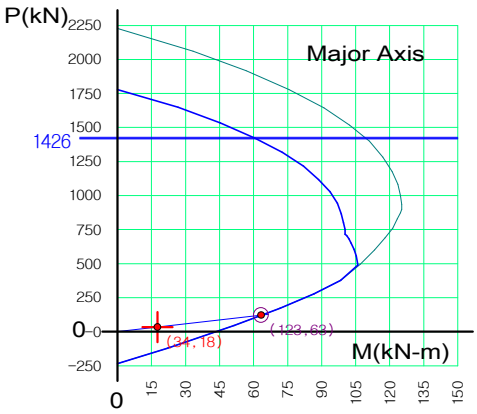
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

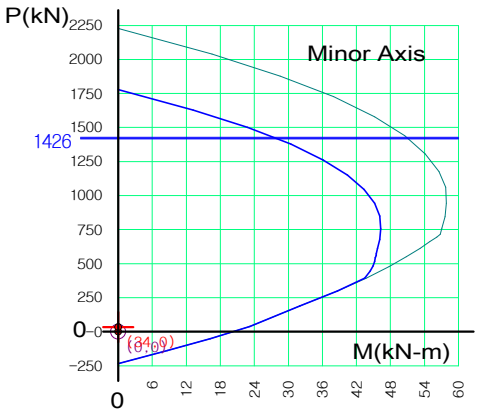


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1426.43 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	34.3120	34.3120
φPn (kN)	122.898	0.00000
Pu / φPn	0.279 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-17.686	0.00000
φMn (kN-m)	63.3486	0.00000
Mc / φMn	0.279 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 10.3832 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 24.0600 + 62.8161 = 86.8760 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.120 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

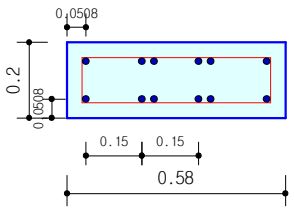
Wall ID : 914 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.58*0.2 m

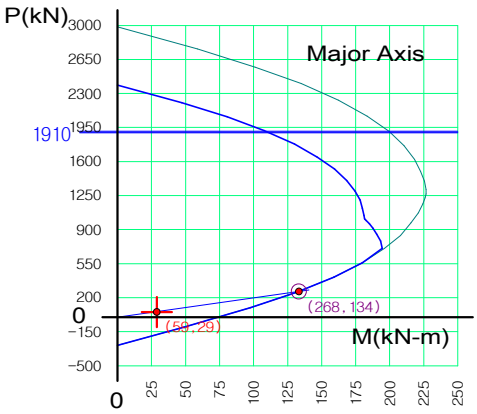
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

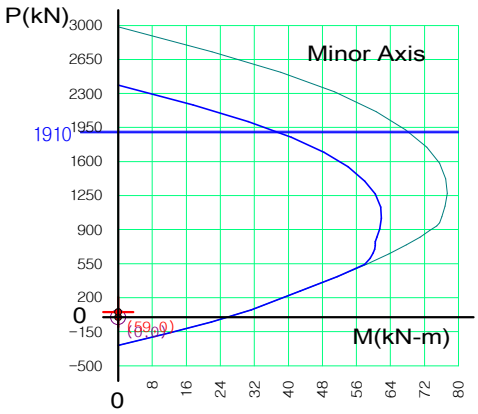


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1910.43 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	58.7629	58.7629
φPn (kN)	267.809	0.00000
Pu / φPn	0.219 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	29.3078	0.00000
φMn (kN-m)	133.569	0.00000
Mc / φMn	0.219 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 16.8954 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 38.1478 + 84.7286 = 122.876 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.137 < 1.000 ..... O.K

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

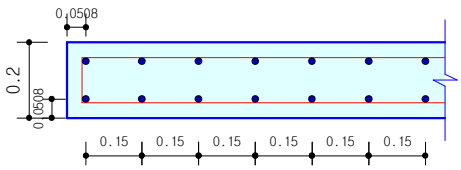
Wall ID : 915 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

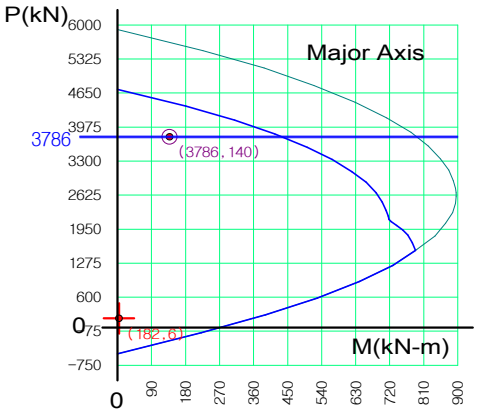
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

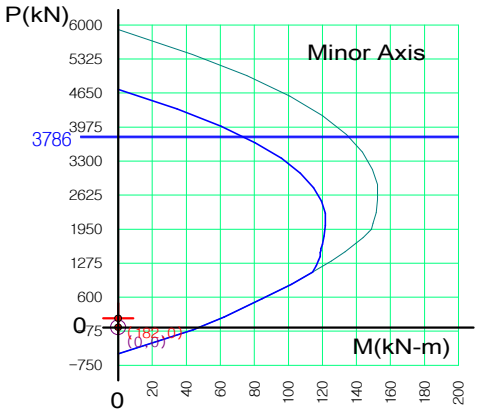


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	181.893	181.893
φPn (kN)	3786.48	0.00000
Pu / φPn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.6807	0.00000
φMn (kN-m)	139.752	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 5.00062 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 122.964 + 169.457 = 292.421 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.017 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

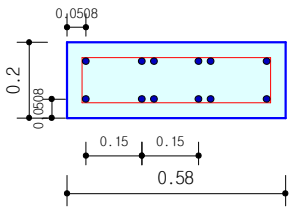
Wall ID : 916 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.58*0.2 m

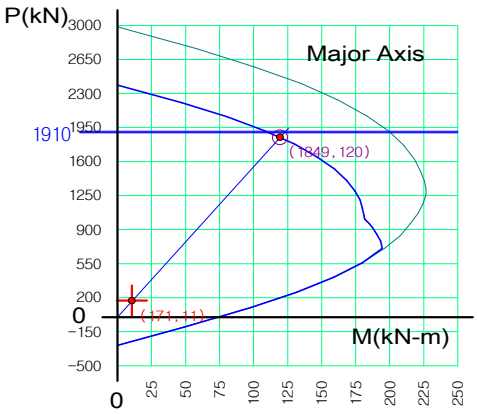
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

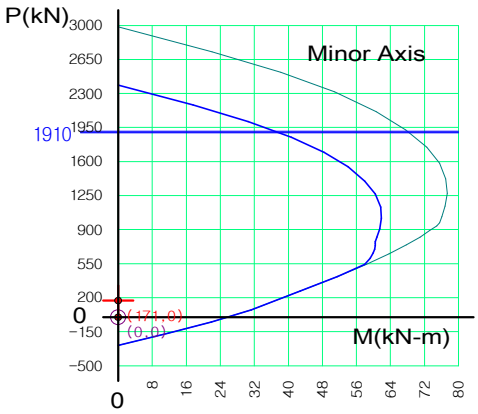


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1910.43 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	171.453	171.453
φPn (kN)	1849.19	0.00000
Pu / φPn	0.093 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	11.1080	0.00000
φMn (kN-m)	119.804	0.00000
Mc / φMn	0.093 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.67388 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 39.6221 + 84.7286 = 124.351 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.062 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

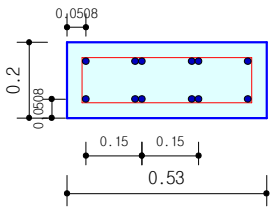
Wall ID : 917 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

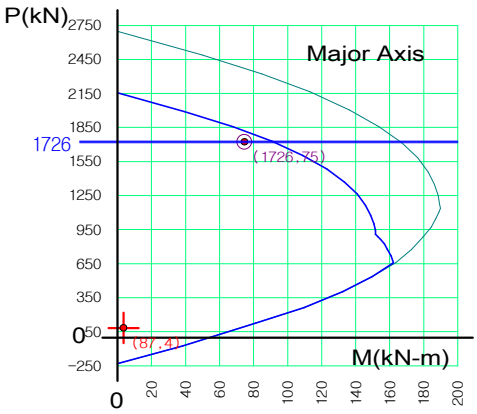
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

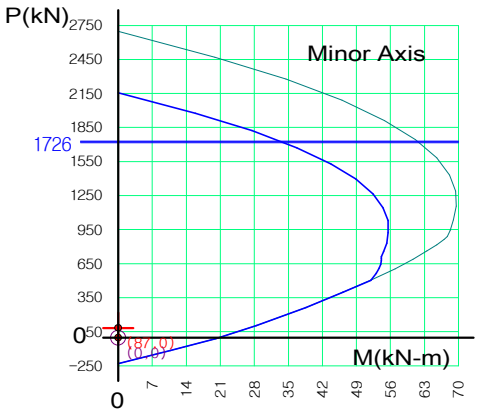


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1726.17 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	87.2995	87.2995
φPn (kN)	1726.17	0.00000
Pu / φPn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.5869	0.00000
φMn (kN-m)	74.8733	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 1.98833 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 33.9152 + 77.4244 = 111.340 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.018 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

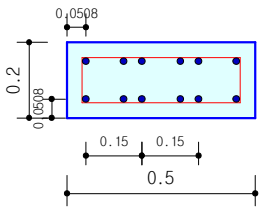
Wall ID : 918 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.5*0.2 m

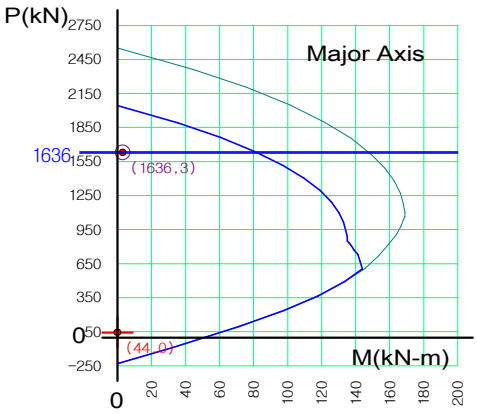
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

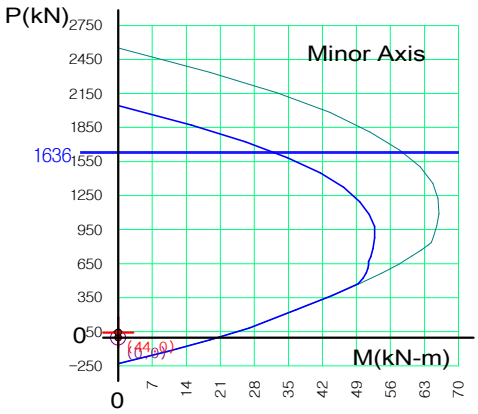


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1636.25 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	43.9350	43.9350
φPn (kN)	1636.25	0.00000
Pu / φPn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.0693	0.00000
φMn (kN-m)	3.20387	0.00000
Mc / φMn	0.022 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.16639 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 28.4191 + 73.0419 = 101.461 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.002 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

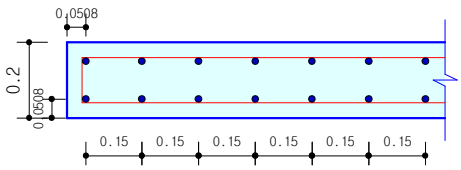
Wall ID : 919 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

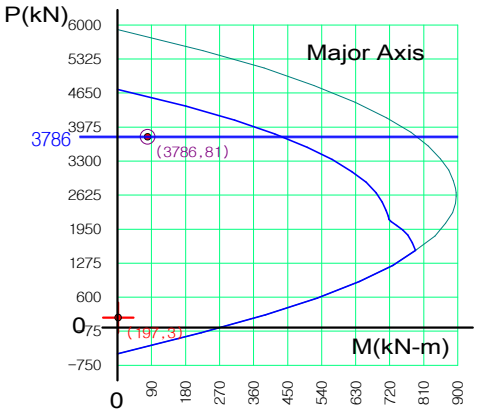
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

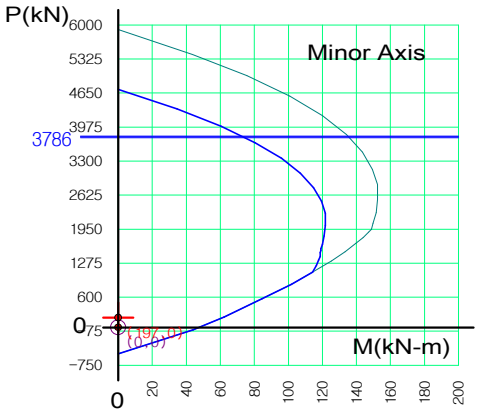


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	196.792	196.792
φPn (kN)	3786.48	0.00000
Pu / φPn	0.052 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-3.4947	0.00000
φMn (kN-m)	81.3807	0.00000
Mc / φMn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.74628 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 108.090 + 169.457 = 277.547 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

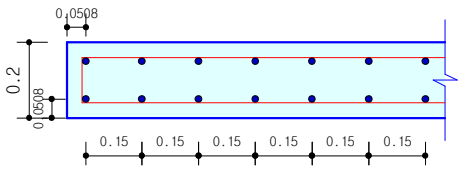
Wall ID : 920 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

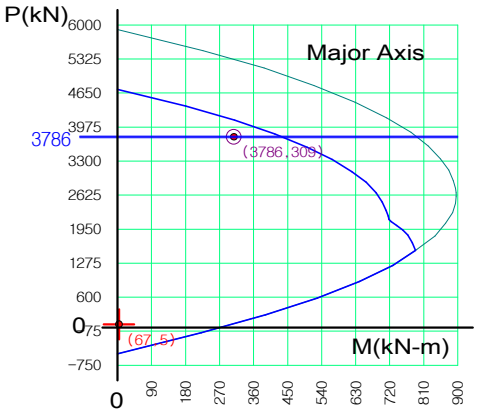
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

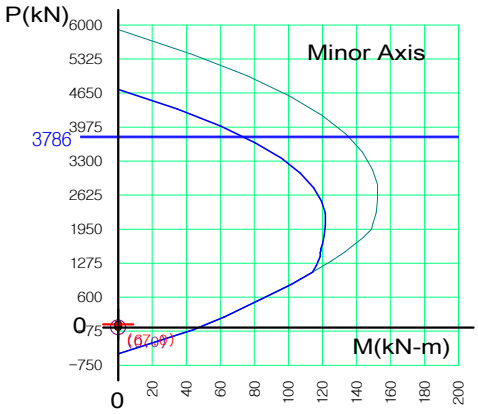


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	66.5688	66.5688
φPn (kN)	3786.48	0.00000
Pu / φPn	0.018 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	4.99910	0.00000
φMn (kN-m)	309.353	0.00000
Mc / φMn	0.016 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.70267 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 114.220 + 169.457 = 283.678 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.017 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 921 (Wall Mark : 3~RW2)

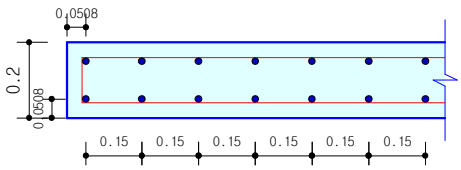
Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

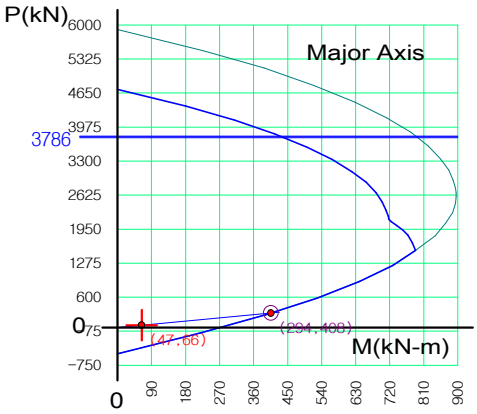
Unit System : kN, m

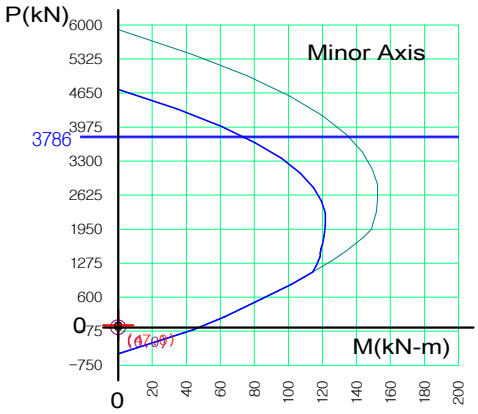


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	47.4471	47.4471
φPn (kN)	293.817	0.00000
Pu / φPn	0.161 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-65.828	0.00000
φMn (kN-m)	407.639	0.00000
Mc / φMn	0.161 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 33.3175 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 108.784 + 169.457 = 278.241 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.120 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

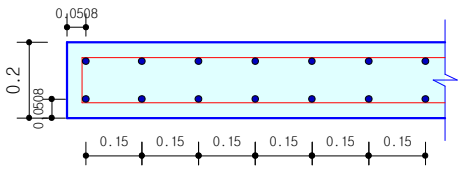
Wall ID : 922 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

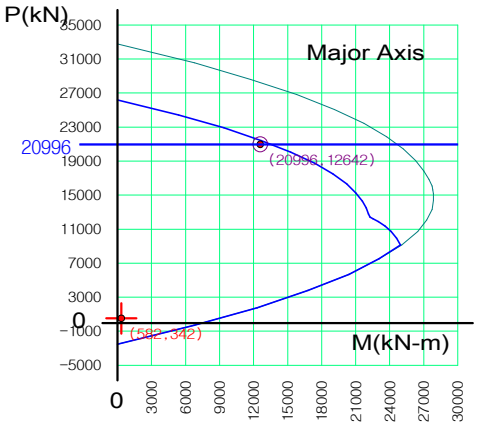
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

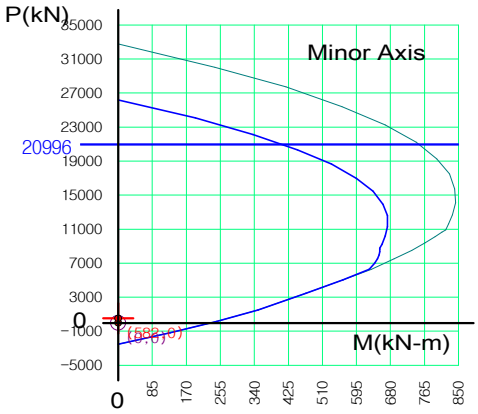


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	581.668	581.668
φPn (kN)	20996.2	0.00000
Pu / φPn	0.028 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	342.243	0.00000
φMn (kN-m)	12642.0	0.00000
Mc / φMn	0.027 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 65.4753 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1299.67 + 949.545 = 2249.22 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.029 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

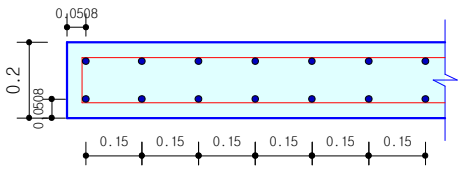
Wall ID : 923 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

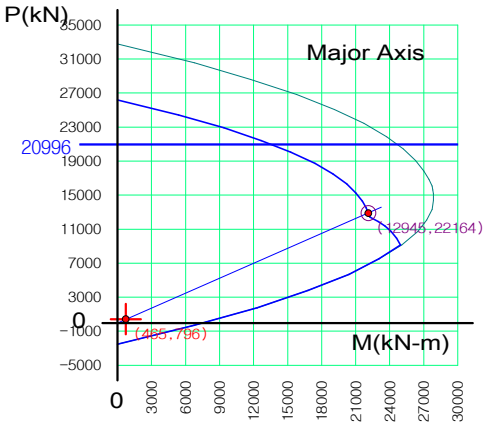
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

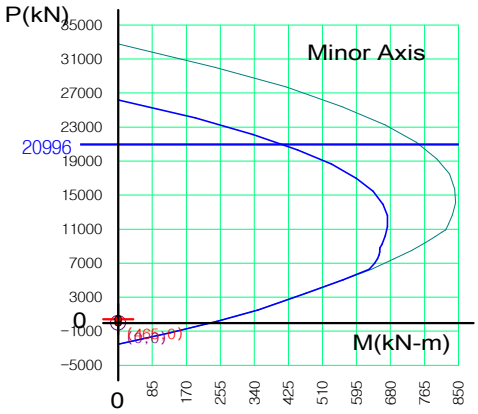


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	464.628	464.628
φPn (kN)	12945.4	0.00000
Pu / φPn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-795.51	0.00000
φMn (kN-m)	22164.5	0.00000
Mc / φMn	0.036 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 323.828 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1280.95 + 949.545 = 2230.49 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.145 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

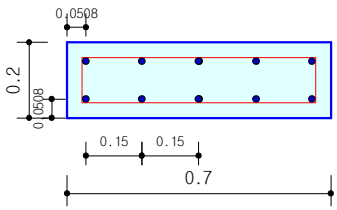
Wall ID : 924 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.7*0.2 m

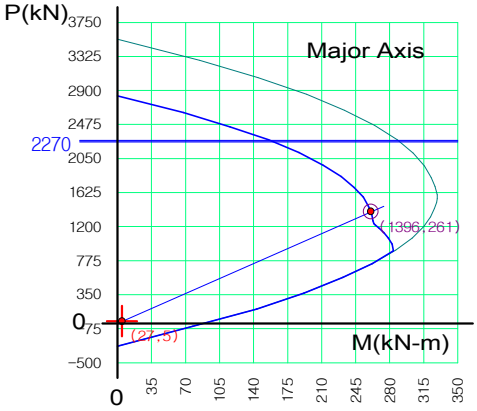
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

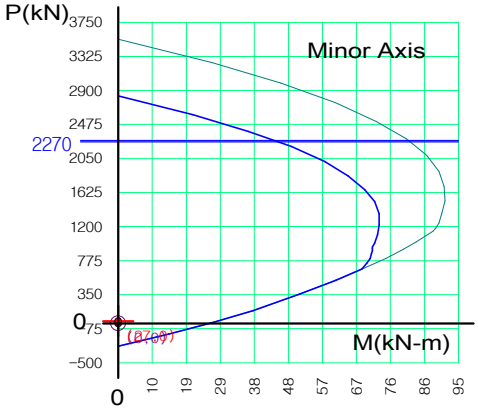


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2270.12 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	27.3283	27.3283
φPn (kN)	1395.59	0.00000
Pu / φPn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-5.1053	0.00000
φMn (kN-m)	260.717	0.00000
Mc / φMn	0.020 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 2.90573 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 48.6528 + 102.259 = 150.911 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

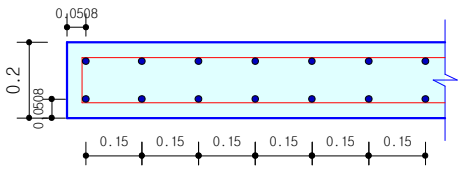
Wall ID : 925 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 8.875*0.2 m

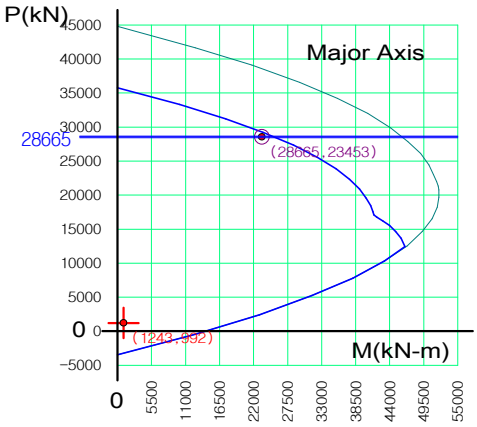
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

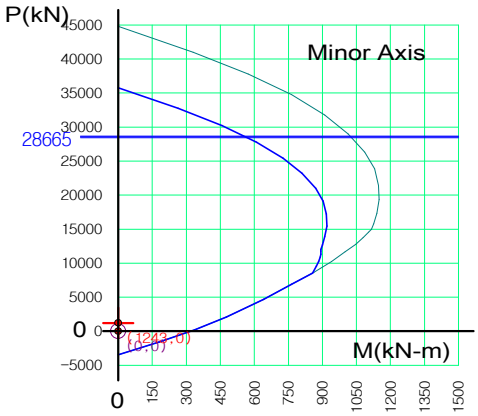


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 28665.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1242.74	1242.74
φPn (kN)	28665.3	0.00000
Pu / φPn	0.043 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-992.35	0.00000
φMn (kN-m)	23452.9	0.00000
Mc / φMn	0.042 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 186.228 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1846.32 + 1296.49 = 3142.82 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.059 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 926 (Wall Mark : 3~RW2)

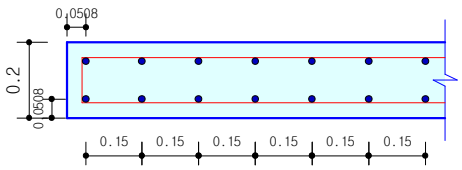
Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.375*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

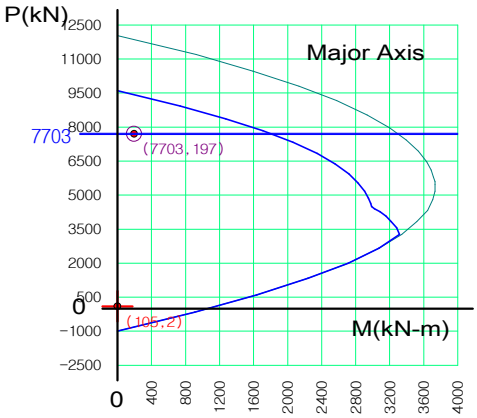
Unit System : kN, m

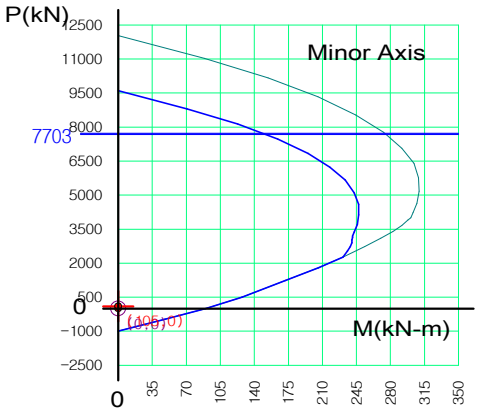


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7703.43 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	105.491	105.491
φPn (kN)	7703.43	0.00000
Pu / φPn	0.014 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-2.2034	0.00000
φMn (kN-m)	197.412	0.00000
Mc / φMn	0.011 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 9.33191 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 250.017 + 346.949 = 596.966 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.016 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

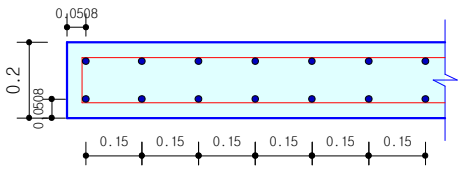
Wall ID : 927 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

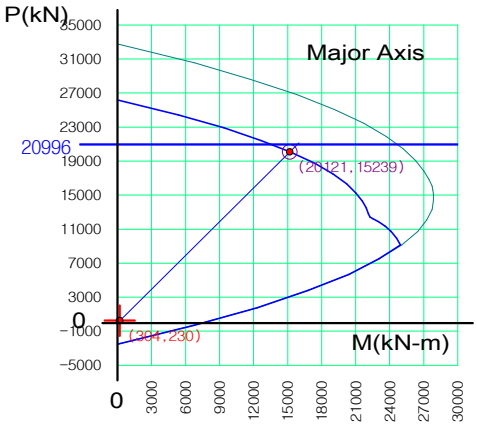
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

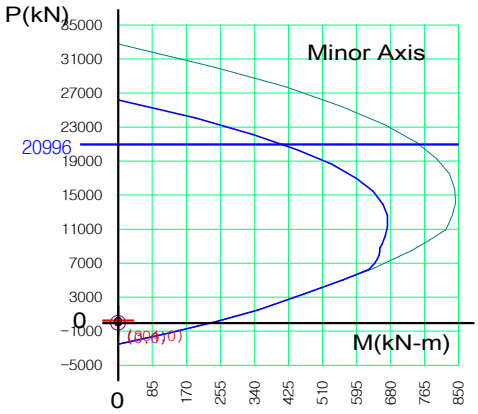


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	303.795	303.795
φPn (kN)	20121.5	0.00000
Pu / φPn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-230.08	0.00000
φMn (kN-m)	15239.0	0.00000
Mc / φMn	0.015 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 40.5964 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1237.72 + 949.545 = 2187.27 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.019 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

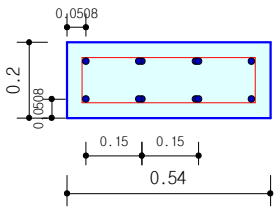
Wall ID : 928 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.54*0.2 m

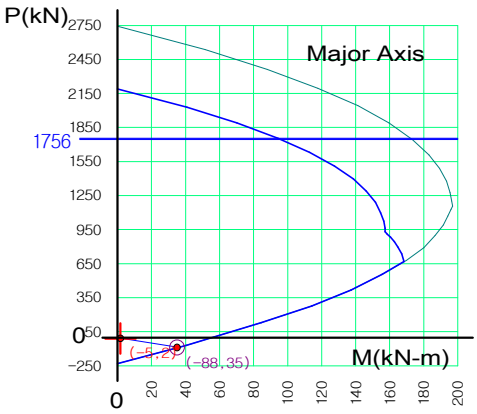
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

