MICRO

Building Permit Application
City of Portland, Oregon - Bureau of Development Services
1900 SW 4th Avenue, Portland, Oregon 97201 • www.portlandonline.com/bds

Type of work

- [x] New construction
- [ ] Addition/alteration/replacement
- [ ] Demolition
- [ ] Other

Category of construction

- [ ] 1 & 2 family dwelling
- [x] Commercial/industrial
- [ ] Accessory building
- [ ] Multifamily
- [ ] Master builder
- [ ] Other

Job site information and location

Job no	Job address 2740 S.E. Powell Blvd.
City/State/ZIP	Portland / OR / 97202
Suite/bldg /apt no	Project name Clark Family Center
Cross street/directions to job site	S.E. 28th & S.E. Powell
Subdivision	Lot no R38266 / Tax map/parcel no

Description of work

Demolition of existing 2-story + Basement Bldg
Construction of new 47,999 s.f.
4-Story + Basement Office Building +
Site Improvements

- [ ] Reference RS / Combination
Permit no

Property owner / **Tenant**

Name	Catholic Charities of Oregon
Address	231 S.E. 12th Avenue
City/State/ZIP	Portland, OR 97214
Phone	503-231-4866
FAX	503-231-4327

Owner installation This installation is being made on property that I own which is not intended for sale lease rent or exchange

Owner signature Date

Contractor

Business name	to Be decided
Address	
City/State/ZIP	
Phone	FAX
CCB lic no	

Authorized signature _____

Print name Date

Applicant / **Contact Person**

Business name	Lundin Cole Architects, PC
Contact name	Robert "Ted" Lundin and Scott Rimmer
Address	208 SW Stark Street, Suite 200
City/State/ZIP	Portland, OR 97204
Phone	503-241-3174
FAX	503-241-3186
E-mail	tlundin@lundincole.com

Authorized signature _____

Print name Scott Rimmer Date 11/24/08

Office Use Only

Permit no	
Date received	
By	

Required Data: One and Two Family Dwelling

Permit fees* are based on the value of the work performed Indicate the value (rounded to the nearest dollar) of all equipment materials labor overhead and the profit for the work indicated on this application

Valuation	
Number of bedrooms	
Number of bathrooms	
Total number of floors	
New dwelling area	square feet
Garage/carport area	square feet
Covered porch area	square feet
Deck area	square feet
Other structure area	square feet

Required Data: Commercial Use

Permit fees* are based on the value of the work performed Indicate the value (rounded to the nearest dollar) of all equipment materials labor overhead and the profit for the work indicated on this application

Valuation	$8.5 million
Existing building area	18,744 square feet
New building area	47,994 square feet
Number of stories	4 + basement
Type of construction	III-A fully-sprinkled
Occupancy groups	
Existing	B
New	Non-separated

Notice

All contractors and subcontractors are required to be licensed with the Oregon Construction Contractors Board under ORS 701 and may be required to be licensed in the jurisdiction in which work is being performed If the applicant is exempt from licensing the following reasons apply

Building Permit Fees*

Please refer to fee schedule

Fees due upon application	
Amount received	
Date received	

This permit application expires if a permit is not obtained within 180 days after it has been accepted as complete

Fee methodology set by Tri County Building Industry Service Board

08-177308-00

BUILDING CODE AND LIFE SAFETY SUMMARY

GOVERNING BUILDING CODE 2007 OREGON STRUCTURAL SPECIALTY CODE (IBC) WITH LATEST AMENDMENTS

OCCUPANCY NONSEPARATED OCCUPANCIES PER 508 3 2 & 302 1

BASEMENT	TYPES B (OFFICE) AND S-2 (PARKING GARAGE)
FIRST FLOOR	TYPES A-2 (LOAVES & FISHES) AND I-4 (DAYCARE)
SECOND FLOOR	FUTURE TYPE B (OFFICE)
THIRD FLOOR	TYPE B (OFFICE)
FOURTH FLOOR	TYPES B (OFFICE) AND A-3 (TRAINING ROOM)

CONSTRUCTION TYPE TYPE III-A (FULLY SPRINKLERED PER NFPA 13 + WATER CURTAIN COVERAGE ON ALL WEST FACADE WINDOWS)

ALLOWABLE AREAS PER TABLE 503 & 508 3 2 2
(MOST RESTRICTIVE BASED ON TYPES A-2 & A-3)

	ALLOWABLE AREA	PROPOSED AREA
BASEMENT	NOT INCLUDED	NOT INCLUDED
FIRST FLOOR	14,000 SF	12 050 SF
SECOND FLOOR	14,000 SF	11,970 SF
THIRD FLOOR	14,000 SF	11 970 SF
FOURTH FLOOR	14,000 SF**	12,004 SF
TOTAL AREA	64,000 SF*	47,994 SF

* = 53,223 SF PER FAR LIMITS

** = ADDITIONAL STORY ALLOWED PER 504 2 (AUTOMATIC SPRINKLER SYSTEM)

ALLOWABLE HEIGHT 4 STORIES**
48 FEET PER ZONING CODE ADJUSTMENT
(45 FEET STANDARD PER ZONING CODE, 65 FEET PER TABLE 503)

PROPOSED HEIGHT 4 STORIES
48 FEET MAXIMUM

08-177308-00

BUILDING CODE AND LIFE SAFETY SUMMARY (Cont)

FIRE RESISTIVE ELEMENTS PER TABLES 601 AND 602

STRUCTURAL FRAME	1 HOUR
BEARING WALLS - EXTERIOR (NON-COMBUSTIBLE PER 602 3) GREATER THAN 5 FEET	2 HOUR FROM INSIDE (704 5) WITH 90 MIN DOORS & WINDOWS AT PROTECTED OPENINGS
BEARING WALLS - INTERIOR	1 HOUR WITH 45 MIN DOORS (TABLE 715 4)
NONBEARING WALLS - EXTERIOR	1 HOUR (LESS THAN 30 FT), 0 HOUR (GREATER THAN 30 FT)
INTERIOR NONBEARING PARTITIONS	NONRATED
CORRIDOR WALLS (1017 1)	0 HOUR WITH NFPA 13 SPRINKLERS
SHAFT ENCLOSURES (707 4)	
CONNECTING 4 STORIES