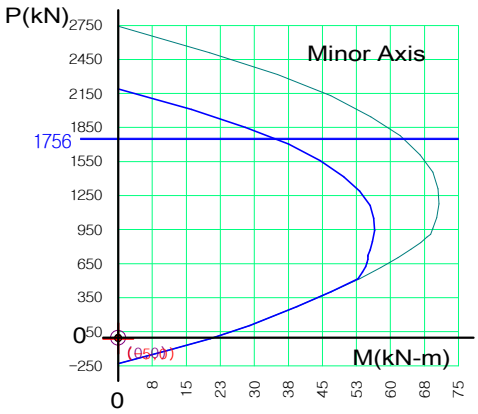


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1756.15 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-4.5082	-4.5082
φPn (kN)	-88.419	0.00000
Pu / φPn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.79878	0.00000
φMn (kN-m)	35.2789	0.00000
Mc / φMn	0.051 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.18440 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 31.2806 + 78.8853 = 110.166 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.011 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

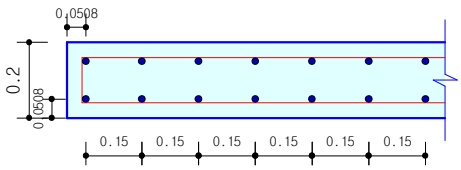
Wall ID : 929 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

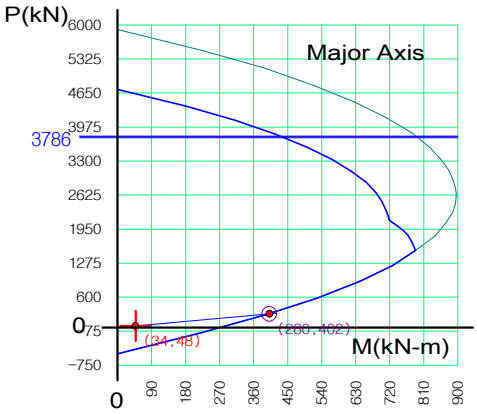
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

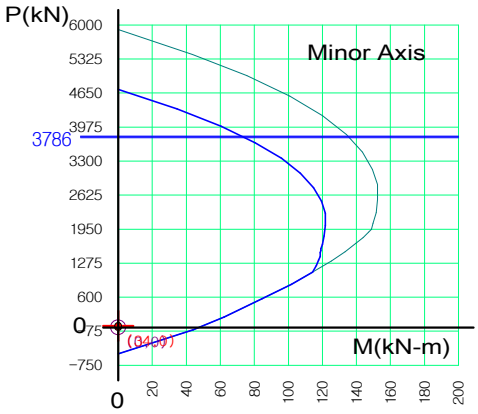


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	33.7714	33.7714
φPn (kN)	280.175	0.00000
Pu / φPn	0.121 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-48.470	0.00000
φMn (kN-m)	402.117	0.00000
Mc / φMn	0.121 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 27.4339 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 119.368 + 169.457 = 288.825 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.095 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

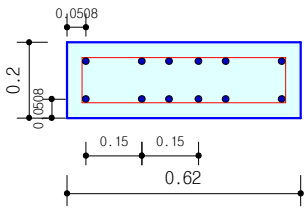
Wall ID : 930 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.62*0.2 m

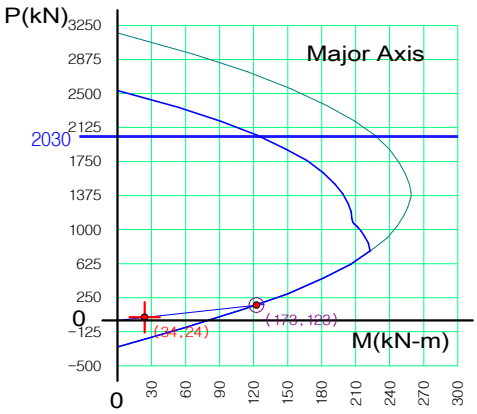
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

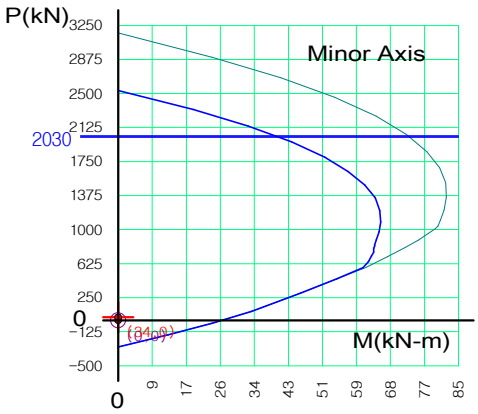


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2030.33 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	33.8986	33.8986
φPn (kN)	173.242	0.00000
Pu / φPn	0.196 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-24.043	0.00000
φMn (kN-m)	122.876	0.00000
Mc / φMn	0.196 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 13.9378 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 40.9792 + 90.5720 = 131.551 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.106 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 931 (Wall Mark : 3~RW2)

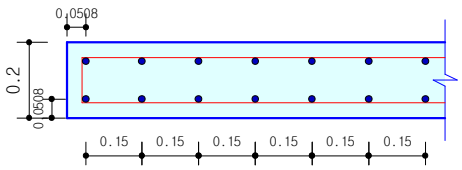
Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

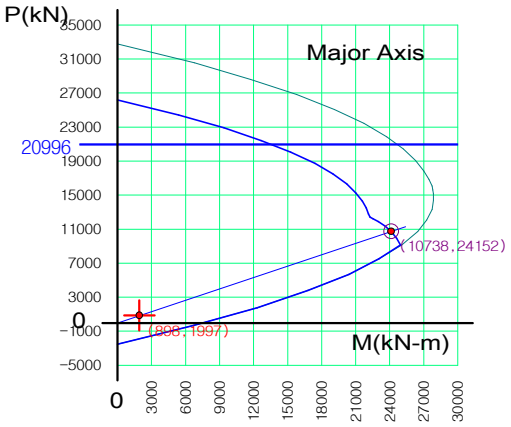
Unit System : kN, m

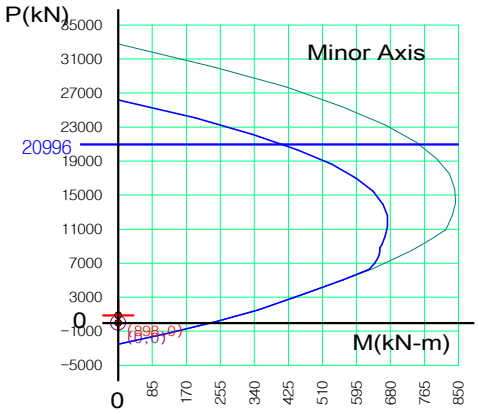


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	897.754	897.754
φPn (kN)	10738.2	0.00000
Pu / φPn	0.084 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1997.20	0.00000
φMn (kN-m)	24152.4	0.00000
Mc / φMn	0.083 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 705.357 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1350.25 + 949.545 = 2299.79 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.307 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

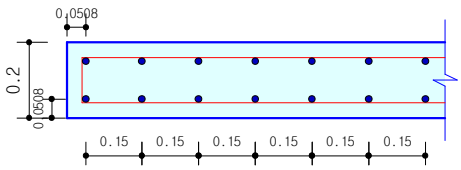
Wall ID : 932 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.2*0.2 m

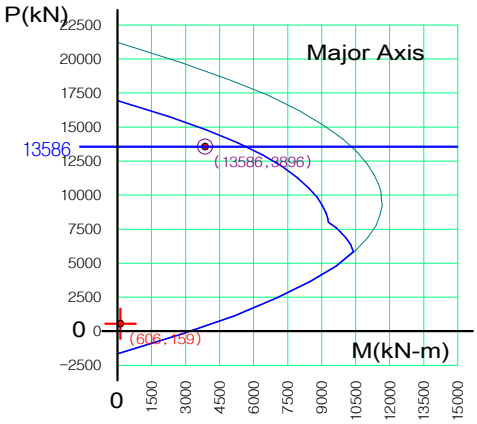
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

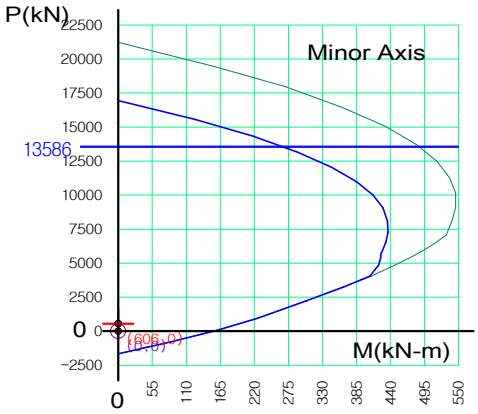


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 13586.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	605.662	605.662
φPn (kN)	13586.4	0.00000
Pu / φPn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	158.805	0.00000
φMn (kN-m)	3895.90	0.00000
Mc / φMn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 73.2095 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 876.560 + 613.552 = 1490.11 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.049 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 933 (Wall Mark : 3~RW2)

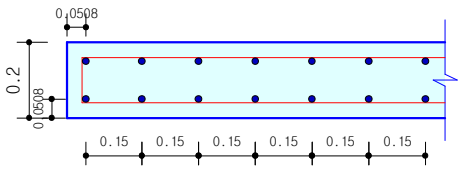
Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.73*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

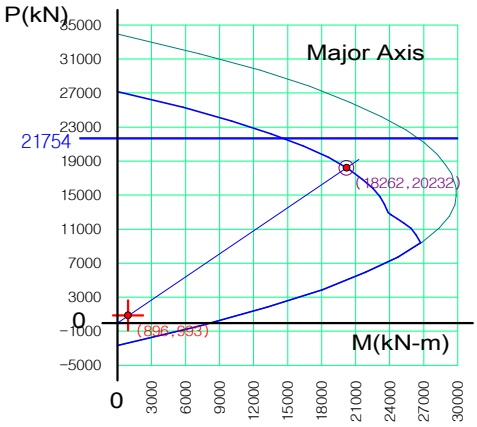
Unit System : kN, m

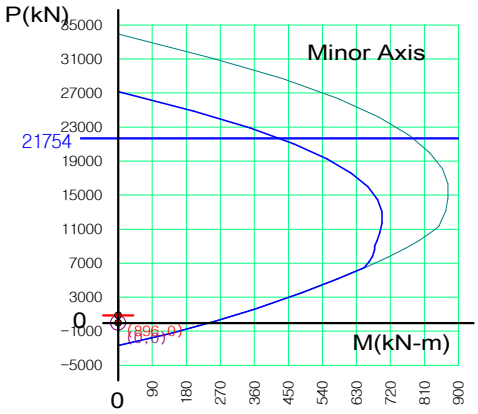


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 21754.4 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	896.317	896.317
φPn (kN)	18261.5	0.00000
Pu / φPn	0.049 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	993.033	0.00000
φMn (kN-m)	20232.0	0.00000
Mc / φMn	0.049 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 419.176 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 1392.71 + 983.144 = 2375.86 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.176 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

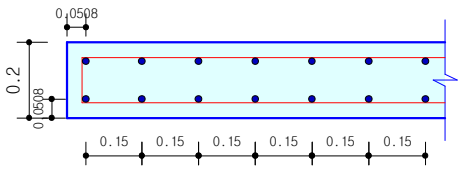
Wall ID : 934 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.97*0.2 m

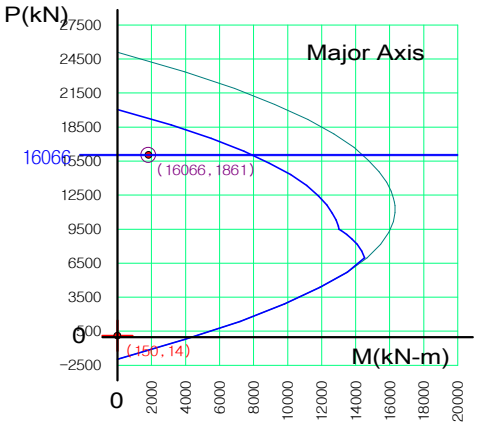
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

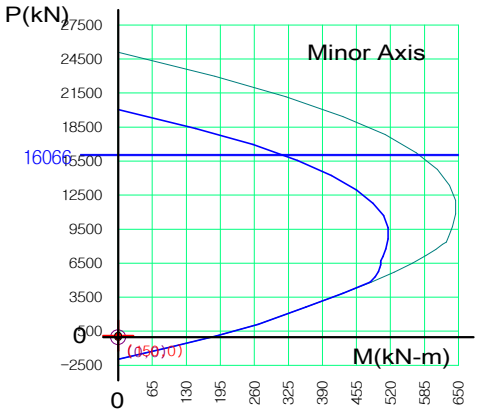


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 16066.3 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	149.665	149.665
φPn (kN)	16066.3	0.00000
Pu / φPn	0.009 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-14.448	0.00000
φMn (kN-m)	1861.25	0.00000
Mc / φMn	0.008 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 15.5532 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 946.537 + 726.037 = 1672.57 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.009 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

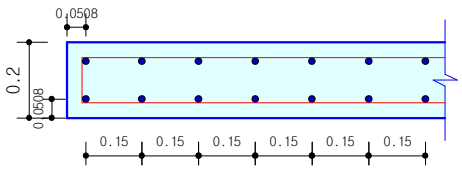
Wall ID : 935 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.54*0.2 m

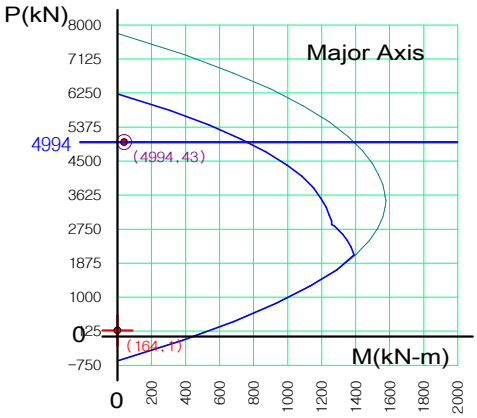
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

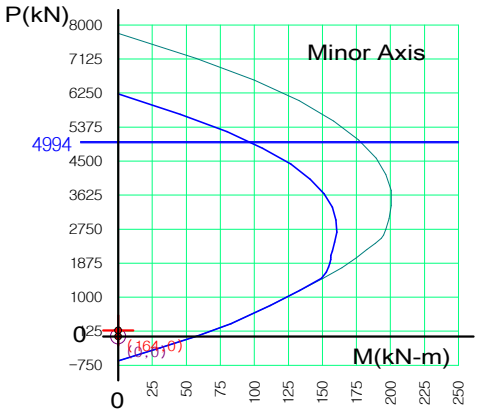


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4994.27 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	163.706	163.706
φPn (kN)	4994.27	0.00000
Pu / φPn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	1.14840	0.00000
φMn (kN-m)	43.3700	0.00000
Mc / φMn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.07519 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 138.393 + 224.969 = 363.362 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.008 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

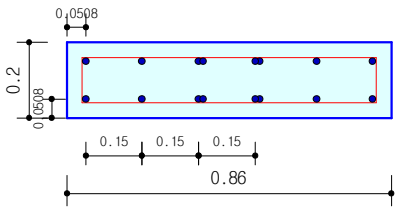
Wall ID : 936 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.86*0.2 m

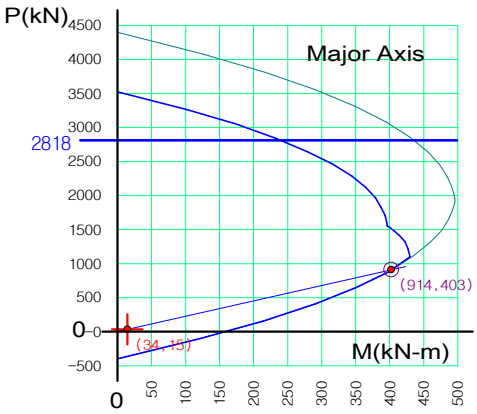
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

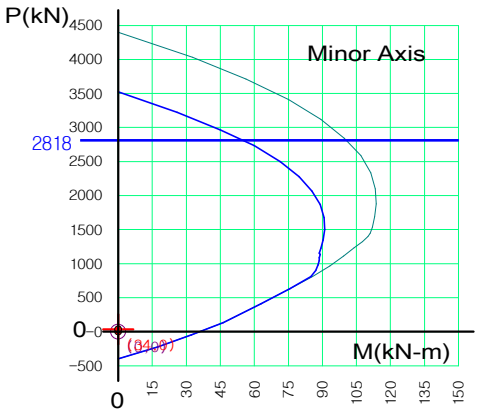


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2818.48 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	34.1049	34.1049
φPn (kN)	914.210	0.00000
Pu / φPn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	15.2028	0.00000
φMn (kN-m)	402.946	0.00000
Mc / φMn	0.038 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 6.42618 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 56.4982 + 125.632 = 182.130 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.035 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

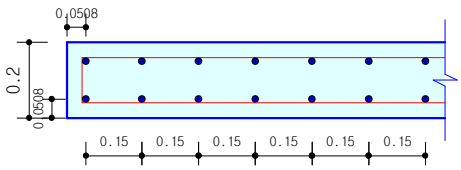
Wall ID : 937 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

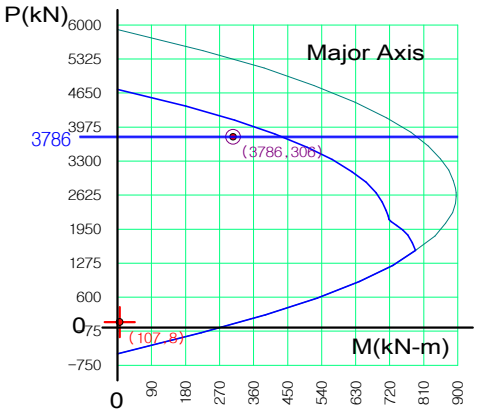
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

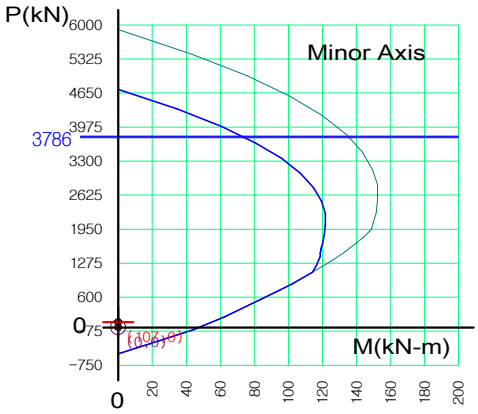


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	107.213	107.213
φPn (kN)	3786.48	0.00000
Pu / φPn	0.028 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-7.9547	0.00000
φMn (kN-m)	306.156	0.00000
Mc / φMn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 4.23874 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 120.964 + 169.457 = 290.421 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.015 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

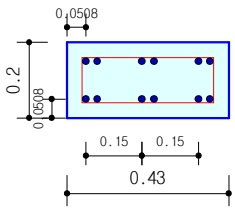
Wall ID : 938 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.43*0.2 m

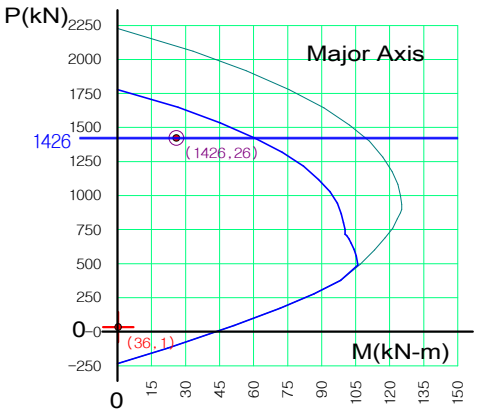
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

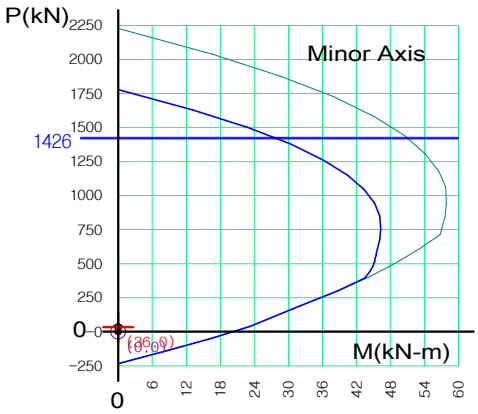


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1426.43 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	36.3046	36.3046
φPn (kN)	1426.43	0.00000
Pu / φPn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.5711	0.00000
φMn (kN-m)	26.0150	0.00000
Mc / φMn	0.022 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.29853 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 22.9375 + 62.8161 = 85.7535 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

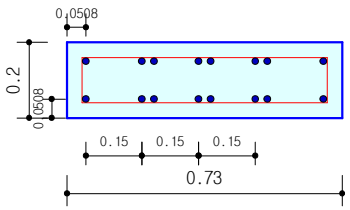
Wall ID : 939 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.73*0.2 m

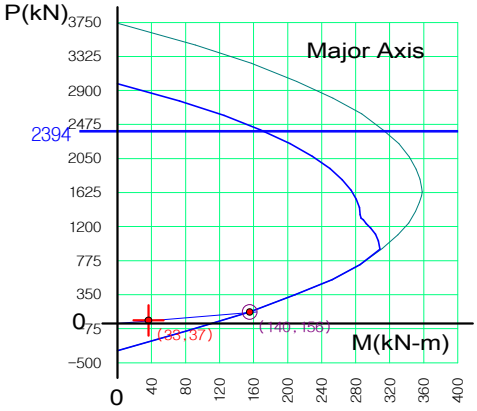
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

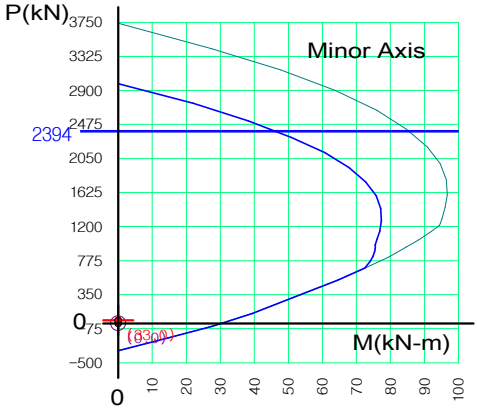


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2394.43 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	33.1513	33.1513
φPn (kN)	140.253	0.00000
Pu / φPn	0.236 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-36.770	0.00000
φMn (kN-m)	155.563	0.00000
Mc / φMn	0.236 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 20.7957 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 52.2460 + 106.641 = 158.887 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.131 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

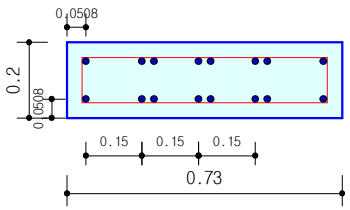
Wall ID : 940 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.73*0.2 m

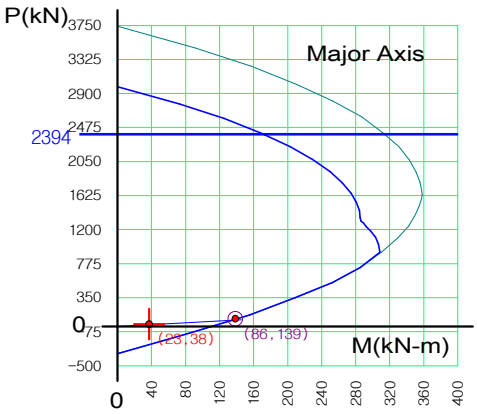
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

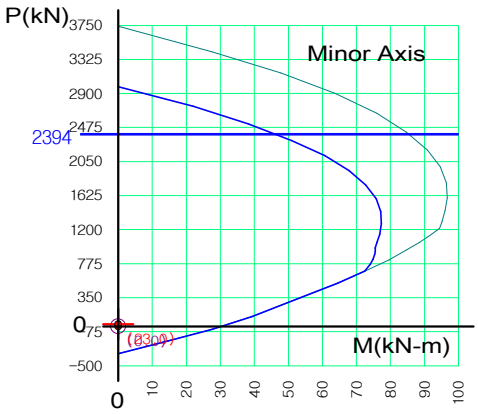


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2394.43 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	23.4788	23.4788
φPn (kN)	85.6724	0.00000
Pu / φPn	0.274 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-38.057	0.00000
φMn (kN-m)	138.869	0.00000
Mc / φMn	0.274 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 22.0303 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 52.4099 + 106.641 = 159.051 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.139 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

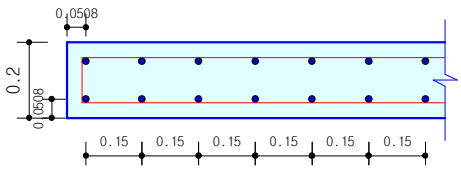
Wall ID : 941 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.68*0.2 m

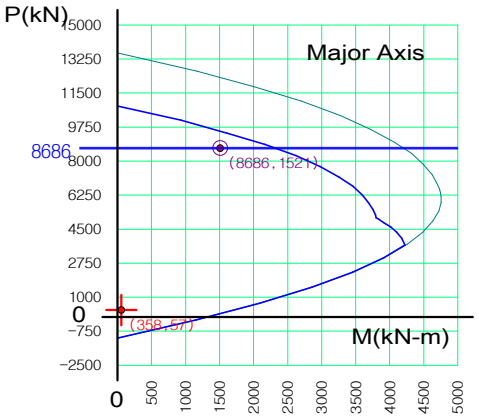
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

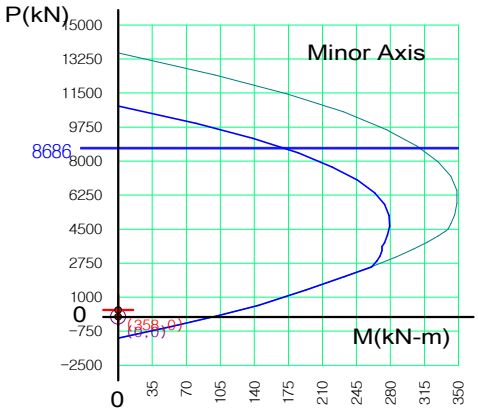


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 8686.41 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	358.003	358.003
φPn (kN)	8686.41	0.00000
Pu / φPn	0.041 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	56.9259	0.00000
φMn (kN-m)	1520.63	0.00000
Mc / φMn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 28.6966 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 309.126 + 391.505 = 700.631 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.041 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

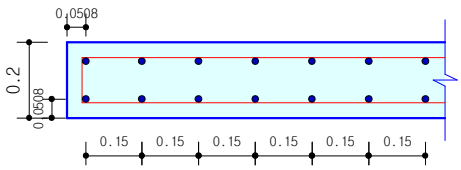
Wall ID : 942 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.57*0.2 m

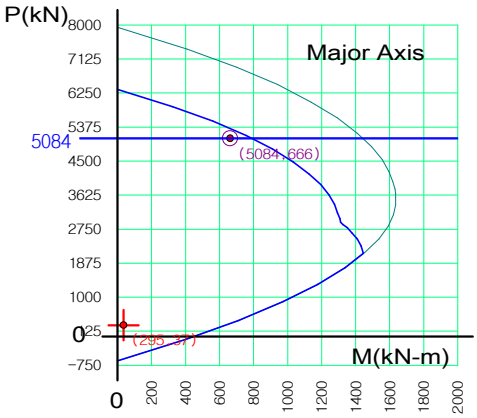
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

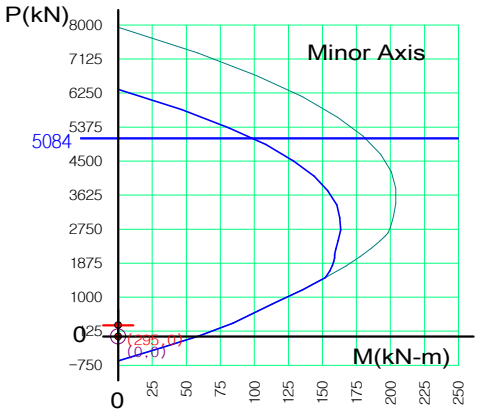


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 5084.19 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	295.235	295.235
φPn (kN)	5084.19	0.00000
Pu / φPn	0.058 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	36.8339	0.00000
φMn (kN-m)	666.143	0.00000
Mc / φMn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 26.5445 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 168.781 + 229.352 = 398.133 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.067 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

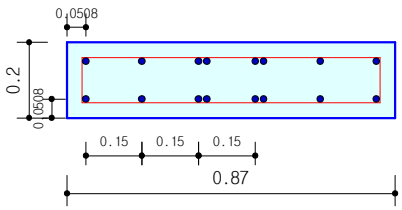
Wall ID : 943 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.87*0.2 m

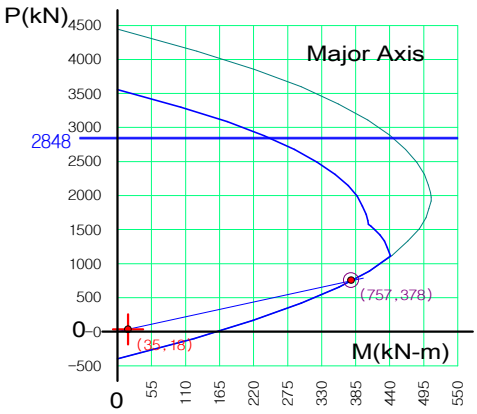
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

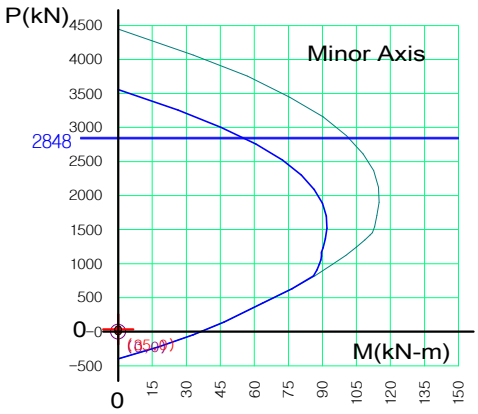


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2848.45 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	35.2515	35.2515
φPn (kN)	757.189	0.00000
Pu / φPn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-17.601	0.00000
φMn (kN-m)	378.058	0.00000
Mc / φMn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 9.90457 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 70.0424 + 127.093 = 197.135 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.050 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 944 (Wall Mark : 3~RW2)

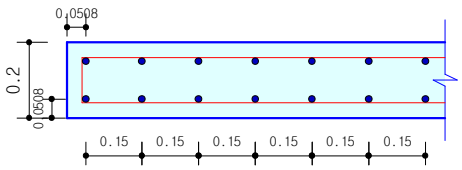
Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.38*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

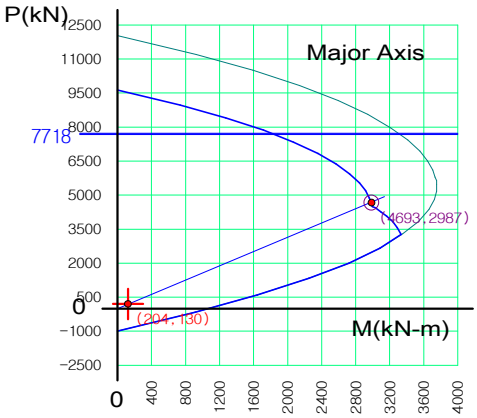
Unit System : kN, m

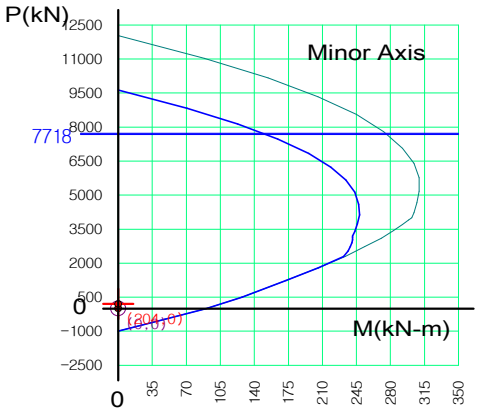


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7718.42 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	204.406	204.406
φPn (kN)	4692.95	0.00000
Pu / φPn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	130.099	0.00000
φMn (kN-m)	2986.95	0.00000
Mc / φMn	0.044 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 34.6827 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 252.855 + 347.680 = 600.534 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.058 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

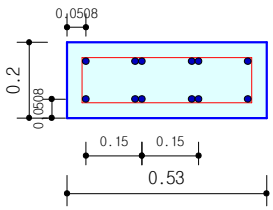
Wall ID : 945 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

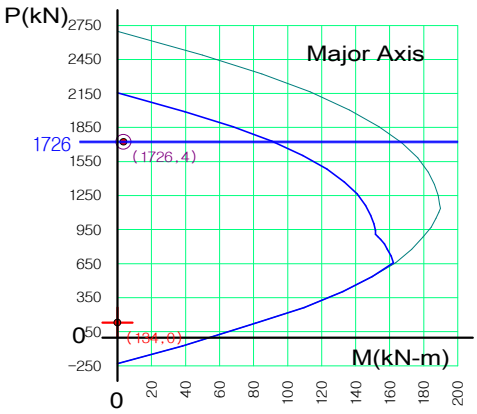
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

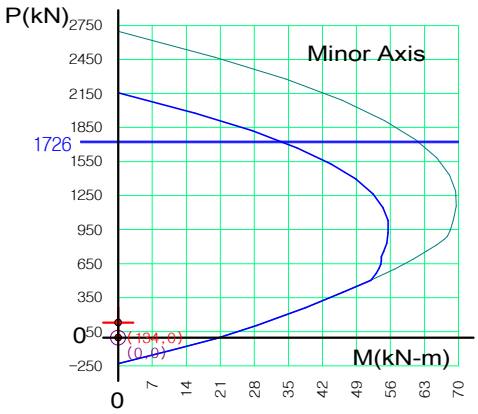


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1726.17 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	133.956	133.956
φPn (kN)	1726.17	0.00000
Pu / φPn	0.078 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.2253	0.00000
φMn (kN-m)	3.60501	0.00000
Mc / φMn	0.063 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 0.09164 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 30.5478 + 77.4244 = 107.972 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

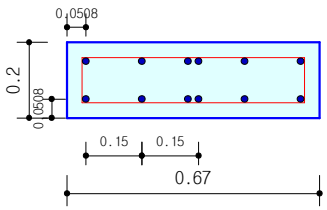
Wall ID : 946 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.67*0.2 m

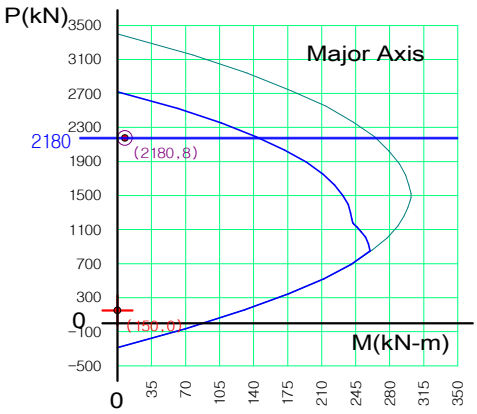
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

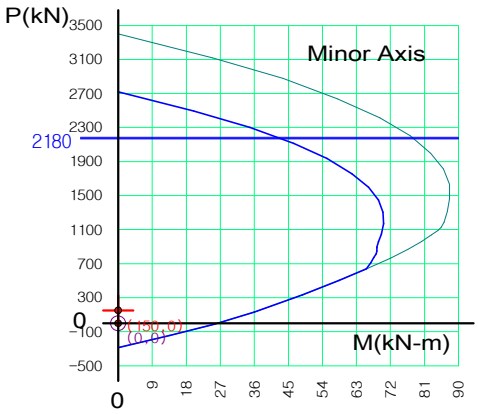


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2180.20 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	150.158	150.158
φPn (kN)	2180.20	0.00000
Pu / φPn	0.069 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-0.4540	0.00000
φMn (kN-m)	8.16107	0.00000
Mc / φMn	0.056 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.18407 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 42.6973 + 97.8762 = 140.573 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.001 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

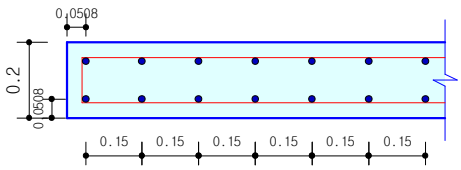
Wall ID : 947 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4.56*0.2 m

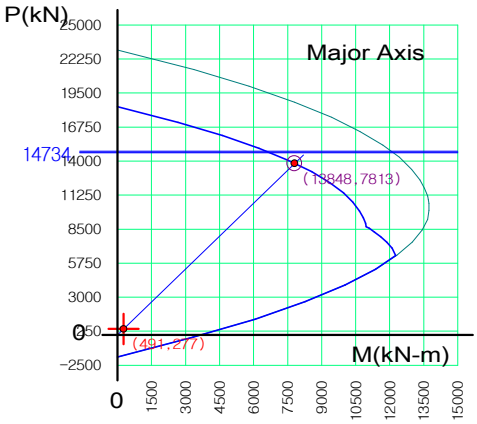
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

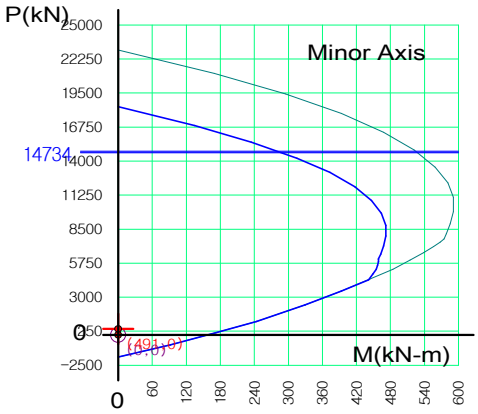


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 14734.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	491.331	491.331
φPn (kN)	13848.3	0.00000
Pu / φPn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	277.186	0.00000
φMn (kN-m)	7812.58	0.00000
Mc / φMn	0.035 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 148.511 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 892.632 + 666.142 = 1558.77 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.095 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

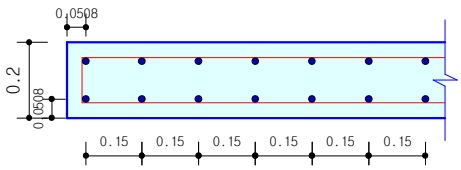
Wall ID : 948 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

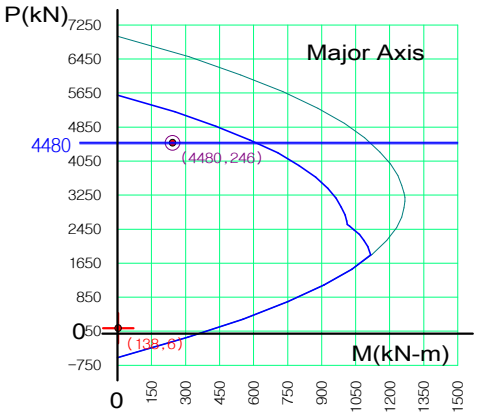
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

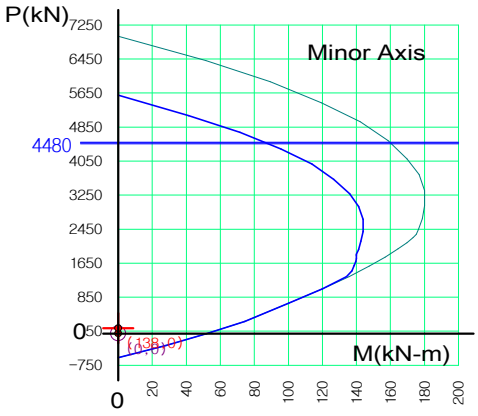


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4480.30 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	137.563	137.563
φPn (kN)	4480.30	0.00000
Pu / φPn	0.031 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	6.48301	0.00000
φMn (kN-m)	245.934	0.00000
Mc / φMn	0.026 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.99599 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 153.945 + 201.596 = 355.541 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.014 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

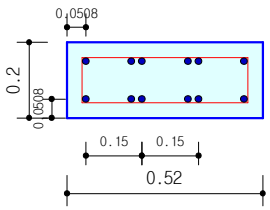
Wall ID : 949 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.52*0.2 m

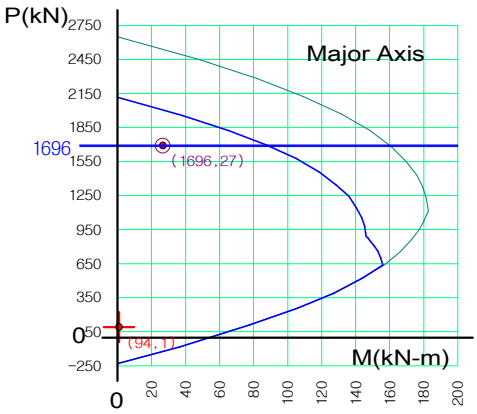
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

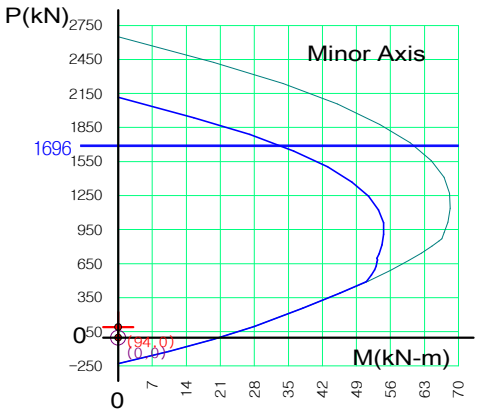


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1696.20 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	94.1760	94.1760
φPn (kN)	1696.20	0.00000
Pu / φPn	0.056 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.2678	0.00000
φMn (kN-m)	27.0348	0.00000
Mc / φMn	0.047 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.65644 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 32.0880 + 75.9636 = 108.052 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.006 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

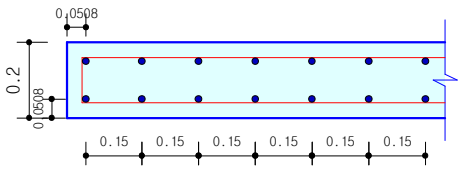
Wall ID : 950 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.38*0.2 m

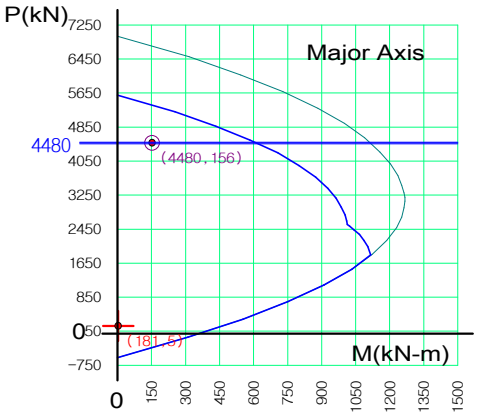
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

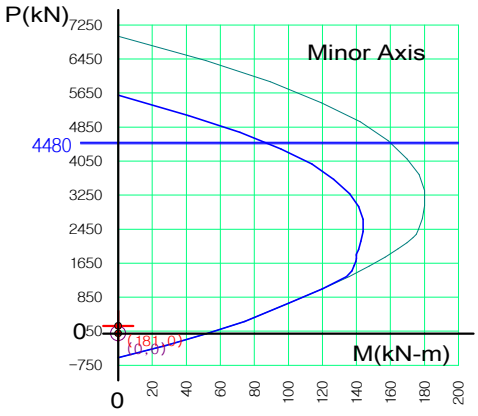


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4480.30 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	181.221	181.221
φPn (kN)	4480.30	0.00000
Pu / φPn	0.040 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	5.27174	0.00000
φMn (kN-m)	155.875	0.00000
Mc / φMn	0.034 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 3.01838 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 188.929 + 201.596 = 390.525 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.008 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

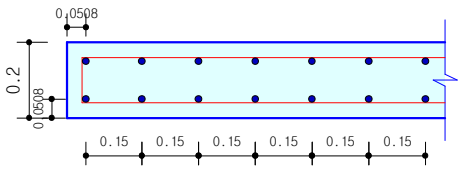
Wall ID : 951 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.26*0.2 m

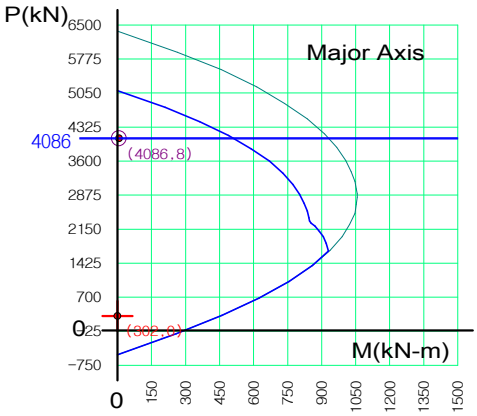
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

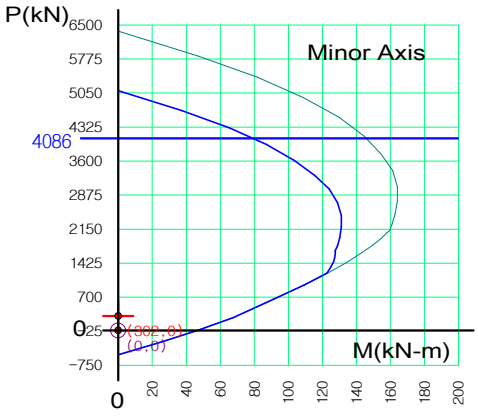


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4086.22 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	301.636	301.636
φPn (kN)	4086.22	0.00000
Pu / φPn	0.074 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.49156	0.00000
φMn (kN-m)	8.30077	0.00000
Mc / φMn	0.059 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.52618 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 105.426 + 184.066 = 289.492 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.026 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

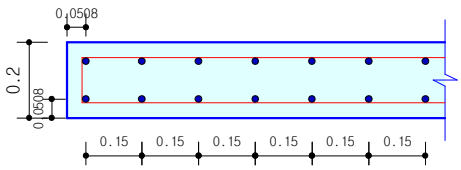
Wall ID : 952 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.16*0.2 m

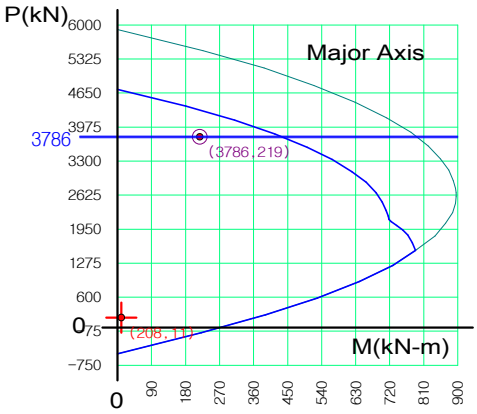
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

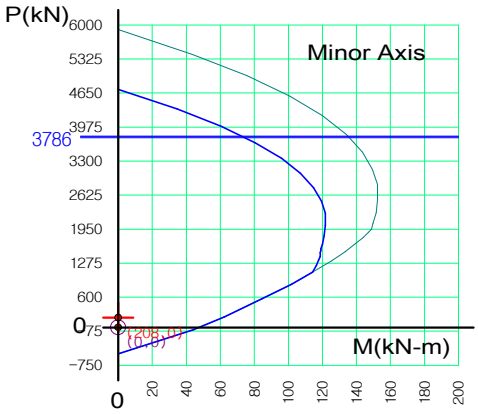


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3786.48 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	207.709	207.709
φPn (kN)	3786.48	0.00000
Pu / φPn	0.055 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	10.5439	0.00000
φMn (kN-m)	219.080	0.00000
Mc / φMn	0.048 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 11.2110 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 122.564 + 169.457 = 292.021 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.038 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

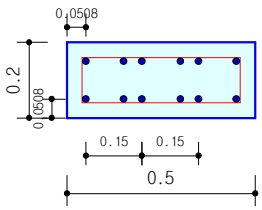
Wall ID : 953 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.5*0.2 m

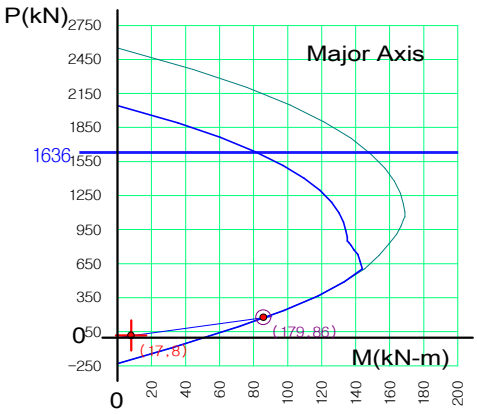
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

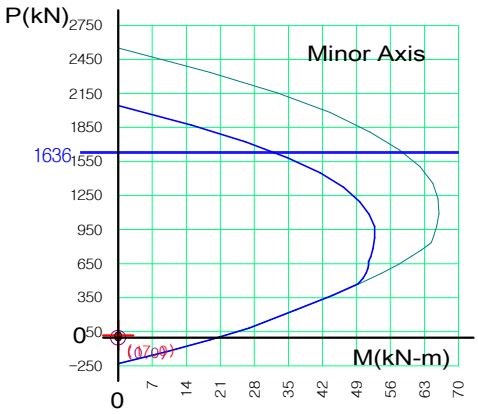


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1636.25 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	16.9718	16.9718
φPn (kN)	178.860	0.00000
Pu / φPn	0.095 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-8.1746	0.00000
φMn (kN-m)	86.1495	0.00000
Mc / φMn	0.095 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 4.76058 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 28.9847 + 73.0419 = 102.027 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.047 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

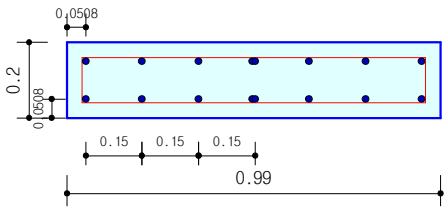
Wall ID : 954 (Wall Mark : wM0954)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.99*0.2 m

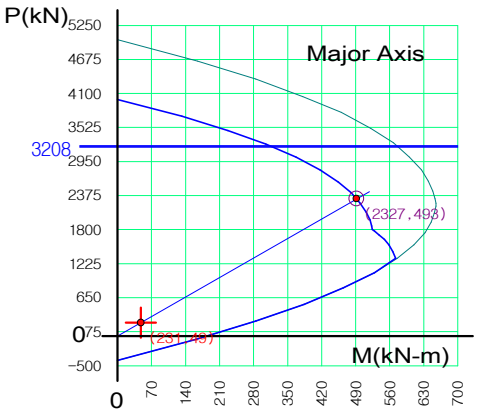
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

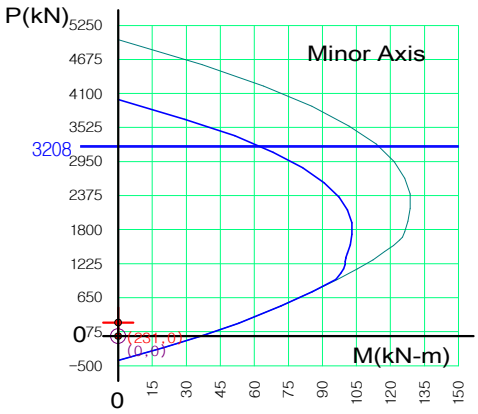


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 3208.15 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	231.108	231.108
φPn (kN)	2326.60	0.00000
Pu / φPn	0.099 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	48.9383	0.00000
φMn (kN-m)	492.671	0.00000
Mc / φMn	0.099 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 14.9096 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 67.3872 + 144.623 = 212.010 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.070 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

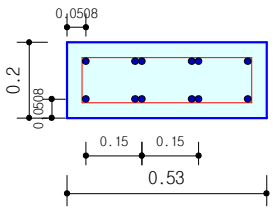
Wall ID : 955 (Wall Mark : 3~RW2)

Story : 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

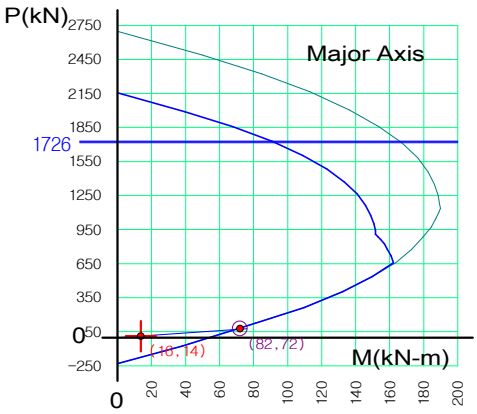
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

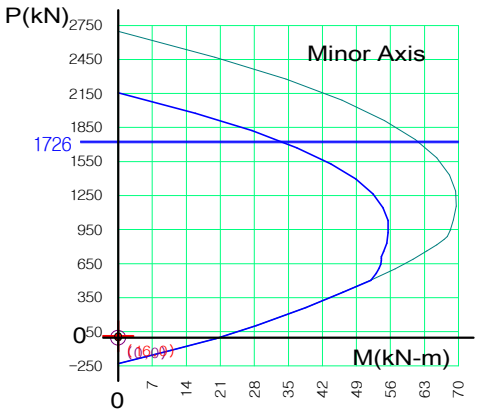


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1726.17 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	15.9024	15.9024
φPn (kN)	82.2985	0.00000
Pu / φPn	0.193 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	13.9920	0.00000
φMn (kN-m)	72.4121	0.00000
Mc / φMn	0.193 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 7.97726 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 31.2030 + 77.4244 = 108.627 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.073 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

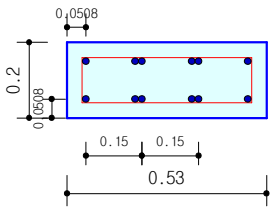
Wall ID : 956 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.53*0.2 m

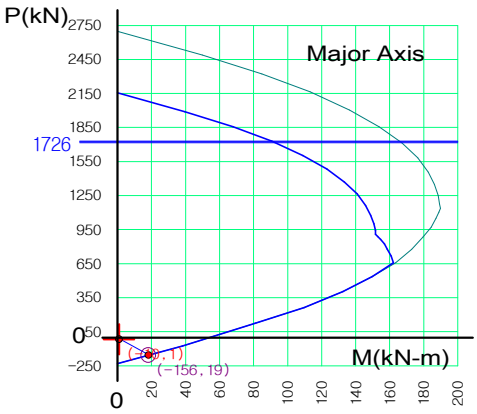
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

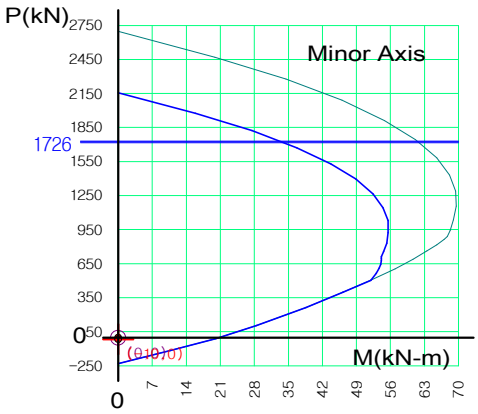


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1726.17 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-10.292	-10.292
φPn (kN)	-155.61	0.00000
Pu / φPn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-1.2321	0.00000
φMn (kN-m)	18.6280	0.00000
Mc / φMn	0.066 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.71215 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 30.2090 + 77.4244 = 107.633 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.007 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

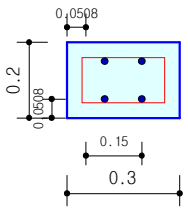
Wall ID : 957 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.3*0.2 m

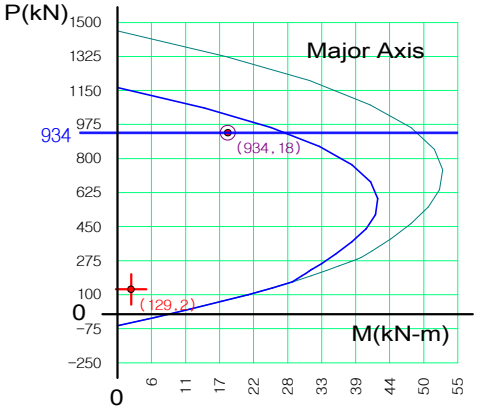
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

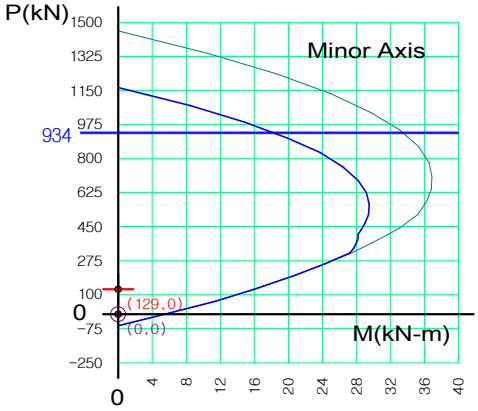


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 933.615 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	129.419	129.419
φPn (kN)	933.615	0.00000
Pu / φPn	0.139 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2.24881	0.00000
φMn (kN-m)	17.8468	0.00000
Mc / φMn	0.126 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 0.97588 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 15.1911 + 43.8252 = 59.0163 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.017 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

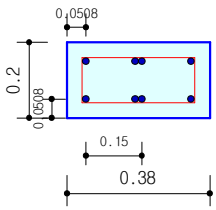
Wall ID : 958 (Wall Mark : 3~RW2)

Story-PM, Shear : 5F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.38*0.2 m

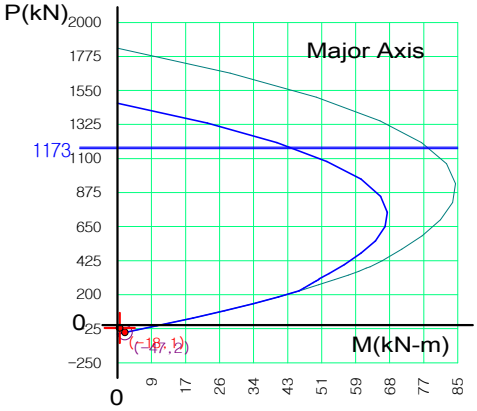
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

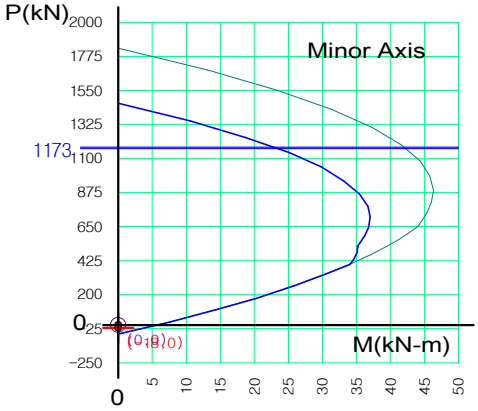


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1173.41 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-17.589	-17.589
φPn (kN)	-46.538	0.00000
Pu / φPn	0.378 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.73280	0.00000
φMn (kN-m)	1.93895	0.00000
Mc / φMn	0.378 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.82271 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 18.9229 + 55.5119 = 74.4348 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.024 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

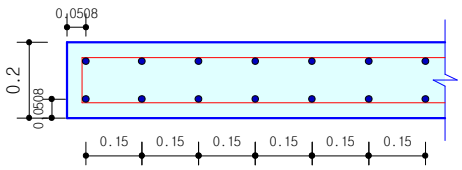
Wall ID : 959 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.4*0.2 m

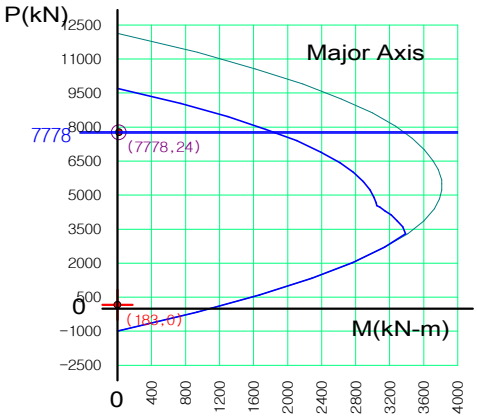
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

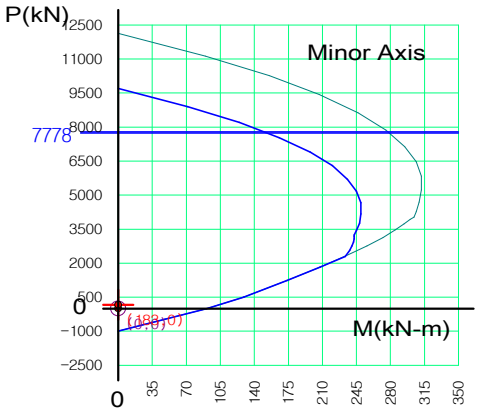


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7778.37 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	182.809	182.809
φPn (kN)	7778.37	0.00000
Pu / φPn	0.024 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	0.46068	0.00000
φMn (kN-m)	24.4469	0.00000
Mc / φMn	0.019 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 1.68803 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 262.546 + 350.601 = 613.147 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.003 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

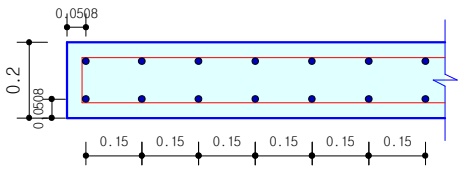
Wall ID : 960 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.4*0.2 m

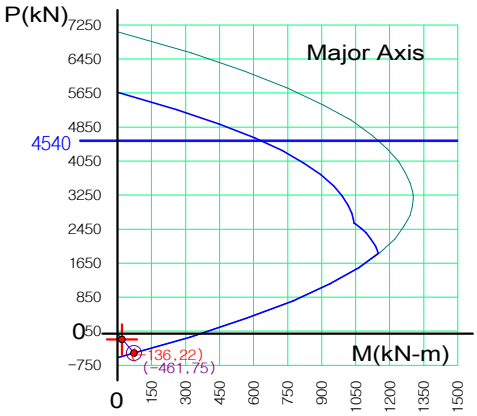
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

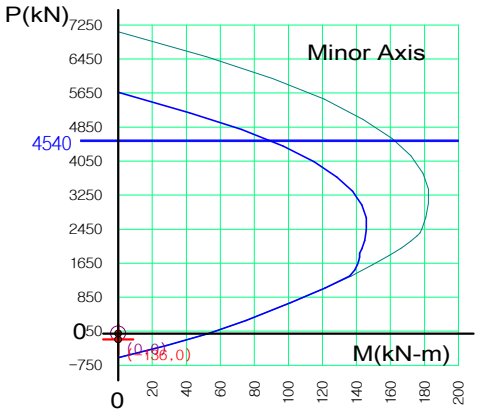


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4540.24 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-135.85	-135.85
φPn (kN)	-461.14	0.00000
Pu / φPn	0.295 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	22.1502	0.00000
φMn (kN-m)	75.1898	0.00000
Mc / φMn	0.295 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 1.82870 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 56.4346 + 204.517 = 260.952 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.007 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

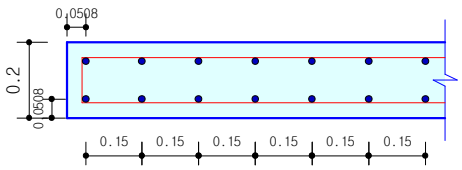
Wall ID : 961 (Wall Mark : 3~RW2)

Story-PM, Shear : 3F (Height = 3.3 m), 4F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 1.51*0.2 m

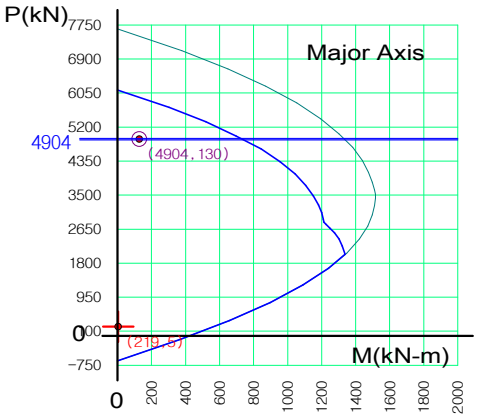
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

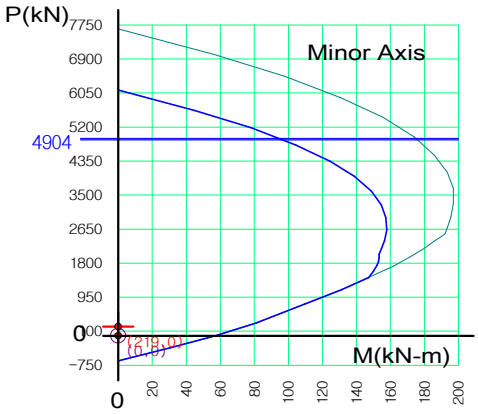


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 4904.35 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	218.678	218.678
φPn (kN)	4904.35	0.00000
Pu / φPn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	4.78828	0.00000
φMn (kN-m)	130.187	0.00000
Mc / φMn	0.037 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 5.48355 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 155.206 + 220.587 = 375.792 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.015 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

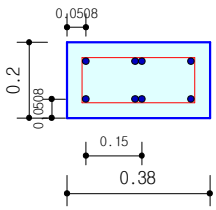
Wall ID : 962 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.38*0.2 m

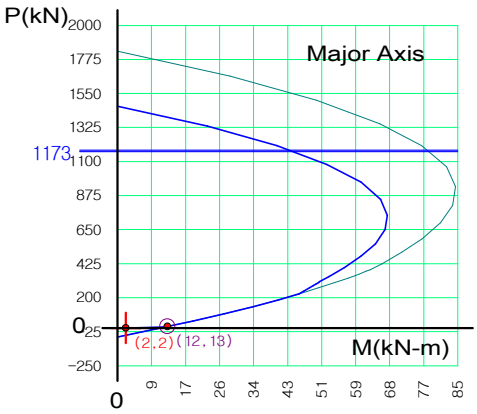
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

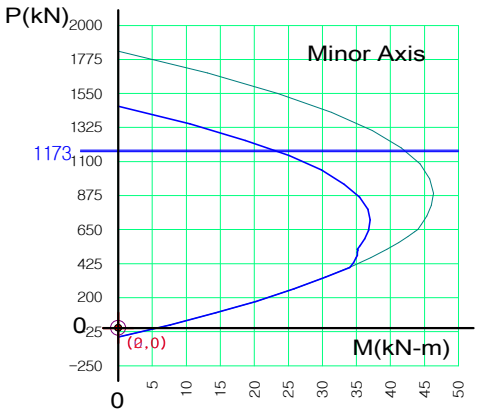


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 1173.41 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	2.11348	2.11348
φPn (kN)	12.3585	0.00000
Pu / φPn	0.171 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2.15757	0.00000
φMn (kN-m)	12.6164	0.00000
Mc / φMn	0.171 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 1.53950 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 18.6716 + 55.5119 = 74.1835 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.021 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

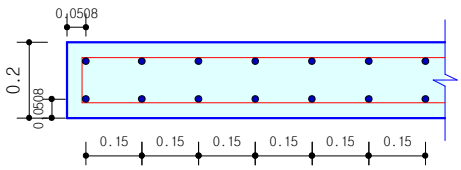
Wall ID : 963 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.42*0.2 m

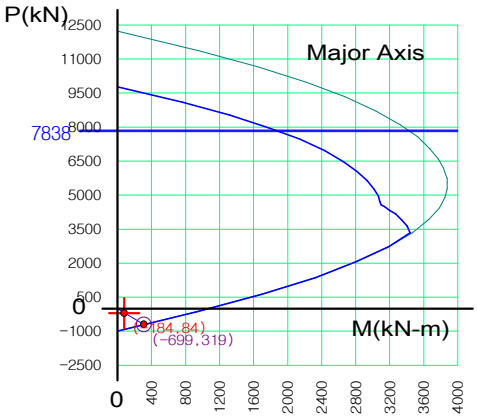
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

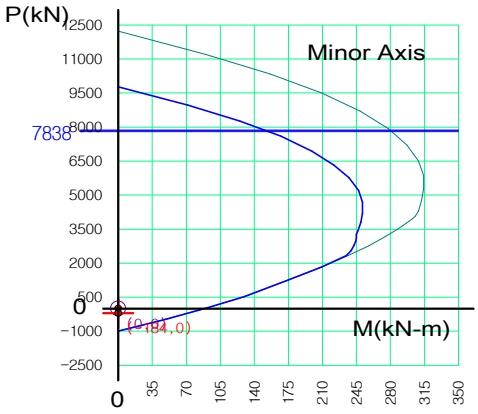


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7838.31 kN

	y (LCB : 1, POS : J)	z (LCB : 1, POS : J)
Pu (kN)	-183.74	-183.74
φPn (kN)	-698.67	0.00000
Pu / φPn	0.263 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	83.9766	0.00000
φMn (kN-m)	319.317	0.00000
Mc / φMn	0.263 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 49.7367 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 425.845 + 353.523 = 779.368 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.064 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

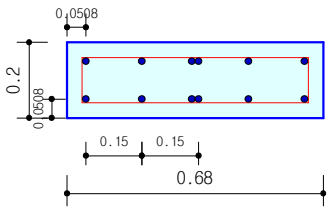
Wall ID : 964 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 0.68*0.2 m

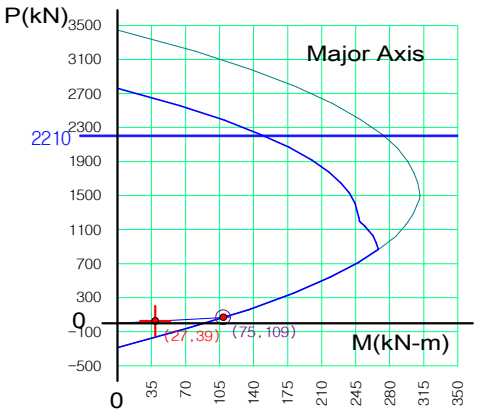
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

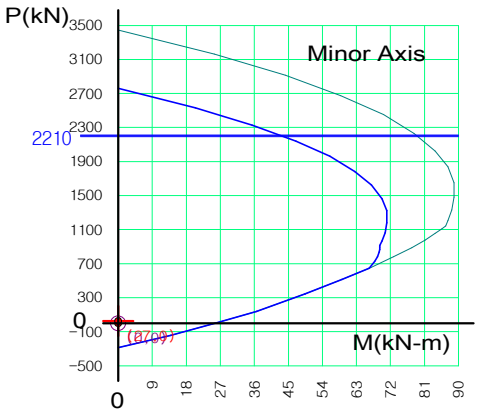


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 2210.17 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	26.7983	26.7983
φPn (kN)	74.9499	0.00000
Pu / φPn	0.358 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-39.104	0.00000
φMn (kN-m)	109.367	0.00000
Mc / φMn	0.358 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 22.1592 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 46.2857 + 99.3370 = 145.623 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.152 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

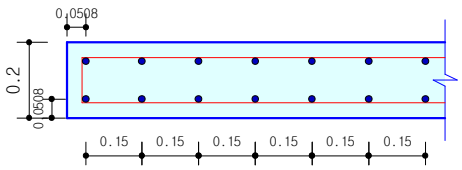
Wall ID : 966 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 6.5*0.2 m

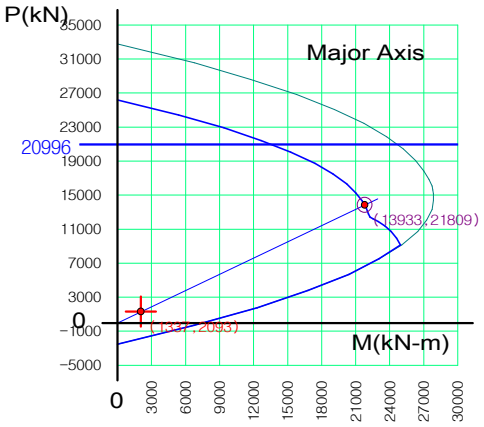
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

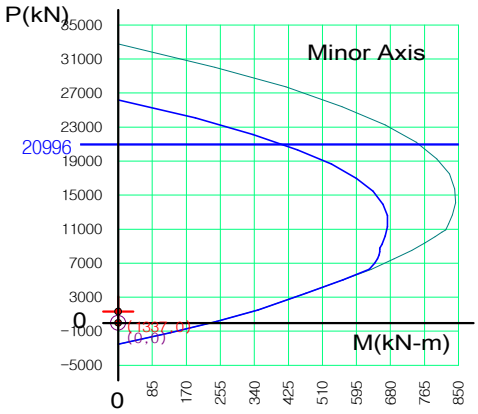


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 20996.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	1337.21	1337.21
φPn (kN)	13932.7	0.00000
Pu / φPn	0.096 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	2093.13	0.00000
φMn (kN-m)	21808.7	0.00000
Mc / φMn	0.096 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 294.690 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 1243.86 + 949.545 = 2193.41 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.134 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

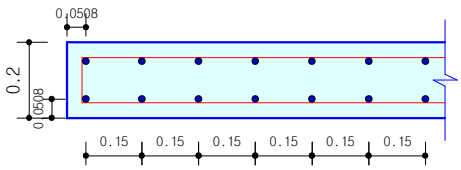
Wall ID : 967 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.3*0.2 m

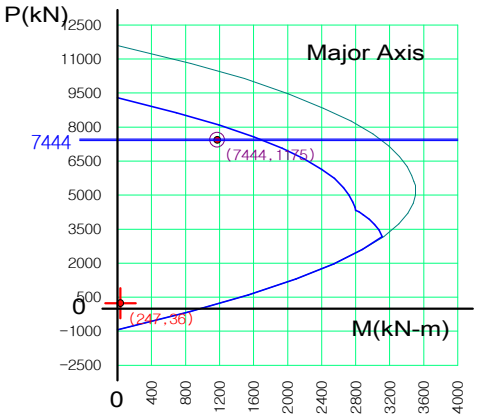
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

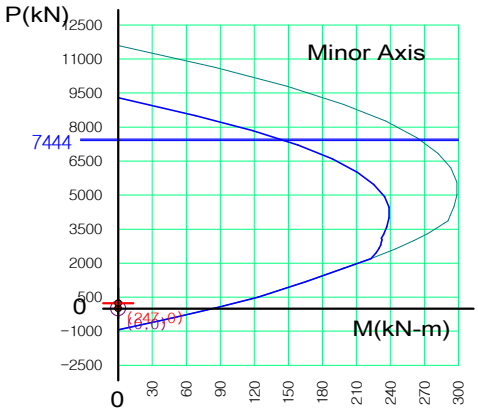


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7444.24 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	247.067	247.067
φPn (kN)	7444.24	0.00000
Pu / φPn	0.033 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-35.680	0.00000
φMn (kN-m)	1174.81	0.00000
Mc / φMn	0.030 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 17.9530 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 466.484 + 335.993 = 802.477 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.022 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

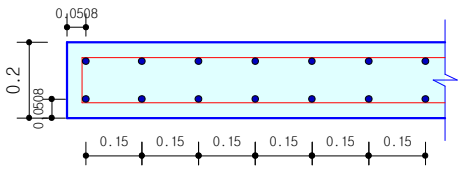
Wall ID : 968 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 2.4*0.2 m

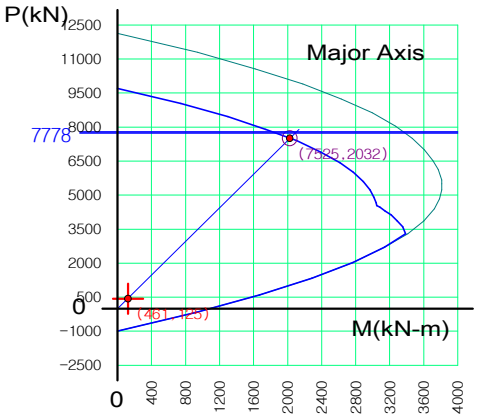
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

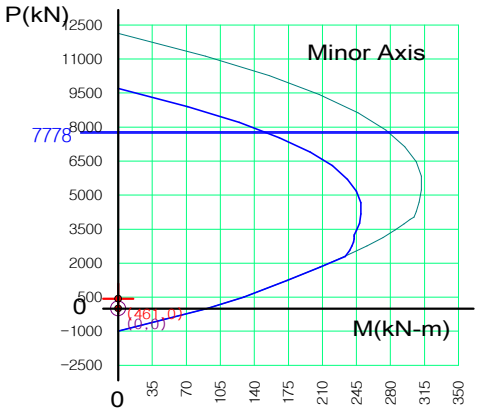


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 7778.37 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	461.186	461.186
φPn (kN)	7525.46	0.00000
Pu / φPn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	124.514	0.00000
φMn (kN-m)	2031.78	0.00000
Mc / φMn	0.061 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force Vu = 62.2032 kN (Load Combination : 1)

Design Shear Strength φVc+φVs = 519.306 + 350.601 = 869.908 kN

(As-H_req = 0.00057 m²/m, D10 @250)

Shear Ratio Vu/φVn = 0.072 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Wall ID : 969 (Wall Mark : 3~RW2)

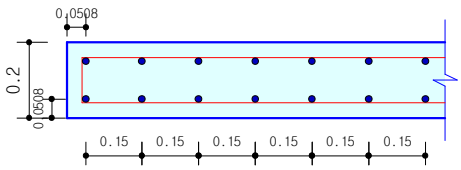
Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.5*0.2 m

Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

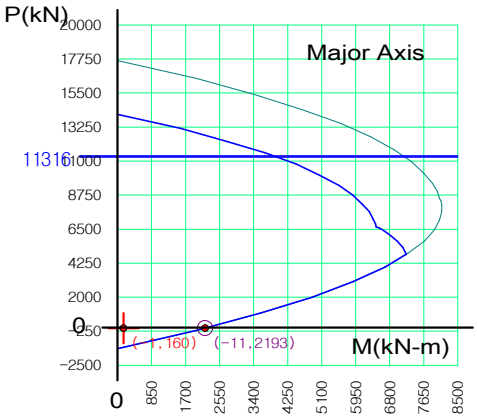
Unit System : kN, m

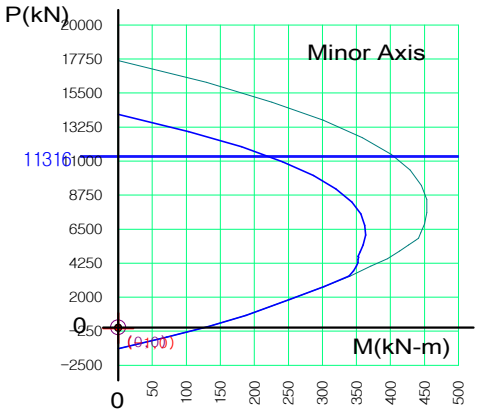


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 11316.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	-0.7694	-0.7694
φPn (kN)	-10.545	0.00000
Pu / φPn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	159.967	0.00000
φMn (kN-m)	2192.61	0.00000
Mc / φMn	0.073 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 49.7367 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 649.589 + 511.293 = 1160.88 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.043 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

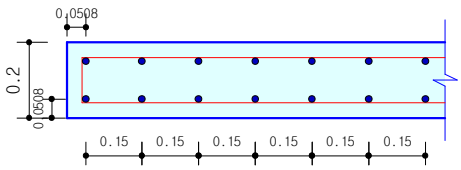
Wall ID : 970 (Wall Mark : 3~RW2)

Story : 3F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 3.95*0.2 m

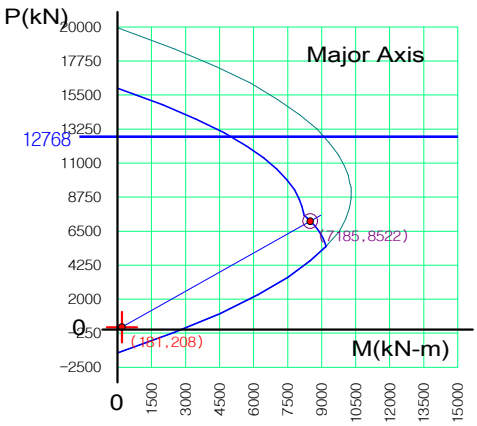
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

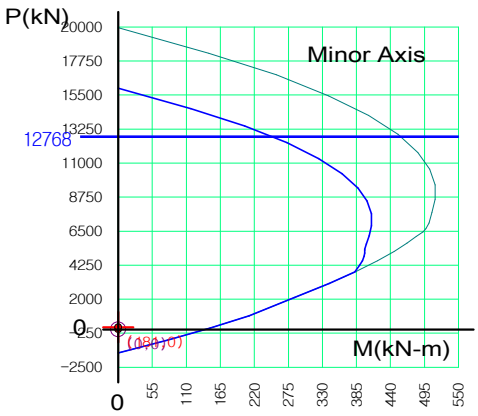


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12768.2 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	181.351	181.351
φPn (kN)	7184.69	0.00000
Pu / φPn	0.025 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	-207.57	0.00000
φMn (kN-m)	8522.35	0.00000
Mc / φMn	0.024 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K





3. Shear Capacity

Applied Shear Force	Vu	= 65.0471 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 762.262 + 577.031 = 1339.29 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.049 < 1.000 ..... O.K

RC Wall Checking Result

Certified by :

Company		Project Title	
Author		File Name	학생교육원 별관동(증축부).mgb

1. Design Condition

Design Code : KDS 41 20 : 2022

Unit System : kN, m

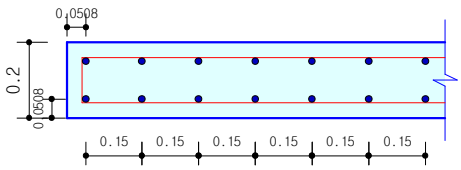
Wall ID : 971 (Wall Mark : 3~RW2)

Story : 5F (Height = 3.3 m)

Material Data : fck = 27550, fy = 400000, fys = 400000 KPa

Wall Dim. (Length*Thk) : 4*0.2 m

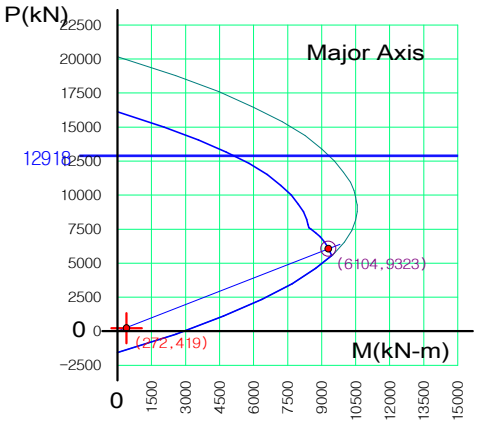
Vertical Rebar : D10 @150 (AsV = 0.00095 m²/m)

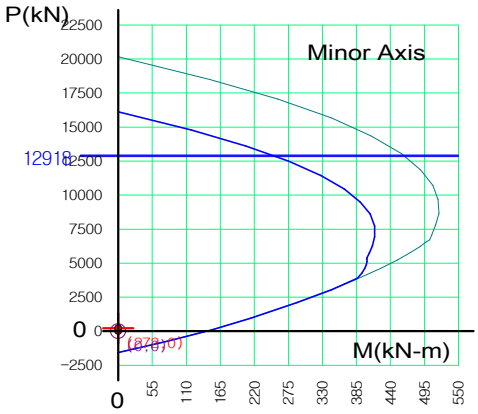


2. Axial and Moments Capacity

Concentric Max. Axial Load φPn-max = 12918.1 kN

	y (LCB : 1, POS : I)	z (LCB : 1, POS : I)
Pu (kN)	271.686	271.686
φPn (kN)	6104.17	0.00000
Pu / φPn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K
Mc (kN-m)	419.285	0.00000
φMn (kN-m)	9323.21	0.00000
Mc / φMn	0.045 < 1.000 ..... O.K	0.000 < 1.000 ..... O.K

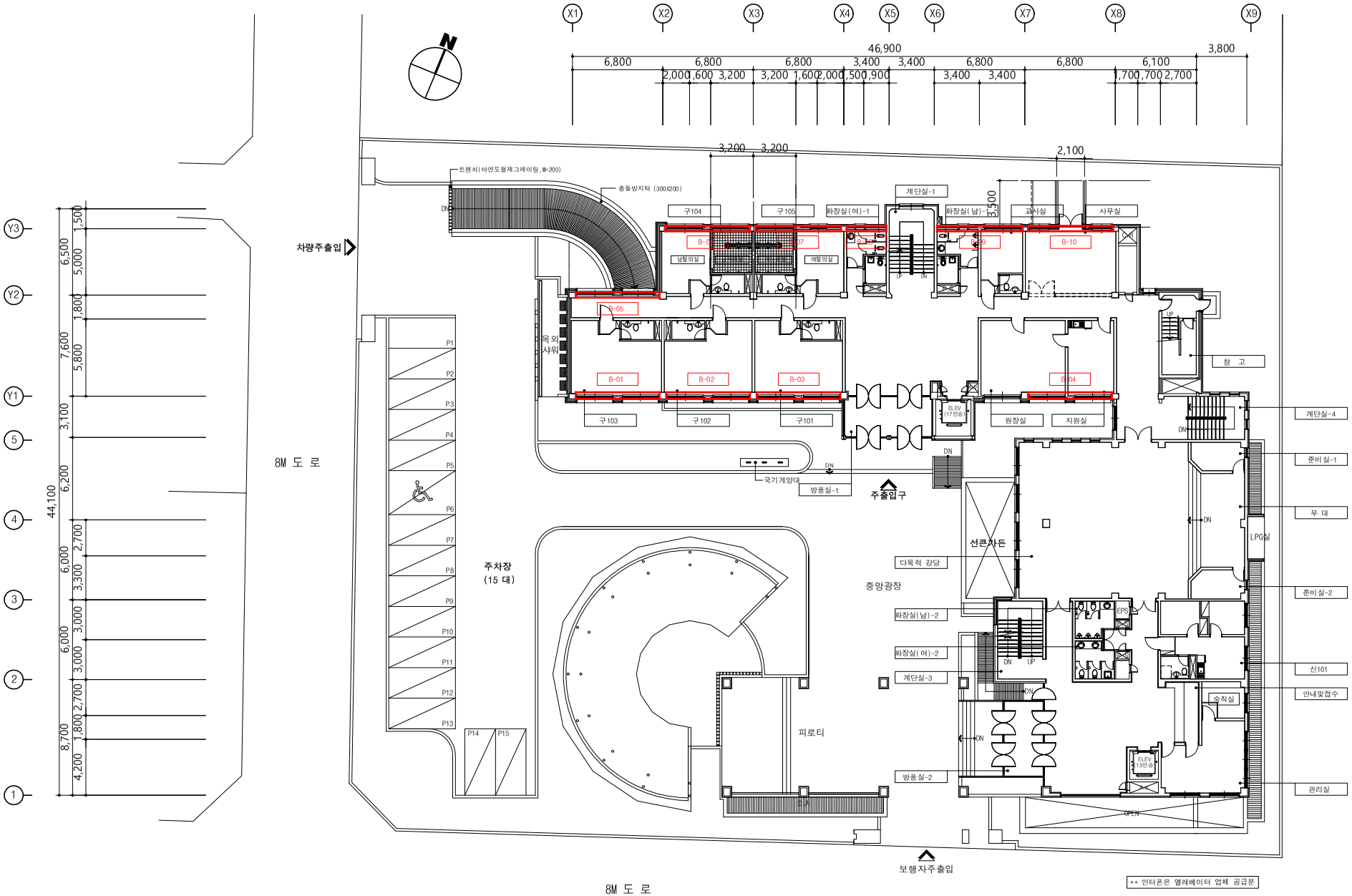




3. Shear Capacity

Applied Shear Force	Vu	= 56.8420 kN (Load Combination : 1)
Design Shear Strength	φVc+φVs	= 360.185 + 584.335 = 944.520 kN
		(As-H_req = 0.00057 m²/m, D10 @250)
Shear Ratio	Vu/φVn	= 0.060 < 1.000 ..... O.K

E. 내진보강 위치도



1 층 내진보강 위치도

1
A -

SCALE - A1:1/150, A3:1/300

2 층 내진보강 위치도

1 / A -

SCALE - A1:1/150, A3:1/300

3 층 내진보강 위치도

1 / A -

SCALE - A1:1/150, A3:1/300

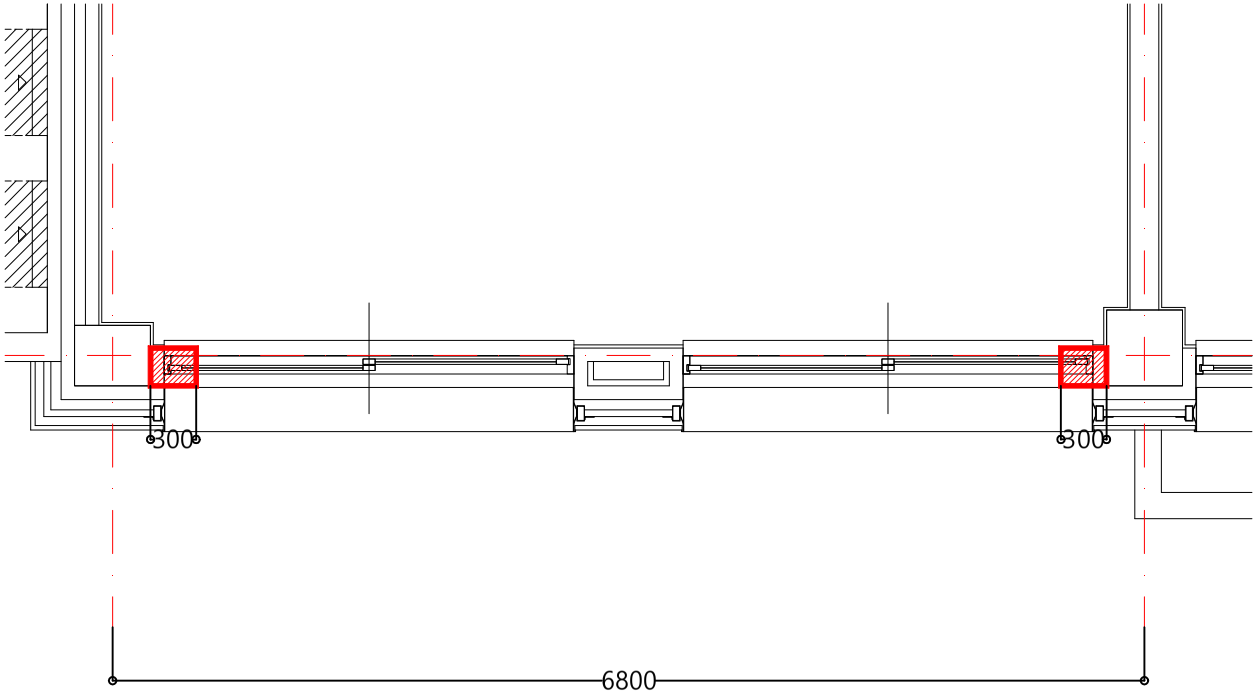
4 층 내진보강 위치도

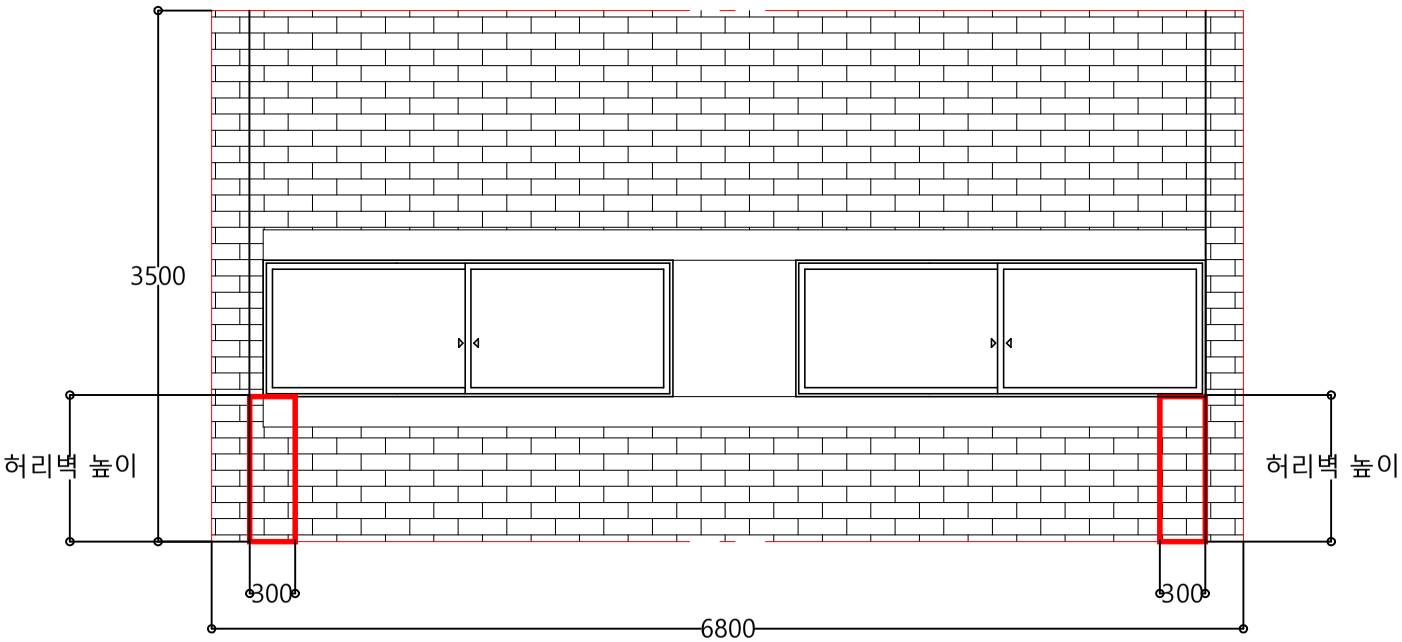
1 / A -

SCALE - A1:1/150, A3:1/300

F. 내진보강 상세도

철거위치





G. 콘크리트 코어채취 시험성적서

시 험 성 적 서

한국에스지에스(주) 건설시험연구원	성적서 번호 : CMT2020-4974

주소: 경기도 화성시 동탄면 동탄산단10길 20
전화: 031-659-0600, 팩스:031-645-0666
https://www.sgsgroup.kr

1. 의뢰인
   - 기 관 명 : 한국시설안전공가원 김 병 민
   - 주 소 : 서울특별시 송파구 송파대로 167, 테라타워 A동 1015호
   - 의뢰일자 : 2020년 07월 07일
2. 시험성적서의 용도 : 품질시험용, 보고서용
3. 시험대상품목 또는 물질, 시료명 : 콘크리트 코어
4. 시험기간 : 2020 년 07 월 07 일 ~ 2020 년 07 월 17 일
5. 시험장소 : ■ 고정시험실 □ 현장시험
   (주소 : 경기도 화성시 동탄면 동탄산단10길 20, 한국에스지에스㈜ CML 시험동 콘크리트/강도시험실)
6. 시험결과 : 서대문도서관 외 4개동 건설늬물가 물택

번 호	시 료 명	시 험 종 목	단 위	시 험 방 법	시 험 결 과
1	일회고력트 벌관 #1	압축 강도	MPa	KS F 2422 : 2017	30.8
2	일회고력트 벌관 #2	압축 강도	MPa	KS F 2422 : 2017	30.5
3	일회고력트 벌관 #3	압축 강도	MPa	KS F 2422 : 2017	30.1
4	일회고력트 벌관 #4	압축 강도	MPa	KS F 2422 : 2017	29.3
5	일회고력트 벌관 #5	압축 강도	MPa	KS F 2422 : 2017	28.8
6	일회고력트 벌관 #6	압축 강도	MPa	KS F 2422 : 2017	28.6

- 끝 -

실무자 : 신 용 원
Tel : 031-645-0606

기술책임자 : 권 [illegible]
Tel : 031-645-0604

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2020 년 08 월 20 일

한국에스지에스(주) 건설시험연구원

품질시험팀
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시 험 성 적 서

CMT2020-4974

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7	일체교육원 벽관 #7	압축 강도	MPa	KS F 2422 : 2017	27.5
8	일체교육원 벽관 #8	압축 강도	MPa	KS F 2422 : 2017	29.3
9	일체교육원 벽관 #9	압축 강도	MPa	KS F 2422 : 2017	27.8
10	일체교육원 벽관 #10	압축 강도	MPa	KS F 2422 : 2017	29.6
11	일체교육원 벽관 #11	압축 강도	MPa	KS F 2422 : 2017	27.8
12	일체교육원 벽관 #12	압축 강도	MPa	KS F 2422 : 2017	29.1
13	일체교육원 본관 #1	압축 강도	MPa	KS F 2422 : 2017	25.6
14	일체교육원 본관 #2	압축 강도	MPa	KS F 2422 : 2017	29.9
15	일체교육원 본관 #3	압축 강도	MPa	KS F 2422 : 2017	29.9
16	일체교육원 본관 #4	압축 강도	MPa	KS F 2422 : 2017	29.6
17	일체교육원 본관 #5	압축 강도	MPa	KS F 2422 : 2017	28.1
18	일체교육원 본관 #6	압축 강도	MPa	KS F 2422 : 2017	26.8
19	일체교육원 본관 #7	압축 강도	MPa	KS F 2422 : 2017	26.9
20	일체교육원 본관 #8	압축 강도	MPa	KS F 2422 : 2017	27.4
21	일체교육원 본관 #9	압축 강도	MPa	KS F 2422 : 2017	27.5
22	일체교육원 본관 #10	압축 강도	MPa	KS F 2422 : 2017	28.3
23	일체교육원 본관 #11	압축 강도	MPa	KS F 2422 : 2017	28.8
24	일체교육원 본관 #12	압축 강도	MPa	KS F 2422 : 2017	25.9

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※ UL 표적시는 비용 및 ISO/IEC 17025의 요건에 해당하는 성적서입니다.

- 끝 -

H. 지반조사보고서

서울특별시교육청학생교육원 대전임해교육원 내진성능평가용역

지 반 조 사 보 고 서

2020. 07.

주식회사 가온기초이엔지

엔지니어링 활동주체 : E-09-005073

제 출 문

귀사에서 의뢰하신 "서울특별시교육청학생교육원 대전입해교육원 내진성능평가용역"에 대하여 지반조사 과업을 완료하고 그 성과를 종합하여 본 보고서로 제출합니다.

본 조사 진행 시 많은 협조를 주신 귀사 관계 직원 여러분께 깊은 감사를 드립니다.

2020. 07.

서울특별시 강서구 공항대로 194, 609호(펜스파크12차)

주 식 회 사 가 온 기 초 이 (인)

대 표 이 사 이 은 석 (인)

지질 및 지반 기술사 임 승 배 (인)

TEL (02)6341-0718(代) FAX (02)6341-0727

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지반조사 결과요약

1. 지반조사

2. 공내 탄성파시험

지반조사 결과요약

1. 지반조사

조사 목적	• 현황, 지반조건 파악 및 설계와 시공에 필요한 제반 토질 정보 제공 • 토질조사 결과에 따른 기초지반 지지력 및 침하량 검토

◎ 지반조사 수행절차

예비조사		기본조사		분석 및 활용
• 현장답사/주변현황 파악 • 위치측량	➡	• 조사계획 수립 • 시추조사 및 현장시험 • 실내시험	➡	• 검토를 위한 설계정수 추정 • 구조물 기초, 지지력 및 침하량 검토

◎ 조사내용

조 사 항 목				
시 추 조 사	서울특별시교육정보연구원 대전임해교육원 본관, 창고, 별관 부지內	공	5	NX Size
현 장 시 험	표준관입시험	회	148	KSF-2307
	공내반상하시험	회	5	KBC, KDS

◎ 조사기간

구 분	조 사 기 간
현 장 조 사	2020. 07. 16. ~ 07. 17.
현 장 시 험	2020. 07. 16. ~ 07. 17.
성과분석 및 보고서 작성	2020. 07. 18. ~ 07. 20.

◎ 시추결과(각 층별 두께)

(단위 : m)

공 번	위 치	매립층	퇴적층	풍화토층	풍화암층	연암층	계	비 고
BH-1	본관	1.0	19.0	4.0	4.4	1.6	30.0	현실파
BH-2		1.0	21.4	4.6	3.0	-	30.0	현실파
BH-1	창고	0.8	23.4	3.8	2.0	-	30.0	현실파
BH-1	별관	1.0	25.5	2.5	1.0	-	30.0	현실파
BH-2		1.2	24.7	2.1	2.0	-	30.0	현실파

◎ 표준관입시험 결과

(단위 : N치)

공 번	위 치	매립층	퇴적층	풍화토층	풍화암층	S.P.T (평)
BH-1	본관	-	6/30~27/30	37/30~50/13	50/10~50/3	28
BH-2		-	3/30~17/30	14/30~50/15	50/10~50/8	30
BH-1	창고	-	3/30~40/30	39/30~50/19	50/10~50/8	30
BH-1	별관	-	3/30~50/20	35/30~50/25	50/10~50/8	30
BH-2		8/30	3/30~50/24	50/23~50/17	50/10~50/9	30

◎ 공내수위측정 결과

공 번	위 치	공 내 수 위 ※ 지표면 GL(-) 기준	본포대상층
BH-1	본관	(-) 11.1m	퇴적층
BH-2		(-) 10.0m	퇴적층
BH-1	창고	(-) 8.8m	퇴적층
BH-1	별관	(-) 4.1m	퇴적층
BH-2		(-) 4.5m	퇴적층

2. 공내 탄성파시험

◎ 공내 탄성파시험 결과

공 번	위 치	시 험 방 법	시험심도 (G.L.~m)	측정심도 (G.L.~m)	설 계 적 용 전단파속도 Vs (m/sec)	지 반 등 급 (2016 KBC기준)	지 반 등 급 (2019 KDS기준)
BH-1	본관	DHT	0.0~30.0	0.0~30.0	267	S_D	S_4
BH-2		DHT	0.0~30.0	0.0~30.0	234	S_D	S_4
BH-1	창고	DHT	0.0~30.0	0.0~30.0	231	S_D	S_4
BH-1	별관	DHT	0.0~30.0	0.0~30.0	225	S_D	S_4
BH-2		DHT	0.0~30.0	0.0~30.0	243	S_D	S_4

◎ 지반 등급분류 (2016 KBC기준)

지반 분류	지반종류의 호칭	전단파속도(Vs 로 760에서 또는 상부30m(Vs) 평균전단파속KBC, 2016)		
		전단파 속도 (m/s)	표준관입시험 $\bar{N}$ (타격횟수/30cm)	비배수전단강도 $\bar{S_u}$(10^{-2}N/mm^2)
S_A	경암 지반	1500 초과	-	-
S_B	보통암 지반	760에서 1500		
S_C	매우 조밀한 토사 지반 또는 연암 지반	360에서 760	>50	>100
S_D	단단한 토사 지반	180에서 360	15에서 50	50에서 100
S_E	연약한 토사 지반	180 미만	<15	<50

◎ 지반 등급분류 【건축물 내진설계기준(KDS 41 17 00) 제정(안) 2019. 03적용】

지반 종류	지반종류의 호칭	분 류 기 준	
		지반깊 깊이, H(m)	토층평균전단파속도, $V_{s,soil}$(m/s)
S_1	암반지반	3 미만	-
S_2	얕고 단단한지반	3~20 이하	260 이상
S_3	얕고 연약한지반	3~20 이하	120 초과 260 미만
S_4	깊고 단단한지반	20 초과 50미만	180 이상
S_5	깊고 연약한지반	20 초과 50미만	120 초과 180 미만
	매우 연약한지반	3 이상	120 이하
S_6	부지 고유의 특성평가 및 지반응답해석이 요구되는 지반		

제1장 과업의 개요

1.1 조사목적

1.2 조사범위

1.3 조사계획

1.4 조사내용

1.5 조사기간

1.6 조사장비

제 1 장 과업의 개요

1.1 조사목적

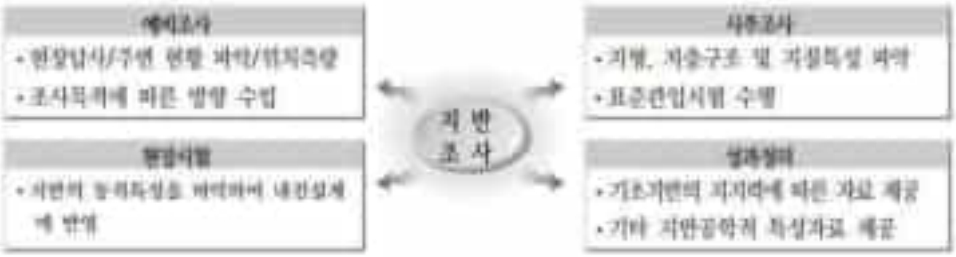
과업명	• 서울특별시교육청학생교육원 대전임해교육원 내진능력가용역 지반조사
기본 방향	• 지반조사는 시추조사 및 표준관입시험 및 현장파시험을 실시하고, 계획부지의 지층구성 상태, 특성을 파악하여 본 사업이 합리적이고 경제적인 설계 및 시공 또는 용역이 되도록 지반공학적 자료를 제공하는데 그 목적이 있다.

1.2 조사범위

위 치	• 충청남도 보령시 신흑동 2055, 2020번지 부지 內
특 징	• 대전임해교육원 본관, 창고, 별관 부지의 지층 및 지지층 판단 및 현장파시험

◎위성사진

1.3 조사계획



1.4 조사내용

과업은 다음과 같이 시추조사와 현장시험으로 구분하여 시행되었다.

조 사 항 목				
시 추 조 사	서울특별시교육정책연교육원 대한임해교육원 본관, 창고, 별관 부지內	공	5	NX Size
현 장 시 험	표준관입시험	회	148	KSF-2307
	공내탄성파시험	회	5	KBC, KDS

1.5 조사기간

구 분	조 사 기 간
현 장 조 사	2020. 07. 16. ~ 07. 17.
현 장 시 험	2020. 07. 16. ~ 07. 17.
성과분석 및 보고서 작성	2020. 07. 18. ~ 07. 20.

1.6 조사장비

장 비 명	규 격	수 량	비 고
시 추 기	유압식-4000 type	1조	NX Size
표준관입시험기	KS F - 2307	1조	-
시추부대장비	-	1식	-

제2장 지층분류 기준

2.1 흙의 분류 및 기재방법

2.2 암의 분류 및 기재방법

제 2 장 지층분류 기준

2.1 흙의 분류

기 준	• 흙의 상태에 대한 기재내용은 함수상태, 색깔 및 연경도 등이며 다음과 같은 • 흙의 공학적 분류방법인 통일분류법(U.S.C.S)을 기준으로 분류방법에 의하여 그 결과를 시추 주상도에 기록한다. • 흙의 공학적 분류방법인 통일분류법(U.S.C.S)을 기준으로 분류
기 재 방 법	• 표준관입시험시 관입저항치(N치)에 의해 상대밀도 및 연경도를 고려하고, 채취된 시료의 육안관찰 및 물성시험을 통해 통일분류법으로 분류
기 술 내 용	• 연경도 및 상대밀도와 습윤상태, 색조, N치 등을 고려하여 기재, • 함수상태는 건조, 습윤, 젖음 및 포화상태로 구분, 색은 흑, 갈, 홍, 적, 황색 등에 담(연한)과 암(진한)의 접두어 사용.

2.1.1 흙의 육안분류법(KSF-2430)

구 분	토립자의 육안적 판별과 일반적인 상태	손으로 쥐었다 놓음		습윤상태에서 손가락으로 끈 모양으로 굴림
		건조상태	습윤상태	
보 래 (Gravel)	• 개별적 입자크기가 판별되며 입상을 보임 • 건조상태에서 흩어져 내림	• 덩어리지지 않고 흐트러짐	• 덩어리지나 가볍게 건드리면 흩어짐	• 끈 모양으로 늘어지지 않음
실트질 모래 (Silty sand)	• 입상이나 실트나 점토가 섞여서 약간 점성이 있음 • 모래질의 특성이 우세함	• 덩어리가 지나 가볍게 건드리면 흐트러짐	• 덩어리지며 조심스럽게 다루면 부서지지 않음	• 끈 모양으로 늘어지지 않음
모래질 실트 (sandy silt)	• 세립질의 재입자와 소량의 점토를 함유하고 실트입자가 반 이상임 • 건조되면 덩어리가 쉽게 부서져서 가루가 됨	• 덩어리지며 자유롭게 만져도 부서지지 않음 • 부서지면 밀가루와 같은 감촉	• 덩어리지며 자중을 견디어도 부서지지 않음 • 물을 부으면 서로 엉김	• 끈 모양으로 늘어지나 쉽게 끊어지고 부드러우며 약간의 점성이 있음
실 트 (Silt)	• 세립자의 점토는 극소량을 함유하고 실트입자의 함량이 80%이상 • 건조되면 덩어리지나 쉽게 부서져서 밀가루 감촉의 가루가 됨	• 덩어리지며 자유롭게 만져도 부서지지 않음	• 덩어리지며 자중을 견디어도 부서지지 않고 물에 젖으면 서로 엉김	• 점점이 끊어지지는 않으나 쉽게 끊어지는 상태로 늘어지고 부드러움
점 토 (Clay)	• 건조되면 매우 딱딱한 덩어리가 됨 • 건조상태로 잘 부서지지 않음	• 덩어리지며 자유롭게 만져도 부서지지 않음	• 덩어리지며 자중을 견디어도 부서지지 않으며 점점상태로 됨	• 잘고 길게 늘어짐 • 점점이 큼

2.1.2 함수상태

함 수 비(%)	상 태
0~10	건 조 (dry)
10~30	습 윤 (moist)
30~70	젖 음 (wet)
70~ 이상	포 화 (saturated)

2.1.3 흙의 색조

색	1	담				암					
	2	보통	홍	황		갈	검암	녹	회		
	3	보통	적	황	갈	검암	녹	청	백	회	흑

2.1.4 점토의 consistency, 일축압축강도와 N치와의 관계

점토의 연경도 (consistency)	N 치	현장관찰법(Peck - Hanson)	일축압축강도 qu(kgf/cm²)
매우연약 (very soft)	< 2	주먹이 쉽게 10cm 들어간다.	< 0.25
연 약 (soft)	2~4	엄지손가락이 쉽게 들어간다.	0.25~0.50
보통견고 (medium)	4~8	노력하면 엄지손가락이 들어간다.	0.50~1.00
견 고 (stiff)	8~15	손가락으로 힘을 충분 들어가게 할 수 있지만 흙 속에 손가락을 넣기는 힘들다.	1.00~2.00
매우견고 (very stiff)	15~30	손톱으로 흙에 자국을 낼 수 있다.	2.00~4.00
고 결 (hard)	> 30	손톱으로 자국을 내기 힘들다.	> 4.00

2.1.5 모래의 상대밀도와 N치와의 관계

N 치	조밀상태 (Gibbs+Holtz)	상대밀도		현장관찰 (Bowles)
		Gibbs+Holtz	Bowles	
0~4	매우느슨 (very loose)	< 0.15	0.0~0.2	엄지손가락 또는 주먹으로 쉽게 자국을 낼 수 있다.
4~10	느 슨 (loose)	0.15~0.35	0.2~0.4	쉽게 삽질할 수 있다. 손가락으로 자국을 낼 수 있다.
10~30	보통조밀 (medium dense)	0.35~0.65	0.4~0.7	힘을 주어서 삽질할 수 있다.
30~50	조 밀 (dense)	0.65~0.85	0.7~0.9	손으로 삽질이 가능, 손의 힘으로 삽을 이용하여 자국을 낼 수 있다.
50 이상	매우조밀 (very dense)	0.85~1.00	0.9~1.0	발바 또는 곡괭이에 의해서만 자국을 낼 수 있다.

2.1.6 통일분류법

구 분		분류방법		기호
조립토 F < 50%	자갈질 흙 $F_1 < \frac{100-F}{2}$	No.200체 통과량 < 5%	$C_u \geq 4$ 이고 $1 < C_g < 3$	GW
		No.200체 통과량 < 5%	GW 조건을 만족 못함	GP
		No.200체 통과량 > 12%	PI < 4 또는 소성도의 A-선 아래	GM
		No.200체 통과량 > 12%	PI > 7 이고 소성도의 A-선 위	GC
		No.200체 통과량 > 12%	소성도의 "CL-ML" 부분	GC-GM
		5 ≤ No.200체 통과량 ≤ 12%	GW와 GM 조건을 만족함	GW-GM
		5 ≤ No.200체 통과량 ≤ 12%	GW와 GC 조건을 만족함	GW-GC
		5 ≤ No.200체 통과량 ≤ 12%	GP와 GM 조건을 만족함	GP-GM
		5 ≤ No.200체 통과량 ≤ 12%	GP와 GC 조건을 만족함	GP-GC
	모래질 흙 $F_1 \geq \frac{100-F}{2}$	No.200체 통과량 < 5%	$C_u \geq 6$ 이고 $1 < C_g < 3$	SW
		No.200체 통과량 < 5%	SW 조건을 만족 못함	SP
		No.200체 통과량 > 12%	PI < 4 또는 소성도의 A-선 아래	SM
		No.200체 통과량 > 12%	PI > 7 이고 소성도의 A-선 위	SC
		No.200체 통과량 > 12%	소성도의 "CL-ML" 부분	SC-SM
		5 ≤ No.200체 통과량 ≤ 12% 소성도의 A-선 아래	SW와 SM 조건을 만족함	SW-SM
		5 ≤ No.200체 통과량 ≤ 12% 소성도의 A-선상 또는 위	SW와 SC 조건을 만족함	SW-SC
		5 ≤ No.200체 통과량 ≤ 12% 소성도의 A-선 아래	SP와 SM 조건을 만족함	SP-SM
		5 ≤ No.200체 통과량 ≤ 12% 소성도의 A-선상 또는 위	SP와 SC 조건을 만족함	SP-SC
무기질 세립토 F≥50%	LL<50%	PI < 4 또는 소성도의 A-선 아래		ML
		PI > 7 이고 소성도의 A-선 위		CL
		4 ≤ PI < 7, 소성도의 "CL-ML" 부분		CL-ML
	LL≥50%	소성도의 A-선 아래		MH
		소성도의 A-선 위		CH
유기질 세립토 F≥50%	LL<50%	$\frac{\text{노건조시료 액성한계}}{\text{공기건조시료 액성한계}} < 0.75$		OL
	LL≥50%			OH

2.2 암의 분류

기 준	• 암반의 분류기준은 분류하는 방법에 따라 다르며 크게 지질학적 분류, 물성에 의한 분류, 공학적 분류로 대별된다. • 본 장에서는 지질학적 분류와 각 기반에서 제시하는 기준을 참고하므로 수록하였다.

◉ 암반의 분류기준

구 분	분 류 방 법	개 요
지질학적 분류	• 성인에 따른 분류	• 암석의 생성조건에 따라 분류
물 성 에 의한분류	• 지반조사에 의한 분류 • 탄성파 속도에 따른 분류 • 압축압축강도에 의한 분류 • 도굴 작업성에 의한 분류	• 지반조사시 암반분류기준에 의거 • 체에이과 및 탄성파속도에 의한 분류 • 암석의 강도특성에 따른 분류 • R.Q.D, T.C.R, 탄성파속도에 따른 분류
공 학 적 분 류	• R.Q.D를 이용한 분류 • RMR을 이용한 분류	• 시추조사시 회수된 core를 이용 • 암반상태를 등급화하여 분류

2.2.1 지질학적 분류

• 지질학적 분류는 지질연대에 의한 분류와 성인에 의한 분류로 나누어진다. 지질연대에 따른 분류는 지층의 층서와 암석의 생년을 기준으로한 연대에 따라 대(代, Era), 기(紀, period), 세(世, age)로 구분한다.
• 암석을 생성조건에 따라 분류하는 방법은 먼저 1단계로 생성과정에 따라 화성암, 변성암, 퇴적암의 3가지로 구분한 다음 암석의 생성조건과 조암광물의 종류 및 성분, 세립질의 입경, 결정구조 등에 따라 세분화된다.

화 성 암	심 성 암	: 화강암(granite), 섬록암(diorite), 반려암(gabbro)
	화 산 암	: 유문암(rhyolite), 안산암(andesite), 현무암(basalt)
퇴 적 암	쇄 설 암	: 역암(conglomerate), 각력암(breccia), 사암(sandstone) 셜암(shale), 이암(mudstone),
	비 쇄 설 암	: 석회암(limestone), 백운암(dolomite), 규암(chert)
변 성 암	광 역 변 성 암	: 천매암(phyllite), 편암(schist), 편마암(gneiss)
	접 촉 변 성 암	: hornfels,
	동 력 변 성 암	: mylonite

2.2.2 각 기관별 암반분류 기준

- 암반의 분류기준은 조사기관별로 틀려지는 바가 다르며, 그 내용도 탄성파속도, 암축압축강도, 트공재압성, 암석의 경연 등에 따라 부분적으로 차이가 있다.

◉ 암석그룹별 탄성파속도에 따른 암반분류 (건교부 표준품셈)

구 분		자연상태의 탄성파속도 V(km/sec)	암반의 탄성파속도 V_p(km/sec)	암반내압강도 (kg/cm²)	비 고
풍화암	A B	0.7~1.2 1.0~1.9	2.0~2.7 2.5~3.0	300~700 100~200	내압강도 시 편 : 5cm 입방체 노 건 조 : 24시간 수중침윤 : 2일 내압시험 시험방향(가압방향) : x축 (층리에 수직, 탄성파속도가 느린방향) 암반 탄성파 속도 1. 시편 : 두께 15~20cm 상하면이 평행인 2. 측정방향 : x축(탄성파속도가 가장 빠른 방향), (층리에 평행)
연 암	A B	1.2~1.9 1.9~2.8	2.7~3.9 3.0~4.3	700~1000 200~500	
보통암	A B	1.9~2.9 2.8~4.1	3.7~4.7 4.3~5.7	1000~1300 500~800	
경 암	A B	2.9~4.2 4.1 이상	4.7~5.8 5.7 이상	1300~1600 800 이상	
극경암	A B	4.2 이상	5.8 이상	1600 이상	

구 분	A 그룹	B 그룹
대표적인 암 석 명	현무암, 사질편암, 녹색편암, 각섬암, 석회암, 사암, 휘록응회암, 역암, 화강암, 섬록암, 감람암, 사장암, 응장암, 세일, 안산암, 현무암	흑색편암, 녹색편암, 휘록응회암, 세일사암, 응회암, 점판암
광물을 함에 의한 시각판별	사질분, 석영분등 다량 광물, 광물이 단단, 경도가 높은 것	사질분, 석영분이 거의 없고 점토분이 거의 없는 암석 현미경의 암석
500~1,000kg 해머의 타격에 의한 판별	타격점의 암흔 작은 평평한 암편으로 되어 떨어지나, 거의 암분을 남기지 않는 것	타격점에 암 파편이 부서지지 않고 분말이 되어 남고 암편이 별로 떨어지지 않는 암석

◎ 국토해양부 및 서울시 표준지반분류

지반명 및 정상적 특징(노두나 굴착지의 노출지반 조사시)	시추조사시의 분류기준 (동시 충족조건)
퇴적토층(DS) 원지반에서 분리·이동되어 다른 곳에 퇴적된 층으로 대체로 원지반보다 연약하며 입자의 크기나 구성에 따라 세분	흙의 통일분류법으로 세분함
풍화토층(RS) 조암광물이 대부분 완전풍화되어 암석으로서의 결합력을 상실한 풍화잔류토로서 절리의 대부분은 풍화잔물인 점토 등 2차 광물로 충전되어 존재만 보이고 함수포화시에 전단 강도가 현저히 저하되기도 하며 손으로 쉽게 부수어지는 지반	N<50회/10cm 흙의 통일분류법으로 세분함
풍화암층(WR) 심한 풍화로 암석조직의 변조가 변색되었으며 충전물이 제워지거나 열린 절리가 많고, 가벼운 망치 타격에도 쉽게 부수어지며 칼로 흠집을 낼 수 있음. 절리간격은 좁을 이해이며 시추시 암편만 회수되는 지반	TCR≥10% RQD<10% N≥50회/10cm qu<100kgf/cm²
연암층(SR) 절리면 주변의 조암광물은 중간풍화되어 변색되었으나 암석내부는 부분적으로 약한 풍화가 진행 중이며 망치 타격에 둔탁한 소리가 나면서 파괴되고, 일부 열린 절리가 있으며 절리간격은 중간 정도인 지반	TCR≥30% RQD≥10% qu≥100kgf/cm²
보통암층(MR) 절리면에서 약한 풍화가 진행되어 일부 변색되었으나 암석은 강한 망치 타격에 다소 맑은 소리가 나면서 깨어지고, 절리면의 대부분이 밀착되어 있고 절리간격이 넓음.	TCR≥60% RQD≥25% qu≥500kgf/cm²
경암층(HR) 조암광물의 대부분이 거의 신선하며 암석은 강한 망치타격에 맑은 소리를 내며 깨어지고, 절리면은 잘 밀착되어 있으며 절리간격이 매우 넓음.	TCR≥80% RQD≥50% qu≥1000kgf/cm²
극경암층(XHR) 거의 완전하게 신선한 암으로서 절리면은 잘 밀착되어 있고 강한 망치 타격에 맑은 소리가 나며 잘 깨어지지 않으며 절리간격이 극히 넓음.	TCR≥80% RQD≥75% qu≥1,500kgf/cm²

주1) N : 표준관입시험(SPT)의 관입저항치, TCR: 코어회수율, RQD : 암질표시율,
qu : 자연함수비 상태의 코어시료 일축압축강도, TCR 및 RQD는 NX 구경 다이아몬드 비트와 이중 코어배럴을 사용한 시추시의 측정치임

주2) 본 분류는 관습적으로 사용하여 오던 강도만을 기준으로한 암석분류가 아니라 강도 외에도 시추시의 코어시료의 상태, 절리면의 간격 등에 근거한 지반(암반) 분류이므로 강도만을 분류기준으로 고려하는 경우 본 분류안을 적용할 수 없음.

◎ 한국토지공사 암반분류기준(도질조사 시행지침)

상태 / 구분	굴 진 상 황	core 형태	풍화변질상태	초 지	현위치시험 (표준관입시험)	비고(강도)
풍화암	• sand crown bit • 큰 지장없이 굴진 • 암질에 따라 차이가 있으나 30cm굴진에 1-5분 소요 • 파쇄에는 지장 없으며 공벽이 변하지는 않을 수 있음	• core화가 거의 불가 • 파쇄에서 재현상태의 core가 소량 산출될 경우도 있음 (특히 파쇄암 제외) • 굴절이 매우 발달하여 간격이 거의 일정하지 않음	조직형태는 완전히 변질됨	개반암이 조직은 유지하고 있으나 암석부가서 광물이 용탕에 산화되어 매우 연하고 약간은 상태	• 상반 : 50/15 • 하반 : S.P.T 불가한 경도 있음	• 125kg/cm² 이하
연암	• sand crown bit • 굴진시 다소 지장이 있으며 일반을 가하여 서 굴진가능 • 암질에 따라 차이가 있으나 30cm 굴진에 3-10분 정도 소요 • 공벽이 변형되는 현상이 두드러짐	• 재현율이 단주상 또는 디스크형(3-5cm정도) • 암질에 따라 점하나 TCR:10-40% 내외 • R.Q.D측정은 거의 불가능한 상태 • 굴절간격은 5cm이하	굴절부위를 따라 풍화가 상당히 진행되어 대부분의 광물이 다소 용해된 상태로서 굴절이 없는 곳은 다소 단단한 상태	개반암조직 유지	S.P.T 불가	• 일부 재질은 암반이나 이 경우 구성 등급core회수가 불가능 경우가 있음 • 125-400 kg/cm²
보통암	• sand crown bit로 굴진가능하나 diamond bit 사용시 core 회수율을 높일 수 있음 • 암질에 따라 차이가 있으나 30cm 굴진에 10-30분 소요	• 단주상-장주상태의 core로 산출 (산출 5-30cm정도) • 암질에 따라 점하나 TCR:40-60%내외, R.Q.D측정 가능 • 굴절간격은 5-15cm 굴절 내의 신선한 부분은 20-30cm 간격인 경우도 있음	굴절부위를 따라 풍화가 약간 진행된 곳도 있으나 대체로 굴절 내부는 신선한 편	개반암조직	S.P.T 불가	• 400-800 kg/cm²
경암	• diamond bit로 굴진 하여야 작업효율이 향상됨	• 대부분 장주상형상으로 산출되나 일부 파쇄부에서는 단주상으로 산출되기도 함 • 암질에 따라 점하나 TCR:60% 이상 • R.Q.D 보통이상 (40 - 50% 이상) • 굴절간격은 20-30cm 이상	신선한 상태	개반암조직	S.P.T 불가	• 800-1200 kg/cm²
특기사항	암을 판별, 분류하는 기준은 건설표준품셈을 비롯하여 그 기준이 다양하나 시공시는 주로 건설표준품셈의 강도 기준에 의거 분류를 하고 있다. 지반조사시 채취되는 시료의 상태는 시공중 채취되는 시료와 발굴, 굴절상태등 여러면에서 차이가 있으므로 조사 굴진중 관찰되는 여러가지 현상을 종합적으로 참조하여 판단할 수 있도록 상기와 같이 기준을 수립하였음. 일부 특수한 암반에서는 상기 기준을 벗어날 수도 있음.					

제3장 조사내용 및 방법

3.1 조사위치 선정

3.2 시추조사

3.3 표준관입시험

3.4 공내수위측정

3.5 하향식 탄성파 탐사

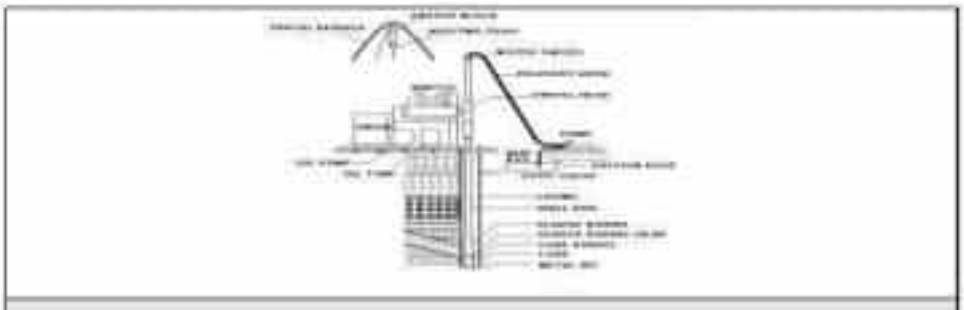
제 3 장 조사내용 및 방법

3.1 조사위치 선정

선정 기준	• 조사위치 선정은 현장답사를 실시하여 계획사항에 따른 요소들을 파악하였다. • 정확한 시추위치는 발주처와 협의하에 도상계획된 위치를 통해 선정하였다.

3.2 시추조사

조사 방법	• 시추는 일정한 압력 및 회전속도를 유지할 수 있는 장치가 장착된 유압형의 시추기를 사용하여 NX Size로 3개소 위치에 대하여 30.0m 기준으로 시추 굴진 후 종료하였다.



시 추 개 요 도

3.3 표준관입시험

3.3.1 시험의 개요

시험 목적	• 입상토의 공학적 특성을 알기 위한 원위치 시험인 동적 sounding이다 • 한국산업규격 KS F-2307 규정에 의함. • 채취한 교란시료는 함수량의 변화가 없도록 하여 시료용기 속에 보관하였다.
시험 방법	• 64kg 해머를 75cm 높이에서 자유낙하 시켜 split spoon sampler의 30cm 관입에 따른 타격수 측정 • 지층이 매우 견고하여 50회 이상 타격 시 그 때의 관입길이와 타격횟수를 기록 • 매 입정심도 또는 지층이 변하는 구간에서 실시

3.3.2 시험결과의 이용

◉ N 값으로부터 추정 또는 판정되는 사항

사질토 지반	점성토 지반	일반 사항
상대밀도 내부마찰각 지반의 지지력 액상화 가능성	consistency 일축압축강도 점 착 력 지반 및 말뚝의 지지력	지반의 극한지지력 말뚝의 연직지지력 지반반력계수 침하속도

◉ φ - N의 근사식 (Durham(1954)의 제안)

입자가 둥글고 입도분포가 균일한 모래	$\varphi = \sqrt{12N+15}$
입자가 둥글고 입도분포가 좋은 모래	$\varphi = \sqrt{12N+20}$
입자가 모나고 입도분포가 균일한 모래	$\varphi = \sqrt{12N+20}$
입자가 모나고 입도분포가 좋은 모래	$\varphi = \sqrt{12N+25}$

3.4 공내수위측정

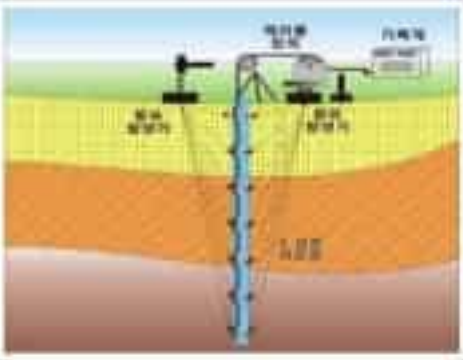
• 시추조사공을 이용하여 공내수위를 측정하였으며, 측정방법은 시추조사 종료후 시추시 유입된 작업수가 완전히 유출될 수 있도록 일정시간이 경과한 후, 수위가 스스로 안정될 때까지 기다린 후 공내수위를 측정하였다.

설계 활용 방안	• 지표면에서 지하수면까지의 심도 측정 • 측정된 수위는 조사결과 및 시추주상도에 기록 • 터널기시 유입수량 계산 및 배수대책 강구

3.5 하향식 탄성파 탐사(Down Hole Test)

시험 목적	• 시추공 주위 암반의 심도에 따른 P파와 S파의 속도 측정 • 측정된 P파와 S파 속도로부터 포아슨비 및 동탄성계수, 동전단계수 산출

시 험 방 법
• 지표에서 탄성파를 발생시키고, 시추공내 3방향(triaxial geophone) 수진기를 통해 심도별로 탄성파 도달시간을 기록, 분석하여 원지반의 지층별 탄성파속도(P파, S파) 측정 • 플래이트를 해머를 이용하여, 주파(P파) 혹은 수평(S파) 방향으로 타격하여 탄성파를 발생 • 기록된 심도별 탄성파 트레이스로부터 P파, S파의 도달시간을 판독한 후, 주시곡선을 작성하고 이로부터 각 구간속도를 결정 • 측정된 탄성파 속도를 토대로 다음식으로 각 구간의 동적특성(G_d, E_d, K_d) 산정 – $G_d = \rho \cdot V_s^2$ – $E_d = 2G_d \cdot (1+\upsilon)$ – $K_d = \frac{E_d}{3(1-2\upsilon)}$ 여기서, ρ : 탐사실시 지층에 대한 밀도 υ : 탐사실시 지층에 대한 동포아송비 • 동탄성계수 산정에 필요한 포아송비는 다음 식에 의해 산정 – $\upsilon = \frac{(V_p^2 - 2V_s^2)}{2(V_p^2 - V_s^2)}$ 여기서, V_p, V_s : 압축파 및 전단파 속도 • 평균 전단파속도 계산방법 – 시험심도 / (각층두께 / V_s평균(2)+(각층두께 / V_s평균(3))

탐사 현장	모식도
	

◎ 지반 등급분류(2016 KBC기준)

지반 분류	지반종류의 호칭	전단파속도(Vs ≥ 760m/s 또는 상부지층 30m(Vs 평균지층특성(KBC, 2016)		
		전단파 속도 (m/s)	표준관입시험 $\overline{N}$ (타격횟수/30cm)	비배수전단강도 $\overline{S_u}$(10^{-5}N/mm^2)
S_A	경암 지반	1500 초과	-	-
S_B	보통암 지반	760에서 1500		
S_C	매우 조밀한 토사 지반 또는 연암 지반	360에서 760	>50	>100
S_D	단단한 토사 지반	180에서 360	15에서 50	50에서 100
S_E	연약한 토사 지반	180 미만	<15	<50

◎ 지반 등급분류 【건축물 내진설계기준(KDS 41 17 00) 제정(안) 2019. 03적용】

지반 종류	지반종류의 호칭	분류기준	
		지반암 깊이, H(m)	토층평균전단파속도, $V_{s,soil}$(m/s)
S_1	암반지반	3 미만	-
S_2	얕고 단단한지반	3~20 이하	260 이상
S_3	얕고 연약한지반	3~20 이하	120 초과 260 미만
S_4	깊고 단단한지반	20 초과 50미만	180 이상
S_5	깊고 연약한지반	20 초과 50미만	120 초과 180 미만
	매우 연약한지반	3 이상	120 이하
S_6	부지 고유의 특성평가 및 지반응답해석이 요구되는 지반		

◎ 활용방안

- 지반의 동적특성(동전단탄성계수, 동탄성계수등)을 파악하여 내진 설계 시 활용
- 시추조사 및 각종 시험결과들과의 종합적 분석을 통하여 암반의 파쇄정도, 풍화대, 약층 판별, 지층구분의 정도등 지반 상태 추정

제4장 지반현황 및 조사결과

4.1 지형 및 지질적 현황

4.2 시추결과 및 지층개요

4.3 표준관입시험 결과

4.4 공내수위측정 결과

4.5 공내 탄성파시험

제 4 장 지반현황 및 조사결과

4.1 지형 및 지질적 현황

◎ 지형 및 지질

지형 및 지질	• 본 조사지역은 행정구역상 충청남도 보령시 일원으로 차령산맥의 말단부가 황해와 만나는 곳으로 해안이면서 주변에 높은 산지를 이루는 해변산골을 형성한다. 북측으로 아자산-오서산, 동측으로 장태산-아미산-월명산-옥녀봉, 남측으로 장태봉이 솟아 있다. 차령산맥의 지맥인 성주산을 중심으로 남으로 주렴산, 동으로 아미산, 북으로 오서산이 각각 위치하며, 서해안으로 뻗어나간 구릉지와 해변에 접한 평야도 잘 발달되어 있다므며 다른 지역에 비해 해안선의 굴곡이 심하고 경사도가 완만하여 간석지에 농경지를 개발, 넓은 평야를 가지고 있는 것이 특징이다. 충청남도 최서단인 외연도와 황도까지 관할하는 넓은 바다를 포함한다면, 넓이가 충청남도의 내륙 넓이에 버금가는 광활한 지역으로, 예로부터 산·평야·바다가 잘 조화되어 물산이 풍부한 지리적 여건으로 선사시대부터의 인류 정착지로서 그 흔적이 도처에 남아 있다. • 본 조사지역의 지질을 보면 크게 보아 변성암류와 퇴적암류, 그리고 이들을 관입한 산성 및 중성 맥암류로 구성되어 있다. 특히 중생대의 퇴적암층이 성주산을 중심으로 분포되어 있는데, 이 층에 석탄층이 발달되어 성주탄전을 형성한다.

◎ 지질도

(출처 : 한국지질연구원)

4.2 시추결과 및 지층개요

4.2.1 시추결과

◉ 시추조사 결과

(단위 : m)

공 번	위 치	매립층	퇴적층	풍화토층	풍화암층	연암층	계	비 고
BH-1	본관	1.0	19.0	4.0	4.4	1.6	30.0	탄성파
BH-2		1.0	21.4	4.6	3.0	-	30.0	탄성파
BH-1	창고	0.8	23.4	3.8	2.0	-	30.0	탄성파
BH-1	별관	1.0	25.5	2.5	1.0	-	30.0	탄성파
BH-2		1.2	24.7	2.1	2.0	-	30.0	탄성파

4.2.2 지층개요

지층현황	• 조사지역의 지층구조는 상부로부터 매립층, 퇴적층, 풍화토층, 풍화암층, 연암층이 수직적으로 분포하고 있다.

◉ 시추조사 지층 개요

구분	두께	구 성 성 분	색 조	N치
매립층	0.8~1.2m	• 자갈 및 조개껍데기 섞인 실트질 모래로 구성 • 자갈크기 1~2cm내외임 • 습한상태	갈색 황갈색	8/30 (Loose)
퇴적층	19.0~25.5m	• 자갈 및 조개껍데기 섞인 실트질 모래 및 점토로 구성 • 모래, 점토구간 반복되어 나타남 • 자갈크기 2~7cm내외임 • 습한상태	갈색 황갈색 담회색 회색 암회색	3/30~50/20 (Soft~Hard) (Very Loose ~ Very Dense)
풍화토층	2.1~4.6m	• 실트질 모래로 구성 • 습한상태	황갈색	14/30~50/13 (Medium ~ Very Dense)
풍화암층	1.0~4.4m	• 굴진시 타격에 의해 실트질 모래로 분해	황갈색	50/10~50/3 (Very Dense)
연암층	현 지반고 (GL-)하부 28.4m 부터 분포	• 기반암의 연암 • 절리 및 균열 발달 • 암편 및 단주상의 코어채취 • 본관 BH-1번 공에서만 확인됨	황갈색	-

4.3 표준관입시험 결과

결과	• 조사와 병행하여 지층의 연경도와 상대밀도, 교란시료 채취와 구성성분 파악

◎ 표준관입시험 결과

(단위 : N치)

공 번	위 치	매립층	퇴적층	풍화토층	풍화암층	S.P.T (회)
BH-1	본관	-	6/30~27/30	37/30~50/13	50/10~50/3	28
BH-2		-	3/30~17/30	14/30~50/15	50/10~50/8	30
BH-1	창고	-	3/30~40/30	39/30~50/19	50/10~50/8	30
BH-1	별관	-	3/30~50/20	35/30~50/25	50/10~50/8	30
BH-2		8/30	3/30~50/24	50/23~50/17	50/10~50/9	30

4.4 공내수위측정 결과

결과	• 전반적인 지하수위 분포상태를 파악하기 위해 시추조사가 완료된 다음 작업수가 스스로 안정되도록 일정시간이 경과한 이후에 측정 실시 • 작업이 종료된 이후 일괄 재측정을 통하여 보다 신뢰성 있는 수위측정

◎ 공내수위측정 결과

공 번	위 치	공 내 수 위 현 지표면 GL(-) 기준	분포대상층
BH-1	본관	(-) 11.1m	퇴적층
BH-2		(-) 10.0m	퇴적층
BH-1	창고	(-) 8.8m	퇴적층
BH-1	별관	(-) 4.1m	퇴적층
BH-2		(-) 4.5m	퇴적층

• 지하수위는 계절적 영향(갈수기, 홍수기), 인근지역의 지하수 이용여부, 토공사로 인한 지하수 유출, 공급수원의 원근 등에 의해 변동될 수 있으므로 공사작업 진행 중에도 파손되지 않도록 대표적인 위치에 지하수위 관측 공을 설치하여 지하수위의 지속적인 변화를 파악하는 것이 좋을 것으로 판단된다.

4.5 공내 탄성파시험(Downhole test) 결과

목 적	• 부지 內 지층별 탄성파(P파, S파) 속도를 파악함으로서 대상지역의 동역학적 특성파악 및 동적지반정수를 산출하여 구조물의 합리적인 설계를 위한 동적 지반정보를 제공함에 그 목적이 있다.

◉ 본 탐사는 총 5개 시추 공에 대하여 수행 되었으며 조사 구간은 아래 표에 나타내었다.

Downhole test 현황				
시 추 공 번	위 치	시험심도(m)	적용구간(m)	비 고
BH-1(DHT)	본관	0.0~30.0	0.0~30.0	KBC, KDS
BH-2(DHT)		0.0~30.0	0.0~30.0	KBC, KDS
BH-1(DHT)	창고	0.0~30.0	0.0~30.0	KBC, KDS
BH-1(DHT)	별관	0.0~30.0	0.0~30.0	KBC, KDS
BH-2(DHT)		0.0~30.0	0.0~30.0	KBC, KDS

◉ Downhole test 장비 및 제원

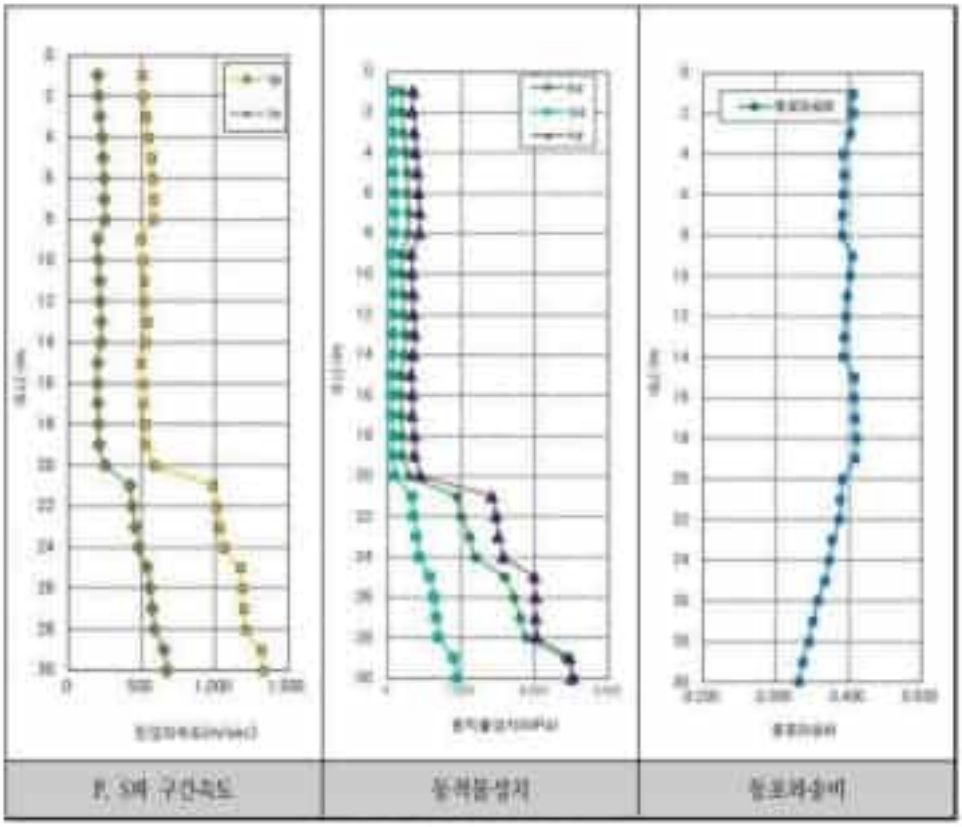
장 비 제 원	장 비 사 진
• MEASURING INSTRUMENT MOD. GEA3 (3 channels, 24 bits)	
• PIEZOELECTRIC STARTER (HAMMER SWITCH) with cable	
• 3D Borehole Geophone MOD. GFA 50 with 50m of lead in cable and 10Hz sensors	
• 기타 부대장비	

4.5.1 탄성파시험(Downhole test) 결과 요약

◎ 본관 BH-1(DH1) Downhole test

Depth (GL,-m)	Rock Type	Vp (m/sec)	Vs (m/sec)	γ (kN/m³)	Dynamic Parameter			
					E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
1.0	매립층	497	198	18.0	2.02E+02	7.20E+01	3.56E+02	0.406
2.0	퇴적층	506	202	17.0	1.99E+02	7.08E+01	3.50E+02	0.405
3.0		527	214	17.0	2.23E+02	7.94E+01	3.76E+02	0.401
4.0		541	220	17.0	2.51E+02	9.02E+01	3.87E+02	0.392
5.0		562	226	17.0	2.69E+02	9.66E+01	4.19E+02	0.393
6.0		570	230	17.0	2.78E+02	9.99E+01	4.30E+02	0.392
7.0		577	244	17.0	2.87E+02	1.03E+02	4.40E+02	0.391
8.0		580	246	17.0	2.92E+02	1.05E+02	4.44E+02	0.390
9.0		493	198	17.0	1.91E+02	6.80E+01	3.31E+02	0.404
10.0		502	204	17.0	2.03E+02	7.22E+01	3.41E+02	0.401
11.0	퇴적층	513	212	17.0	2.18E+02	7.80E+01	3.53E+02	0.397
12.0		516	214	17.0	2.22E+02	7.94E+01	3.56E+02	0.396
13.0		532	223	17.0	2.40E+02	8.63E+01	3.78E+02	0.393
14.0		519	216	17.0	2.30E+02	8.24E+01	3.56E+02	0.392
15.0		494	195	17.0	1.86E+02	6.60E+01	3.35E+02	0.408
16.0		502	198	17.0	1.91E+02	6.80E+01	3.46E+02	0.408
17.0		505	199	17.0	1.93E+02	6.87E+01	3.51E+02	0.408
18.0		519	202	17.0	2.00E+02	7.08E+01	3.71E+02	0.410
19.0		523	206	17.0	2.07E+02	7.36E+01	3.76E+02	0.408
20.0		586	248	17.0	2.97E+02	1.07E+02	4.53E+02	0.391
21.0	풍화토층	986	421	19.0	9.54E+02	3.44E+02	1.43E+03	0.389
22.0		1,006	432	19.0	1.00E+03	3.62E+02	1.48E+03	0.387
23.0		1,028	456	19.0	1.11E+03	4.03E+02	1.51E+03	0.376
24.0		1,054	474	19.0	1.20E+03	4.36E+02	1.57E+03	0.373
25.0	풍화암층	1,167	535	20.0	1.60E+03	5.84E+02	2.00E+03	0.367
26.0		1,184	558	20.0	1.72E+03	6.35E+02	2.01E+03	0.357
27.0		1,192	572	20.0	1.80E+03	6.68E+02	2.01E+03	0.350
28.0		1,205	586	20.0	1.89E+03	7.01E+02	2.03E+03	0.345
29.0	연암층	1,312	651	21.0	2.43E+03	9.09E+02	2.68E+03	0.337
30.0		1,328	667	21.0	2.54E+03	9.53E+02	2.51E+03	0.331

Depth (GL.-m)	Soil&Rock Type	탄성파속도 (평균)		동적물성치 (평균)			
		Vp (m/sec)	Vs (m/sec)	E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
0.0~1.0	매립층	497	198	2.02E+02	7.20E+01	5.58E+02	0.406
1.0~20.0	퇴적층	530	217	2.29E+02	8.18E+01	3.78E+02	0.399
20.0~24.0	풍화토층	1,019	446	1.06E+03	3.85E+02	1.50E+03	0.382
24.0~28.4	풍화암층	1,187	563	1.75E+03	6.46E+02	2.01E+03	0.355
28.4~30.0	연암층	1,320	659	2.48E+03	9.31E+02	2.49E+03	0.334
비 고	• 동적 물성치 산정에 적용된 밀도 값은 일반적인 지층별 값을 사용함.						



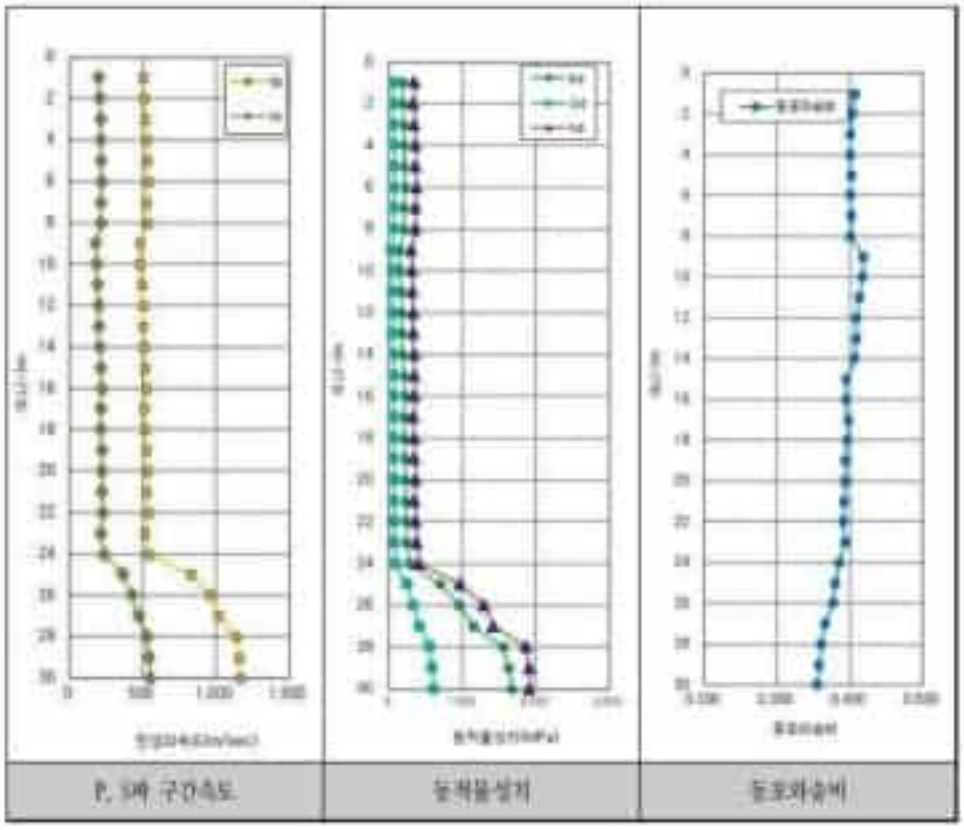
P, S파 구간속도 | 동적물성치 | 동포와송비

Downhole test 결과 그래프

◎ 본관 BH-2(DHT) Downhole test

Depth (GL.-m)	Rock Type	Vp (m/sec)	Vs (m/sec)	ρ (kN/m³)	Dynamic Parameter			
					E_d (kPa)	G_d (kPa)	K_d (kPa)	ν_d
1.0	매립층	499	197	18.0	2.01E+02	7.13E+01	3.62E+02	0.408
2.0	퇴적층	506	204	17.0	2.03E+02	7.22E+01	3.48E+02	0.403
3.0		516	210	17.0	2.14E+02	7.65E+01	3.60E+02	0.401
4.0		520	212	17.0	2.18E+02	7.80E+01	3.65E+02	0.400
5.0		527	214	17.0	2.23E+02	7.94E+01	3.76E+02	0.401
6.0		532	217	17.0	2.29E+02	8.17E+01	3.82E+02	0.400
7.0		521	211	17.0	2.17E+02	7.72E+01	3.68E+02	0.402
8.0		526	214	17.0	2.23E+02	7.94E+01	3.74E+02	0.401
9.0		435	170	17.0	1.56E+02	5.50E+01	3.18E+02	0.419
10.0		480	181	17.0	1.61E+02	5.68E+01	3.24E+02	0.417
11.0		492	190	17.0	1.77E+02	6.26E+01	3.36E+02	0.412
12.0		497	195	17.0	1.86E+02	6.60E+01	3.41E+02	0.409
13.0		499	196	17.0	1.88E+02	6.66E+01	3.43E+02	0.409
14.0		508	202	17.0	1.99E+02	7.08E+01	3.53E+02	0.406
15.0		516	215	17.0	2.24E+02	8.02E+01	3.55E+02	0.395
16.0		520	217	17.0	2.28E+02	8.17E+01	3.60E+02	0.395
17.0		509	210	17.0	2.14E+02	7.65E+01	3.47E+02	0.397
18.0		514	213	17.0	2.20E+02	7.87E+01	3.55E+02	0.396
19.0		521	218	17.0	2.30E+02	8.24E+01	3.61E+02	0.394
20.0		527	221	17.0	2.36E+02	8.47E+01	3.68E+02	0.393
21.0		522	220	17.0	2.34E+02	8.40E+01	3.61E+02	0.392
22.0		531	225	17.0	2.44E+02	8.78E+01	3.72E+02	0.391
23.0	풍화토층	514	216	19.0	2.52E+02	9.05E+01	3.92E+02	0.393
24.0		536	232	19.0	2.89E+02	1.04E+02	4.18E+02	0.395
25.0		825	363	19.0	7.05E+02	2.55E+02	9.79E+02	0.380
26.0		956	425	19.0	9.64E+02	3.50E+02	1.30E+03	0.377
27.0		1,014	467	19.0	1.15E+03	4.23E+02	1.43E+03	0.365
28.0	풍화연암층	1,136	530	20.0	1.56E+03	5.73E+02	1.87E+03	0.361
29.0		1,152	542	20.0	1.63E+03	6.00E+02	1.91E+03	0.359
30.0		1,160	551	20.0	1.68E+03	6.20E+02	1.92E+03	0.354

Depth (GL.-m)	Soil&Rock Type	탄성파속도 (평균)		동적물성치 (평균)			
		Vp (m/sec)	Vs (m/sec)	E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
0.0~1.0	매립층	499	197	2.01E+02	7.13E+01	3.62E+02	0.408
1.0~22.4	퇴적층	512	208	2.10E+02	7.49E+01	3.55E+02	0.402
22.4~27.0	풍화토층	769	341	6.20E+02	2.25E+02	8.47E+02	0.378
27.0~30.0	풍화암층	1,149	541	1.62E+03	5.97E+02	1.90E+03	0.358
비 고	•동적 물성의 산정에 적용된 밀도 값은 일반적인 지층별 값을 사용함.						

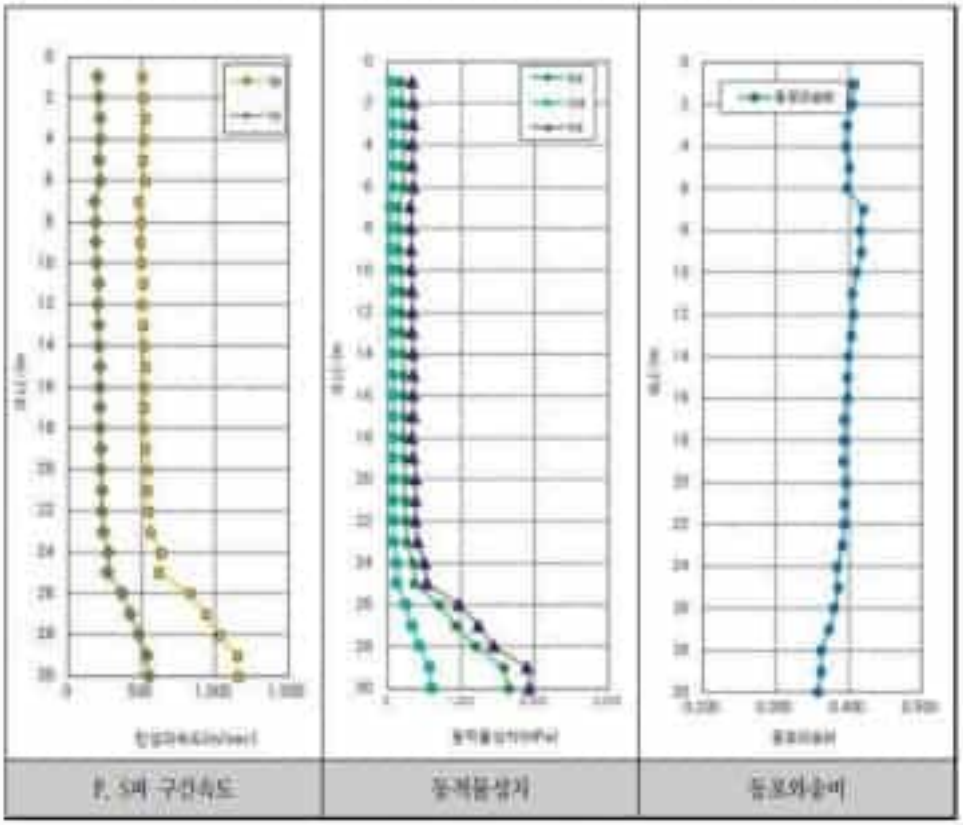


Downhole test 결과 그래프

◎ 창고 BH-1(DHT) Downhole test

Depth (GL-m)	Rock Type	Vp (m/sec)	Vs (m/sec)	γ (kN/m³)	Dynamic Parameter			
					E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
1.0	매립/ 퇴적층	496	196	17.0	1.88E+02	6.66E+01	3.39E+02	0.407
2.0		509	204	17.0	2.03E+02	7.22E+01	3.55E+02	0.404
3.0		521	215	17.0	2.24E+02	8.02E+01	3.64E+02	0.397
4.0		510	212	17.0	2.18E+02	7.80E+01	3.47E+02	0.396
5.0		505	206	17.0	2.06E+02	7.36E+01	3.44E+02	0.400
6.0		520	214	17.0	2.22E+02	7.94E+01	3.63E+02	0.399
7.0		475	177	17.0	1.54E+02	5.43E+01	3.19E+02	0.419
8.0		488	186	17.0	1.70E+02	6.00E+01	3.35E+02	0.415
9.0		481	181	17.0	1.61E+02	5.68E+01	3.26E+02	0.418
10.0		492	192	17.0	1.80E+02	6.39E+01	3.35E+02	0.410
11.0		505	202	17.0	1.99E+02	7.08E+01	3.48E+02	0.405
12.0		496	187	17.0	1.89E+02	6.73E+01	3.37E+02	0.406
13.0		504	203	17.0	2.03E+02	7.15E+01	3.45E+02	0.403
14.0		511	209	17.0	2.12E+02	7.50E+01	3.52E+02	0.400
15.0		520	214	17.0	2.22E+02	7.94E+01	3.63E+02	0.399
16.0		513	212	17.0	2.18E+02	7.80E+01	3.53E+02	0.397
17.0		516	216	17.0	2.26E+02	8.09E+01	3.54E+02	0.394
18.0		513	215	17.0	2.23E+02	8.02E+01	3.50E+02	0.393
19.0		520	219	17.0	2.32E+02	8.32E+01	3.59E+02	0.392
20.0		535	222	17.0	2.39E+02	8.55E+01	3.63E+02	0.396
21.0		539	224	17.0	2.43E+02	8.70E+01	3.80E+02	0.394
22.0		541	227	17.0	2.49E+02	8.94E+01	3.89E+02	0.393
23.0		556	235	17.0	2.67E+02	9.58E+01	4.09E+02	0.391
24.0		625	271	17.0	3.53E+02	1.27E+02	5.08E+02	0.384
25.0	풍화토층	613	263	19.0	3.77E+02	1.36E+02	5.47E+02	0.385
26.0		825	363	19.0	7.05E+02	2.55E+02	9.79E+02	0.380
27.0		934	420	19.0	9.39E+02	3.42E+02	1.24E+03	0.373
28.0		1,026	478	19.0	1.21E+03	4.43E+02	1.45E+03	0.361
29.0	풍화암층	1,143	532	20.0	1.57E+03	5.78E+02	1.91E+03	0.362
30.0		1,158	546	20.0	1.63E+03	6.08E+02	1.93E+03	0.357

Depth (GL.-m)	Soil&Rock Type	탄성파속도 (평균)		동적물성치 (평균)			
		Vp (m/sec)	Vs (m/sec)	E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
0.0~24.2	매립/퇴적층	516	210	2.15E+02	7.68E+01	3.60E+02	0.400
24.2~28.0	풍화토층	650	382	7.75E+02	2.82E+02	1.02E+03	0.374
28.0~30.0	풍화암층	1,152	539	1.61E+03	5.93E+02	1.92E+03	0.360
비 고	•동적 물성치 산정에 적용된 밀도 값은 일반적인 지층별 값을 사용함.						

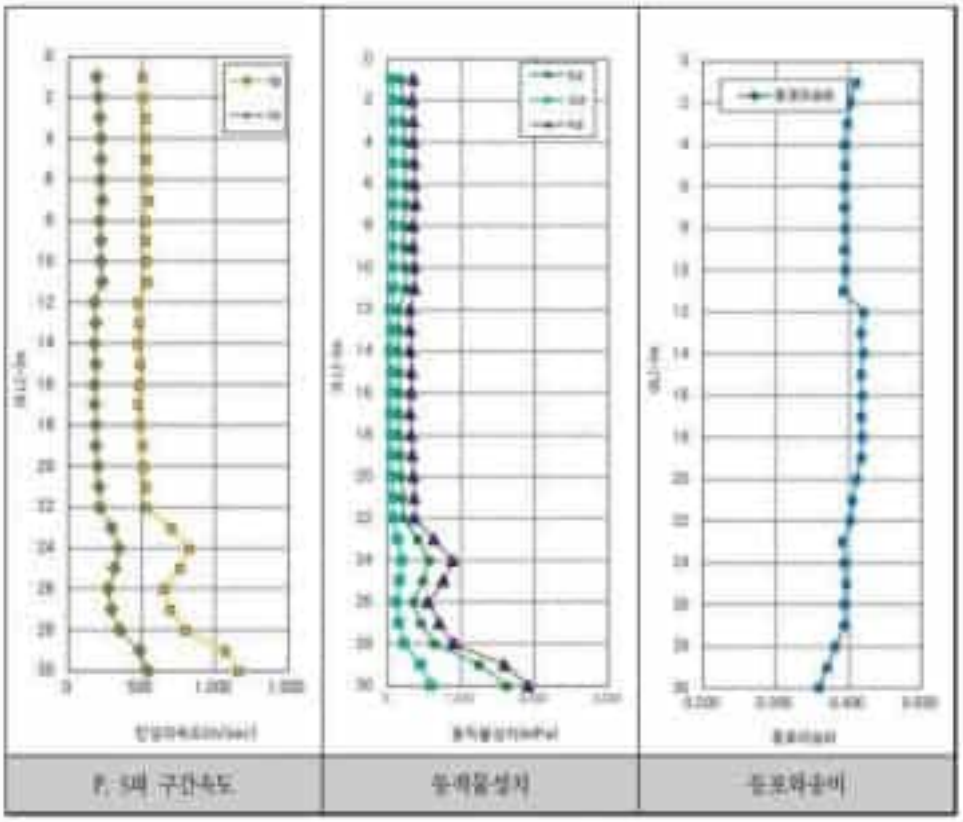


Downhole test 결과 그래프

◎ 발파 BH-1(DHT) Downhole test

Depth (GL-m)	Rock Type	Vp (m/sec)	Vs (m/sec)	γ (kN/m³)	Dynamic Parameter			
					E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
1.0	매립층	496	194	18.0	1.95E+02	6.91E+01	3.60E+02	0.410
2.0	퇴적층	507	205	17.0	2.04E+02	7.29E+01	3.49E+02	0.402
3.0		518	214	17.0	2.22E+02	7.94E+01	3.60E+02	0.397
4.0		521	218	17.0	2.30E+02	8.24E+01	3.61E+02	0.394
5.0		528	220	17.0	2.34E+02	8.40E+01	3.72E+02	0.395
6.0		532	223	17.0	2.40E+02	8.63E+01	3.76E+02	0.393
7.0		538	225	17.0	2.45E+02	8.79E+01	3.85E+02	0.394
8.0		518	216	17.0	2.26E+02	8.09E+01	3.50E+02	0.395
9.0		521	218	17.0	2.30E+02	8.24E+01	3.61E+02	0.394
10.0		528	220	17.0	2.34E+02	8.40E+01	3.72E+02	0.395
11.0		535	226	17.0	2.47E+02	8.86E+01	3.78E+02	0.391
12.0		471	175	17.0	1.51E+02	5.31E+01	3.14E+02	0.420
13.0		479	181	17.0	1.61E+02	5.68E+01	3.22E+02	0.417
14.0	퇴적층	473	176	17.0	1.51E+02	5.37E+01	3.16E+02	0.420
15.0		486	184	17.0	1.66E+02	5.87E+01	3.31E+02	0.416
16.0		480	180	17.0	1.59E+02	5.62E+01	3.25E+02	0.418
17.0		472	178	17.0	1.56E+02	5.50E+01	3.13E+02	0.417
18.0		487	183	17.0	1.65E+02	5.81E+01	3.34E+02	0.418
19.0		495	187	17.0	1.72E+02	6.07E+01	3.44E+02	0.417
20.0		507	196	17.0	1.92E+02	6.80E+01	3.55E+02	0.410
21.0		518	207	17.0	2.09E+02	7.43E+01	3.66E+02	0.405
22.0		526	213	17.0	2.21E+02	7.87E+01	3.75E+02	0.402
23.0		695	294	17.0	4.17E+02	1.50E+02	6.56E+02	0.391
24.0		817	342	17.0	5.66E+02	2.03E+02	8.87E+02	0.394
25.0		758	315	17.0	4.86E+02	1.72E+02	7.67E+02	0.396
26.0		647	271	17.0	3.55E+02	1.27E+02	5.56E+02	0.394
27.0	풍화토층	692	290	19.0	4.54E+02	1.63E+02	7.11E+02	0.393
28.0		796	346	19.0	6.41E+02	2.32E+02	9.01E+02	0.381
29.0		1,064	484	19.0	1.24E+03	4.54E+02	1.59E+03	0.370
30.0	풍화암층	1,153	541	20.0	1.62E+03	5.97E+02	1.92E+03	0.359

Depth (GL.-m)	Soil&Rock Type	탄성파속도 (평균)		동적물성치 (평균)			
		Vp (m/sec)	Vs (m/sec)	E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
0.0~1.0	매립층	496	194	1.95E+02	6.91E+01	3.60E+02	0.410
1.0~26.5	퇴적층	542	219	2.33E+02	8.30E+01	5.99E+02	0.403
26.5~29.0	풍화토층	849	373	7.46E+02	2.70E+02	1.04E+03	0.380
29.0~30.0	풍화암층	1,153	541	1.62E+03	5.97E+02	1.92E+03	0.359
비 고	•동적 물성의 산정에 적용된 밀도 값은 일반적인 지층별 값을 사용함.						

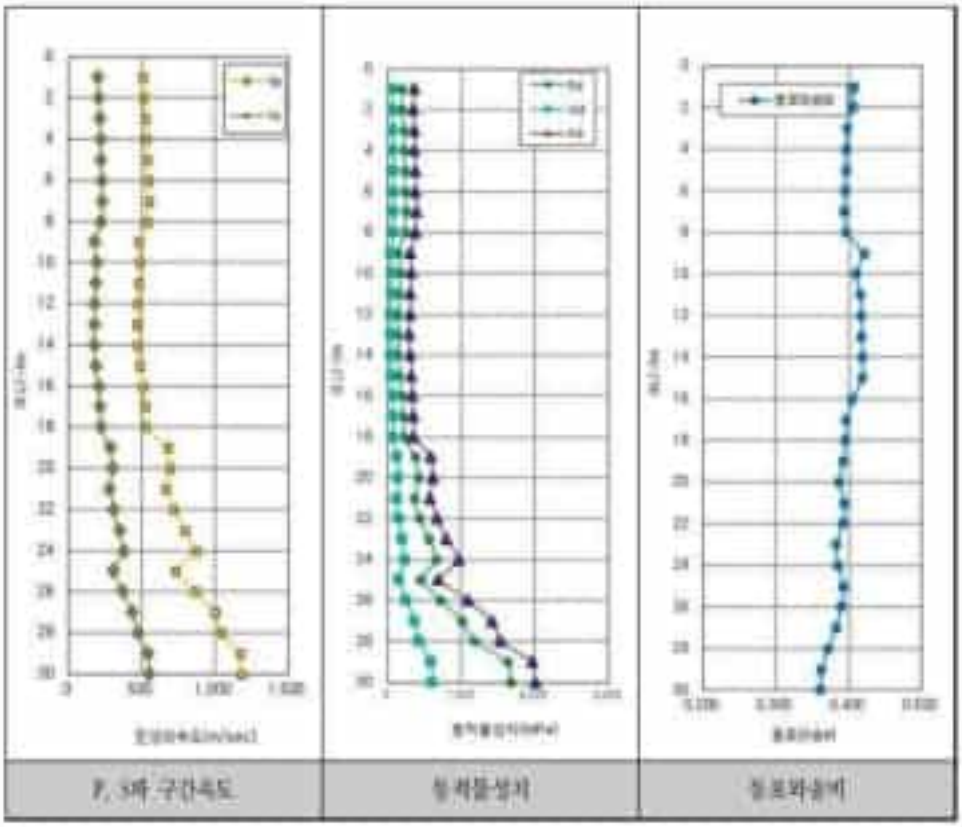


Downhole test 결과 그래프

◎ 발파 BH-2(D)-FT) Downhole test

Depth (GL-m)	Rock Type	Vp (m/sec)	Vs (m/sec)	γ (kN/m³)	Dynamic Parameter			
					E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
1.0	매립층	302	199	18.0	2.05E+02	7.27E+01	3.66E+02	0.407
2.0	퇴적층	511	204	17.0	2.03E+02	7.22E+01	3.57E+02	0.405
3.0		523	216	17.0	2.26E+02	8.09E+01	3.67E+02	0.397
4.0		529	219	17.0	2.32E+02	8.32E+01	3.75E+02	0.397
5.0		537	223	17.0	2.41E+02	8.63E+01	3.85E+02	0.396
6.0		542	226	17.0	2.47E+02	8.86E+01	3.91E+02	0.395
7.0		545	229	17.0	2.53E+02	9.10E+01	3.94E+02	0.393
8.0		537	223	17.0	2.41E+02	8.63E+01	3.85E+02	0.396
9.0		476	176	17.0	1.53E+02	5.37E+01	3.21E+02	0.421
10.0		483	180	17.0	1.77E+02	6.26E+01	3.25E+02	0.409
11.0		479	182	17.0	1.63E+02	5.75E+01	3.21E+02	0.416
12.0		470	177	17.0	1.54E+02	5.43E+01	3.11E+02	0.417
13.0		462	174	17.0	1.48E+02	5.25E+01	3.00E+02	0.417
14.0		471	176	17.0	1.52E+02	5.37E+01	3.13E+02	0.419
15.0		486	182	17.0	1.63E+02	5.75E+01	3.33E+02	0.418
16.0		505	202	17.0	1.99E+02	7.08E+01	3.48E+02	0.408
17.0		517	214	17.0	2.22E+02	7.94E+01	3.58E+02	0.397
18.0		523	218	17.0	2.30E+02	8.24E+01	3.65E+02	0.395
19.0		674	284	17.0	3.50E+02	1.40E+02	6.01E+02	0.392
20.0		691	297	17.0	4.24E+02	1.53E+02	6.24E+02	0.387
21.0		663	278	17.0	3.74E+02	1.34E+02	5.84E+02	0.393
22.0		719	302	17.0	4.40E+02	1.58E+02	6.76E+02	0.391
23.0		792	346	17.0	5.74E+02	2.08E+02	8.11E+02	0.382
24.0		867	374	17.0	6.72E+02	2.43E+02	9.80E+02	0.386
25.0		724	305	17.0	4.49E+02	1.61E+02	6.94E+02	0.392
26.0	풍화토층	863	367	19.0	7.26E+02	2.61E+02	1.10E+03	0.390
27.0		995	435	19.0	1.01E+03	3.67E+02	1.43E+03	0.382
28.0		1,043	471	19.0	1.18E+03	4.30E+02	1.54E+03	0.372
29.0	풍화암층	1,167	543	20.0	1.64E+03	6.02E+02	1.98E+03	0.362
30.0		1,178	550	20.0	1.68E+03	6.17E+02	2.01E+03	0.361

Depth (GL.-m)	Soil&Rock Type	탄성파속도 (평균)		동적물성치 (평균)			
		Vp (m/sec)	Vs (m/sec)	E_d (MPa)	G_d (MPa)	K_d (MPa)	ν_d
0.0~1.2	매립층	502	199	2.05E+02	7.27E+01	5.66E+02	0.407
1.2~25.9	퇴적층	572	234	2.66E+02	9.50E+01	4.41E+02	0.399
25.9~28.0	풍화토층	967	424	9.64E+02	3.49E+02	1.35E+03	0.381
28.0~30.0	풍화암층	1,173	547	1.66E+03	6.10E+02	1.99E+03	0.361
비 고	•동적 물성의 산정에 적용된 밀도 값은 일반적인 지층별 값을 사용함.						



Downhole test 결과 그래프

4.5.2 지반의 등급분류 결과

결 과	• 본관, 창고, 별관 부지 BH-1(DHT), BH-2(DHT)번의 시험 공은 위의 (4.5.1)의 공내 탄성파시험(Downhole test)의 결과를 가지고 전단 탄성파(Vs)의 속도를 산출하였다.

◉ 지반 등급산정

공 번	위 치	시 험 방 법	시험심도 (G.L.-m)	적용심도 (G.L.-m)	설 계 적 용 전단탄성파속도 Vs (m/sec)	지 반 등 급 (2016 KBC기준)	지 반 등 급 (2019 KDS기준)
BH-1	본관	DHT	0.0~30.0	0.0~30.0	267	S_D	S_E
BH-2		DHT	0.0~30.0	0.0~30.0	234	S_D	S_E
BH-1	창고	DHT	0.0~30.0	0.0~30.0	231	S_D	S_E
BH-1	별관	DHT	0.0~30.0	0.0~30.0	225	S_D	S_E
BH-2		DHT	0.0~30.0	0.0~30.0	243	S_D	S_E

본 현장의 각 층후별 전단파속도 결과와 산술적 평균과 지반등급의 산정은 본 지반고(G.L.)를 기준으로 심도 0.0~30.0m지점까지의 전단탄성파속도(Vs) 자료를 적용한 결과 **지반등급산정의 표에서와 같이** <u>건축구조기준(KBC 2016) S_D등급</u>으로, <u>건축물 내진설계기준(KDS 2019. 03) S_E등급</u>으로 나타났다.

상기에서 언급된 지반의 등급은 Downhole test에 의하여 산출된 Vs파 속도값을 이용하여 건축구조기준(KBC 2016)과, 건축물 내진설계기준(KDS 2019. 03)에서 제시한 기준으로 시추공로 구간까지의 자료를 토대로 지반을 분류한 것이므로 실제 설계적용 시 참고자료로서 활용하여야 할 것으로 사료된다.

제5장 지층별 지반정수

5.1 토사층의 지반정수

5.2 풍화암의 지반정수

5.3 암층의 지반정수

제 5 장 지층별 지반정수

5.1 토사층의 지반정수

◎ 경험식에 의한 강도정수(c, φ) 산정결과

• 점착력 산정식		• 내부마찰각 산정식	
φ = 0 으로서 $c = \frac{q_u}{2}$		- Dunham	$\phi = \sqrt{12N} + 20$
- Dunham	$q_u = \frac{N}{0.77}$	- Meyerhof	$\phi = 0.25N + 32.5$
- Terzaghi-Peck	$q_u = \frac{N}{0.02}$	- Peck	$\phi = 0.3N + 27$
- Ohsaki	$q_u = 4 + \frac{N}{3}$	- Ohsaki	$\phi = \sqrt{20N} + 15$
		- 도로교시방서	$\phi = \sqrt{15N} + 15$

◎ 도로설계요령(한국도로공사)

종 류	재료의 상태	단위중량 (tonf/m³)	점착력, c (tonf/m²)	내부마찰각, φ (°)	통일분류
자 갈	조밀한 것	2.0	0	35	GW, GP
	조밀하지 않은 것 또는 입도가 나쁜것	1.8	0	30	
모 래	조밀한 것	2.0	0	35	SW, SP
	조밀하지 않은 것 또는 입도가 나쁜것	1.8	0	30	
사 질 토	조밀한 것	1.9	3이하	30	SM, SC
	조밀하지 않은 것	1.7	0	25	
점 성 토	단단한것(N=8~15)	1.8	5	25	ML, CL
	약간 연한 것, (N=4~8)	1.7	3	20	
	연한것(N=2~4)	1.7	1.5	15	
점토 및 실트	단단한 것, (N=8~15)	1.7	5	20	CH,MH,ML
	약간 연한 것(N=4~8)	1.6	3	15	
	연한것(N=2~4)	1.4	1.5	10	

◎ 토질역학(김상규)

지 층	상 태	단위중량 (ton/m³)		
		건 조	반 포	포 화
모래질 자갈	느슨	1.4~1.7	1.8~2.0	1.9~2.1
	중중	1.9~2.1	2.0~2.3	2.1~2.4
가정모래, 중간모래	느슨	1.3~1.5	1.6~1.9	1.8~1.9
	중중	1.7~1.8	1.8~2.1	2.0~2.1
균등한 모래	느슨	1.4~1.5	1.5~1.9	1.8~1.9
	중중	1.7~1.8	1.8~2.1	2.0~2.1
가정 실트	느슨	1.3~1.5	1.5~1.9	1.8~1.9
	중중	1.6~1.7	1.7~2.1	2.0~2.1
실트	연약	1.3~1.5	1.6~2.0	1.8~2.0
	중간	1.6~1.7	1.7~2.1	2.0~2.1
	견고	1.8~1.9	1.8~1.9	1.8~2.2
소성이 작은 점토	연약	1.3~1.4	1.5~1.8	1.8~2.0
	중간	1.5~1.8	1.7~2.1	1.9~2.1
	견고	1.8~1.9	1.8~2.2	2.1~2.2
소성이 큰 점토	연약	0.9~1.5	1.2~2.8	1.4~1.8
	중간	1.5~1.8	1.5~2.0	1.7~2.1
	견고	1.8~2.0	1.7~2.2	1.9~2.3

◎ 지반조사편람(서울특별시)

지 층	단위체적중량 γ_d (ton/m³)	점착력, c (ton/m²)	내부마찰각, φ (°)
풍화토층	1.7~2.0	0.0~10.0	25~30

◎ 국내사례 (사질토, 점성토)

구 분	단위중량 γ_d (ton/m³)	점착력 c(ton/m²)	내부마찰각 φ (°)
지반조사편람 (서울특별시,1996)	1.8	1.0	25
지반공학책	2.0	2.0	25
군위~남영(한도대교)	1.8~1.9	1.0~4.0	25~32
보성~김성리 7공구 광도간설	31.8	1.0	28
목포~광양 1공구 고속도로	1.8	1.0	30
호남고속도로	1.7~1.75	2.5~3.0	31~35
88고속도로	1.8	3.0	30

● Geotechnical Engineering Investigation (Roy E. Hunt)

material		compactness	Dr(%)	N	γ_d (tonf/m³)	void ratio	strength (φ)
GW	well-graded gravels, gravel-sand mixtures	dense	75	90	2.21	0.22	40
		medium dense	50	55	2.08	0.28	36
		loose	25	<28	1.97	0.36	32
GP	poorly grade gravels, gravel sand mixtures	dense	75	70	2.04	0.33	38
		medium dense	50	50	1.92	0.39	35
		loose	25	<20	1.83	0.47	32
SW	well-graded sands, gravelly sands	dense	75	65	1.89	0.43	37
		medium dense	50	35	1.79	0.49	34
		loose	25	<15	1.70	0.57	30
SP	poorly graded sands, gravelly sands	dense	75	50	1.76	0.52	36
		medium dense	50	30	1.67	0.60	33
		loose	25	<10	1.59	0.65	29
SM	silty sands	dense	75	45	1.65	0.62	35
		medium dense	50	25	1.56	0.74	32
		loose	25	<8	1.49	0.80	29
ML	inorganic silts, fine sands	dense	75	35	1.49	0.0	33
		medium dense	50	20	1.41	0.90	31
		loose	25	<4	1.35	1.0	27

● PILE DESIGN and CONSTRUCTION PRACTICE : Cohesive and Organic Soil (M.J. Tomlinson)

soil type, compactness & consistency	γ_d (tonf/m³)	γ_{sat} (tonf/m³)	c (tonf/m²)
soft plastic clay	1.6 ~ 1.9	0.6 ~ 0.9	2 ~ 4
firm plastic clay	1.75 ~ 2.0	0.75 ~ 1.1	4 ~ 7.5
stiff plastic clay	1.8 ~ 2.1	0.8 ~ 1.1	7.5 ~ 15
soft slightly plastic clay	1.7 ~ 2.0	0.7 ~ 1.0	2 ~ 4
firm slightly plastic clay	1.8 ~ 2.1	0.8 ~ 1.1	4 ~ 75
stiff slightly plastic clay	2.1 ~ 2.2	1.1 ~ 1.2	7.5 ~ 15
stiff to very stiff clay	2.0 ~ 2.3	1.0 ~ 1.3	15 ~ 30
organic clay	1.4 ~ 1.7	0.4 ~ 0.7	-
peat	1.05 ~ 1.4	0.05 ~ 0.40	-

● PILE DESIGN and CONSTRUCTION PRACTICE : Cohesionless Soil (M.J. Tomlinson)

soil type, compactness & consistency	γ_t (ton/m³)	γ_{sat} (ton/m³)	ϕ (ton/m²)
loose gravel with low sand content	1.6 ~ 1.9	0.9	28 ~ 30
medium dense gravel with low sand content	1.8 ~ 2.0	1.0	30 ~ 36
dense to very dense gravel with low sand content	1.9 ~ 2.1	1.1	36 ~ 46
loose well-graded sandy gravel	1.8 ~ 2.0	1.0	28 ~ 30
medium-dense well-graded sandy gravel	1.9 ~ 2.1	1.1	30 ~ 36
dense well graded sandy gravel	2.0 ~ 2.2	1.2	36 ~ 45
loose clayey sandy gravel	1.8 ~ 2.0	1.0	28 ~ 30
medium-dense clayey sandy gravel	1.9 ~ 2.1	1.1	30 ~ 35
dense to very dense clayey sandy gravel	2.1 ~ 2.2	1.2	35 ~ 40
sloose coarse to fine sand	1.7 ~ 2.0	1.0	28 ~ 30
medium-dense coarse to fine sand	2.0 ~ 2.1	1.1	30 ~ 35
dense to very dense coarse to fine sand	2.1 ~ 2.2	1.2	35 ~ 40
loose fine and silty sand	1.5 ~ 1.7	0.7	28 ~ 30
medium-dense fine and silty sand	1.7 ~ 1.9	0.9	30 ~ 35
dens to very dense fine and silty sand	1.9 ~ 2.1	1.1	35 ~ 40

5.2 풍화암의 지반정수

◉ 지반조사편람(서울특별시)

지 층	단위중량 γ_t (tonf/m³)	점착력 c (tonf/m²)	내부마찰각 φ (°)	변형계수 E (tonf/m²)	포아송비 ν
풍화암	2.0~2.2	10~30	30~35	10,000~20,000	0.30~0.40

◉ 도로설계요령(한국도로공사)

구 분	일반하천설계		경도정수		비 고
	T(30년)	W(20년)	내부마찰각 (φ, °)	점착력 (c, tonf/m²)	
풍화암 또는 매우가 극심한 지반일 경우	20 이하	10 이하	30	10	일반의 파쇄상태에 따른 전단강도 제한

◉ 기존사례

구 분		단위중량 (tonf/m³)	변형계수 (tonf/m²)	점착력 (tonf/m²)	내부마찰각 (°)	포아송비	비 고
지반공학의 학습방법론		2.0	–	5.0	30	–	–
		2.6	200,000	8.0~9.0	25	0.20	–
목포~광양 1공구		2.0	–	1.8	35	–	–
군위~남창(안도재교)		2.0	20,000	5.0	33	0.29	–
보령~임천리 7공구		2.0	27,000	3.2	32	0.30	–
경부선 (성환~천안)	A사	2.1	30,000	3.0	30	0.30	–
	B사	2.0	20,000	5.0	32	0.29	–
	C사	1.9	–	5.0	30	–	–

◉ Hunt (Geotechnical Engineering Investigation Manual)

풍 화 정 도	점착력 (c_u, tonf/m²)	내부마찰각 (φ, °)	비 고
decomposed	0.0	27.0~31.0	
weathered	–	26.0~33.0	
partly weathered	–	27.0~31.0	
relatively sound	–	29.0~32.0	
decomposed, fine-grained	0.0 (포화시)	25.0~34.0	
decomposed, coarse-grained	–	36.0~38.0	
decomposed, coarse-grained	–	36.0~38.0	

5.3 암층의 지반정수

◎ 지반조사 편람(서울특별시)

지 층	단위중량 γ_t (tonf/m³)	점착력 C tonf/m²	내부마찰각 φ (°)	변형계수 E tonf/m²	포아송비 ν
풍화암	2.0~2.2	1.0~3.0	30~35	10,000~20,000	0.30~0.40
연 암	2.3 ~2.5	3.0~6.0	30~40	20,000~40,000	0.25~0.30
보통암	2.5~2.7	15.0~20.0	35~40	40,000~80,000	0.20

◎ 도로설계 요령(한국도로공사)

암석분류(경S)	암 반 파 쇄 상 태		암반의 변단강도지수	
	T.C.R	R.Q.D	φ(°)	C(kg/cm²)
강한 풍화암으로서 파쇄가 거의 없는 경우의 대부분의 연경암	20~30%	10~25%	30	1.3
	40~50%	25~35%	35	1.5
	70% 이상	40~50%	40	2.0

◎ 기존사례

프 로 젝 트 명	분류	단위중량 (tonf/m³)	점착력 (tonf/m²)	내부마찰각 (°)	포아송비	비 고
서울시지반조사편람	풍화암	2.0~2.2	5.0	35	0.30~0.40	-
	연 암	2.3~2.5	3.0~6.0	30~40	0.25~0.30	-
	경 암	2.5~2.7	15.0~20.0	35~45	0.20	-
동해선 복선~대원간 철도기본설계	풍화암	2.1	5.0	33	0.30	-
	연 암	2.5	7.0	35	0.26	-
	경 암	2.7	5.0	47	0.22	-
경전선 삼랑진~진주5공구 (마산~창원간) 복선전철 건설공사	풍화암	2.0	3.0	32	0.28	-
	연 암	2.5	6.0	35	0.22	-
	경 암	2.7	10.0	45	0.20	-
보성~임성리 7공구 철도 건설	풍화암	2.1	3.0	30	0.30	-
	연 암	2.4	10.0	30	0.24	-
	경 암	2.5	15.0	43	0.22	-

부 록

1. 시추위치도

2. 시추주상도

3. 지층단면도

4. 현장조사사진성과

1. 시 추 위 치 도

지반조사 위치평면도

범례 : 시추 및 탐날파

PROJECT TITLE	DRAWING TITLE	SCALE	DATE	SHEET NO.
이음특별자치도부설직업교육원 대전정보통신교육원 내진성능향상기술의 지반조사	지 반 조 사 위 치 평 면 도	NONE	2020. 07. .	주식회사 가온기초[illegible]

2. 시 추 주 상 도

시 추 주 상 도

DRILL LOG

2 페 중 1

공 사 명 PROJECT	서울특별시교육청학생교육원 대전원 해교육원 내진성능평가용역 지반조사	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2055 (본관동) 부지內	지 반 표 고 ELEVATION	현지반고 m
일 자 DATE	2020년7월16일	지 하 수 위 GROUND WATER	(GL-) 11.1 m
		감 독 자 INSPECTOR	강 재 구

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	불연속면	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
-1.000		1.0	1.0		매립층	▶매립층(0.0 ~ 1.0m) - 갈색 - 자갈 및 조개껍데기 혼합 실트질 모래로 구성 - 자갈크기 1~2cm내외함 - 느슨함 - 습한상태		S-1	○	1.0	7/30	
								S-2	○	2.0	9/30	
								S-3	○	3.0	11/30	
								S-4	○	4.0	15/30	
	5					▶퇴적층(1.0 ~ 20.0m) - 갈색, 황갈색, 담회색, 회색 - 자갈 및 조개껍데기 혼합 실트질 모래 및 점토로 구성 - 모래, 점토구간 반복되며 나타남 - 자갈크기 2~6cm내외함 - 상부층고~매우견고한 견결도 - 느슨~보통조밀한 상대밀도 - 습한상태		S-5	○	5.0	21/30	
								S-6	○	6.0	25/30	
								S-7	○	7.0	27/30	
								S-8	○	8.0	27/30	
								S-9	○	9.0	7/30	
	10				퇴적층			S-10	○	10.0	9/30	
								S-11	○	11.0	10/30	
								S-12	○	12.0	11/30	
								S-13	○	13.0	17/30	
								S-14	○	14.0	15/30	
	15							S-15	○	15.0	9/30	
								S-16	○	16.0	7/30	
								S-17	○	17.0	8/30	
								S-18	○	18.0	8/30	
								S-19	○	19.0	9/30	
-20.000		20.0	19.0						◎			

시 추 주 상 도

DRILL LOG

2쪽 중 2

공 사 명 PROJECT	서울특별시교육청동작생교육원 대지위 평교육원 내진성능평가용역 지반조사	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2055 (본관동) 부지內	지 반 표 고 ELEVATION	현지반고 m
일 자 DATE	2020년7월16일	지 하 수 위 GROUND WATER	(GL-) 11.1 m
		감 독 자 INSPECTOR	강 재 구

(주) 시료채취방법의 기호 REMARKS

- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 혼드러진 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	통일 USCS	시료 Sample 시료 번호	채취 방법	채취 심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
					풍화토	▶풍화토(20.0 ~ 24.0m) - 황갈색 - 실트질 모래로 구성 - 습潤~매우포화 - 이완상태		S-20		20.0	37/30	
								S-21	○	21.0	50/16	
								S-22	○	22.0	50/14	
								S-23	○	23.0	50/13	
-24.000		24.0	4.0					S-24	○	24.0	50/10	
	25				풍화암	▶풍화암(24.0 ~ 28.4m) - 황갈색 - 실트질 모래에 의해 실트질 모래로 분해 - 매우포화		S-25	○	25.0	50/ 8	
								S-26	○	26.0	50/ 5	
									⊗	27.0	50/ 4	
									⊗	28.0	50/ 3	
-28.400		28.4	4.4									
					연암층	▶연암층(28.4 ~ 30.0m) - 황갈색 - 지반에의 연암 - 절리 등 균열 발달 - 암편 및 연주상의 연암파쇄			●	28.0		
-30.000	30	30.0	1.6									

심도 30.0m에서 시추종료

35

시 추 주 상 도

DRILL LOG

2쪽 중 1

공 사 명 PROJECT	서울특별시교육청학생교육원 대지위해요소 내진성능평가용역 지반조사	공 번 HOLE No.	BH-2(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2055 (본관동) 부지內	지반높고 ELEVATION	현지반고 m
날 짜 DATE	2020년7월16일	지하수위 GROUND WATER	(GL-) 10.0 m
		감 독 자 INSPECTOR	강 재 구

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Column Section	지층명	지 층 설 명 Description	통일 USCS 분류	시료 Sample 시료 번호	채취 방법	채취 심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
±1.000		1.0	1.0		매립층	▶매립층(0.0 ~ 1.0m) - 갈색 - 자갈 및 조개껍데기 섞인 실트질 모래로 구성 - 자갈크기 1~2cm내외함 - 느슨함 - 습한상태						
	5				퇴적층	▶퇴적층(1.0 ~ 22.4m) - 암회색, 황갈색, 갈색 - 자갈 및 조개껍데기 섞인 실트질 모래 및 점토로 구성 - 모래, 점토구간 반복되며 나타남 - 자갈크기 1~5cm내외함 - 연약~매우연고한 연경도 - 매우느슨~상대조밀한 상대밀도 - 습한상태		S-1	○	1.0	7/30	
								S-2	○	2.0	9/30	
								S-3	○	3.0	8/30	
								S-4	○	4.0	9/30	
								S-5	○	5.0	11/30	
								S-6	○	6.0	12/30	
								S-7	○	7.0	10/30	
								S-8	○	8.0	11/30	
								S-9	○	9.0	3/30	
	10							S-10	○	10.0	4/30	
								S-11	○	11.0	5/30	
								S-12	○	12.0	7/30	
								S-13	○	13.0	7/30	
								S-14	○	14.0	9/30	
	15							S-15	○	15.0	11/30	
								S-16	○	16.0	12/30	
								S-17	○	17.0	10/30	
								S-18	○	18.0	11/30	
								S-19	○	19.0	13/30	

시 추 주 상 도

DRILL LOG

2 매 중 2

공 사 명 PROJECT	서울특별시교육청동작센교육원 대지위 재교육원 내진보강공사 지반조사	공 번 HOLE No.	BH-2(DHT)
위 치 LOCATION	충청남도 부여시 신흥읍 2055 (본관동) 부지內	지 반 표 고 ELEVATION	현지반고 m
일 자 DATE	2020년7월16일	지 하 수 위 GROUND WATER	(GL-) 10.0 m
		감 독 자 INSPECTOR	김 재 규

(주) 시험종류별범례 기호 REMARKS

- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	통일분류 U.S.C.S.	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
								S-20		20.5	15/30	
								S-21	○	21.0	16/30	
-22.400		22.4	21.4					S-22	○	22.5	17/30	
					풍화토	▶ 풍화토(22.4 ~ 27.0m) - 회갈색 - 실트질 모래로 구성 - 단계조밀~매우조밀함 - 습한상태		S-23	○	23.5	14/30	
								S-24	○	24.5	24/30	
	25							S-25	○	25.5	50/27	
								S-26	○	26.5	50/15	
-27.000		27.0	4.6					S-27	○	27.5	50/13	
					풍화암	▶ 풍화암(27.0 ~ 30.0m) - 회갈색 - 굴진시 타격에 의해 실트질 모래로 분해 - 매우조밀함		S-28	○	28.5	50/10	
								S-29	○	29.5	50/ 9	
-30.000		30.0	3.0					S-30	○	30.5	50/ 8	
						심도 30.0m에서 시추종료						
	35											

시 추 주 상 도

DRILL LOG

2쪽 중 1

공 사 명 PROJECT	서울특별시교육청학생교육원 대지위 해교육원 내진성능평가용역 지반조사	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2055 (정고동) 부지內	지 반 표 고 ELEVATION	현지반고 m
날 짜 DATE	2020년7월16일	지 하 수 위 GROUND WATER	(GL-) 8.8 m
		감 독 자 INSPECTOR	강 재 구

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ○ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	통일분류 U.S.C.	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows)	N blow 10 20 30 40 50
-0.800		0.8	0.8		매립층	▶매립층(0.0 ~ 0.8m) - 황갈색 - 자갈 및 조개껍데기 섞인 실트질 모래로 구성 - 자갈크기 1~2cm내외함 - 느슨함 - 습한상태						
					퇴적층	▶퇴적층(0.8 ~ 24.2m) - 암회색, 황갈색, 갈색 - 자갈 및 조개껍데기 섞인 실트질 모래 및 점토로 구성 - 모래, 점토구간 반복되며 나타남 - 자갈크기 1~5cm내외함 - 연약~굳음한 연경도 - 매우느슨~조밀한 상대밀도 - 습한상태		S-1	○	1.0	7/30	
								S-2	○	2.0	9/30	
								S-3	○	3.0	12/30	
								S-4	○	4.0	10/30	
	5							S-5	○	5.0	9/30	
								S-6	○	6.0	11/30	
								S-7	○	7.0	3/30	
								S-8	○	8.0	5/30	
								S-9	○	9.0	4/30	
	10							S-10	○	10.0	5/30	
								S-11	○	11.0	9/30	
								S-12	○	12.0	8/30	
								S-13	○	13.0	9/30	
								S-14	○	14.0	10/30	
	15							S-15	○	15.0	11/30	
								S-16	○	16.0	17/30	
								S-17	○	17.0	13/30	
								S-18	○	18.0	13/30	
								S-19	○	19.0	14/30	
									○			

시 추 주 상 도

DRILL LOG

공 사 명 PROJECT	[illegible]	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2055 (정고동) 부지內	지반표고 ELEVATION	현지반고 m
날 짜 DATE	2020년7월16일	지하수위 GROUND WATER	(GL-) 8.8 m
		감 독 자 INSPECTOR	김 재 규

(주) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ○ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	통일분류 U.S.C.S.	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows/m)	N blow 10 20 30 40 50
								S-20		20.0	15/30	
								S-21	○	21.0	16/30	
								S-22	○	22.0	18/30	
								S-23	○	23.0	28/30	
-24.200		24.2	23.4					S-24	○	24.0	40/30	
	25				풍화암	▶ 풍화암(24.2 ~ 28.0m) - 황갈색 - 심한 모래로 구성 - 고결~매우조밀함 - 습윤상태		S-25	○	25.0	30/30	
								S-26	○	26.0	50/27	
								S-27	○	27.0	50/19	
-28.000		28.0	3.8					S-28	○	28.0	50/19	
					풍화토	▶ 풍화토(28.0 ~ 30.0m) - 황갈색 - 굴진시 [illegible] 의해 실트질 모래로 변해 - 매우조밀함		S-29	○	29.0	50/ 9	
-30.000		30.0	2.0					S-30	○	30.0	50/ 6	
						심도 30.0m에서 시추종료						
	30											

시 추 주 상 도

DRILL LOG

2쪽 중 1

공 사 명 PROJECT	서울특별시교육청학생교육원 대전원 해금북문 내진보강공사 지반조사	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2020 (쌍관동) 부지內	지반높고 ELEVATION	현지반고 m
일 자 DATE	2020년7월17일	지하수위 GROUND WATER	(GL-) 4.1 m
		감 독 자 INSPECTOR	강 재 구

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란자갈 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	불연속면	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows)	N blow 10 20 30 40 50
-1.000		1.0	1.0		매립층	▶매립층(0.0 ~ 1.0m) - 갈색 - 자갈 및 조개껍데기 섞인 실트질 모래로 구성 - 자갈크기 1~2cm내외함 - 느슨함 - 습한상태						
	5				퇴적층	▶퇴적층(1.0 ~ 26.5m) - 갈색, 암회색, 황갈색 - 자갈 및 조개껍데기 섞인 실트질 모래 및 점토로 구성 - 모래, 점토구간 반복되며 나타남 - 자갈크기 2~7cm내외함 - 연약~굳음한 연경도 - 매우느슨~매우조밀한 상대밀도 - 습한상태		S-1	○	1.0	5/30
								S-2	○	2.0	9/30	
								S-3	○	3.0	12/30	
								S-4	○	4.0	14/30	
								S-5	○	5.0	16/30	
								S-6	○	6.0	19/30	
								S-7	○	7.0	21/30	
								S-8	○	8.0	14/30	
								S-9	○	9.0	16/30	
	10							S-10	○	10.0	17/30	
								S-11	○	11.0	16/30	
								S-12	○	12.0	5/30	
								S-13	○	13.0	4/30	
								S-14	○	14.0	5/30	
	15							S-15	○	15.0	5/30	
								S-16	○	16.0	4/30	
								S-17	○	17.0	5/30	
								S-18	○	18.0	4/30	
								S-19	○	19.0	5/30	
									○			

시 추 주 상 도

DRILL LOG

2쪽 중 2

공 사 명 PROJECT	서울특별시교육청동작센터교육원 대지위 재교육원 내진보강공사를 위한 지반조사	공 번 HOLE No.	BH-1(DHT)
위 치 LOCATION	충청남도 보령시 신흑동 2020 (옛관동) 부지內	지반표고 ELEVATION	현지반고 m
일 자 DATE	2020년7월17일	지하수위 GROUND WATER	(GL-) 4.1 m
		감 독 자 INSPECTOR	강 재 구

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란되지 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지 층 설 명 Description	통일분류 USCS	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
	25							S-20		20.5	8/30	
								S-21	○	21.5	10/30	
								S-22	○	22.5	13/30	
								S-23	○	23.5	47/30	
								S-24	○	24.5	50/25	
								S-25	○	25.5	50/27	
								S-26	○	26.5	32/30	
-26.500		26.5	25.5									
					풍화토	▶ 풍화토(26.5 ~ 29.0m) - 황갈색 - 실트질 모래로 구성 - 점토~매우조밀함 - 습한상태		S-27	○	27.5	35/30	
								S-28	○	28.5	50/25	
-29.000		29.0	2.5					S-29	○	29.5	50/15	
-30.000	30	30.0	1.0		풍화토	▶ 풍화암(29.0 ~ 30.0m) - 황갈색 - 굴진시 타격에 의해 실트질 모래로 분해 - 매우조밀함		S-30	○	30.0	50/4	
						심도 30.0m에서 시추종료						

시 추 주 상 도

DRILL LOG

2쪽 중 1

공 사 명 PROJECT	서울특별시교육청학생교육원 대전원 해교육원 내진보강공사 지반조사	공 번 HOLE No.	BH-2(DHT)
위 치 LOCATION	충청남도 부여시 신흥동 2020 (쌍관동) 부지內	지반높고 ELEVATION	현지반고 m
날 짜 DATE	2020년7월17일	지하수위 GROUND WATER	(GL-) 4.5 m
		감 독 자 INSPECTOR	강 재 규

(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ○ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 교란자갈 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Column Section	지층명	지층설명 Description	불연속면	시료 Sample 시료번호	채취방법	채취심도	표준관입시험 Standard Penetration Test N치 (Blows/30cm)	N blow 10 20 30 40 50
-1.200		1.2	1.2		매립층	▶매립층(0.0 ~ 1.2m) - 갈색 - 자갈 및 조개껍데기 혼합 실트질 모래로 구성 - 자갈크기 1~2cm내외함 - 느슨함 - 습한상태		S-1	○	1.0	8/30	
								S-2	○	2.0	9/30	
								S-3	○	3.0	11/30	
								S-4	○	4.0	14/30	
	5					▶퇴적층(1.2 ~ 25.9m) - 갈색, 암회색, 황갈색 - 자갈 및 조개껍데기 혼합 실트질 모래 및 점토로 구성 - 모래, 점토구간 반복되며 나타남 - 자갈크기 2~7cm내외함 - 연약~굳음한 연경도 - 매우느슨~매우조밀한 상대밀도 - 습한상태		S-5	○	5.0	16/30	
								S-6	○	6.0	17/30	
								S-7	○	7.0	21/30	
								S-8	○	8.0	16/30	
								S-9	○	9.0	4/30	
	10							S-10	○	10.0	7/30	
					퇴적층			S-11	○	11.0	5/30	
								S-12	○	12.0	4/30	
								S-13	○	13.0	5/30	
								S-14	○	14.0	4/30	
	15							S-15	○	15.0	5/30	
								S-16	○	16.0	9/30	
								S-17	○	17.0	11/30	
								S-18	○	18.0	13/30	
								S-19	○	19.0	30/30	
									○			

시 추 주 상 도

DRILL LOG

2쪽 중 2

공 사 명 PROJECT	[illegible]	공 번 HOLE No.	BH-2(DHT)
위 치 LOCATION	충청남도 보령시 선촌동 2020 (옛관동) 부지內	지반표고 ELEVATION	현지반고 m
일 자 DATE	2020년7월17일	지하수위 GROUND WATER	(GL-) 4.5 m
		감 독 자 INSPECTOR	강 재 구

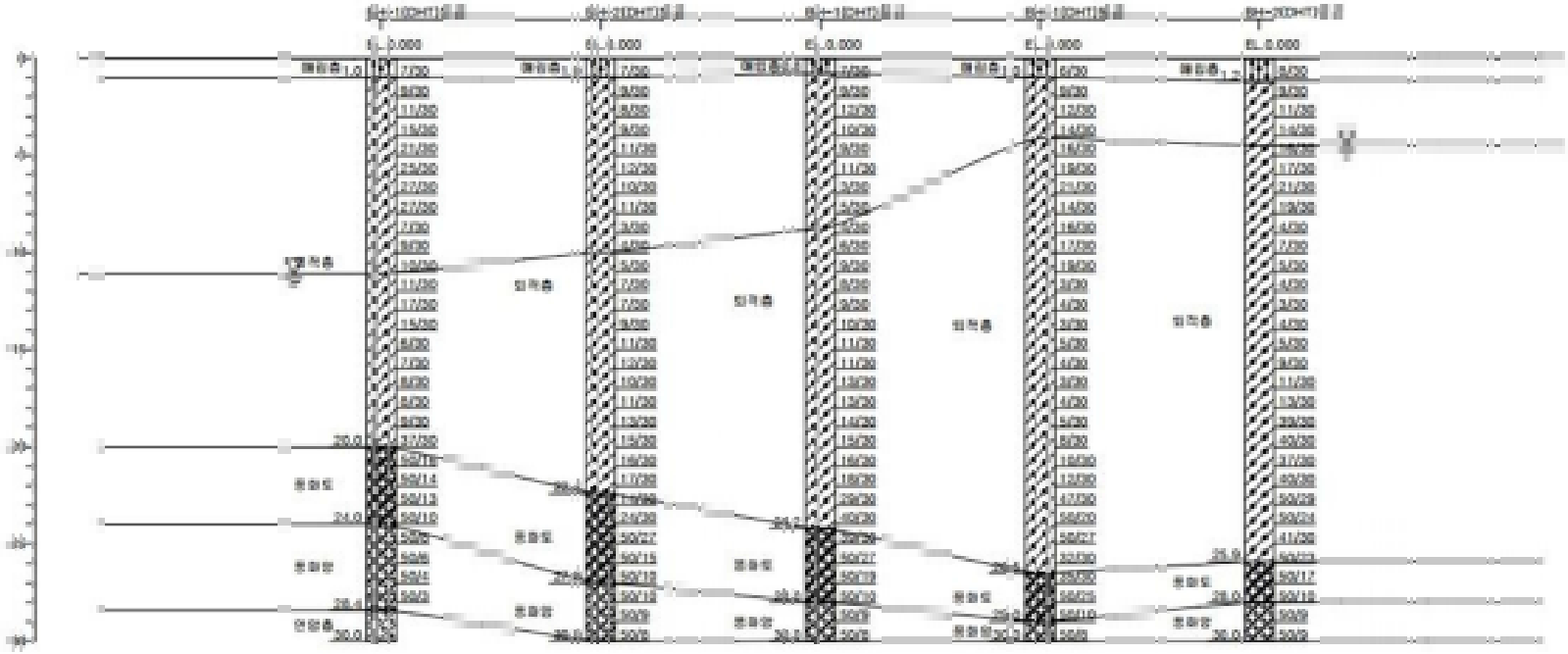
(※) 시료채취방법의 기호 REMARKS
- ○ 자연시료 U.D. SAMPLE
- ◎ 표준관입시험용 채취시료 S.P.T. SAMPLE
- ● 연암시료 CORE SAMPLE
- ⊗ 혼드러진 시료 DISTURBED SAMPLE

표고 Elev. m	Scale m	심도 Depth m	층후 Thickness m	주상도 Columnar Section	지층명	지층설명 Description	불연속면	시료 Sample 시료번호	재취방법	재취심도	표준관입시험 Standard Penetration Test N치	N blow 10 20 30 40 50
	25							S-20		20.5	40/30	
								S-21	○	21.5	37/30	
								S-22	○	22.5	40/30	
								S-23	○	23.5	50/29	
								S-24	○	24.5	50/24	
								S-25	○	25.5	41/30	
-25.500		25.5	24.7					S-26	○	26.5	50/23	
					풍화토	▶ 풍화토(25.5 ~ 28.0m) - 황갈색 - 점토질 모래로 구성 - 매우조밀함 - 습윤상태		S-27	○	27.5	50/17	
-28.000		28.0	2.1					S-28	○	28.5	50/10	
					풍화암	▶ 풍화암(28.0 ~ 30.0m) - 황갈색 - 굴진시 심각한 마찰 발진등 모래로 변해 - 매우조밀함		S-29	○	29.5	50/ 9	
-30.000	30	30.0	2.0					S-30	○	30.5	50/ 9	
						심도 30.0m에서 시추종료						

3. 지 층 단 면 도

지 층 단 면 도

FREE SCALE



4. 현장조사 사진성과

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-10(HT)	시 추 광 경

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-10(HT)	표준관입시험

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-10(HT)	시 료 채 취

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-20(HT)	시 추 광 경

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-20(HT)	표준관입시험

조 사 날 짜	2020년 07월 16일 ~ 17일
본관 BH-20(HT)	시 료 채 취

조 사 날 짜	2020년 07월 16일 ~ 17일
청고 BH-10(HT)	시 추 장 경

조 사 날 짜	2020년 07월 16일 ~ 17일
청고 BH-10(HT)	표준관입시험

조 사 날 짜	2020년 07월 16일 ~ 17일
청고 BH-10(HT)	시 료 채 취

조 사 날 짜	2020년 07월 16일 ~ 17일
별관 BH-10(HT)	시 추 장 경

조 사 날 짜	2020년 07월 16일 ~ 17일
별관 BH-10(HT)	표준관입시험

조 사 날 짜	2020년 07월 16일 ~ 17일
별관 BH-10(HT)	시 료 채 취

조사날짜	2020년 07월 16일 ~ 17일
벨런 BH-2D(FT)	사주경계

조사날짜	2020년 07월 16일 ~ 17일
벨런 BH-2D(FT)	표준안전시설

조사날짜	2020년 07월 16일 ~ 17일
벨런 BH-2D(FT)	시료채취

조사날짜	2020년 07월 16일 ~ 17일
본관 BH-1	시료상자

조사날짜	2020년 07월 16일 ~ 17일
본관 BH-2	시료상자

조사날짜	2020년 07월 16일 ~ 17일
정고 BH-1	시료상자

조 사 날 짜	2020년 07월 16일 ~ 17일
별관 BH-1, BH-2	시 료 성 격

시 험 날 짜	2020년 07월 16일 ~ 17일
본관 BH-1(DHT)	반성하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
본관 BH-2(DHT)	반성하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
본관 BH-1(DHT)	반성하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
본관 BH-2(DHT)	반성하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
정고 8H-1(DHT)	안정하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
정고 8H-1(DHT)	안정하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
별관 8H-1(DHT)	안정하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
별관 8H-1(DHT)	안정하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
별관 8H-2(DHT)	안정하시험 전경

시 험 날 짜	2020년 07월 16일 ~ 17일
별관 8H-2(DHT)	안정하시험 전경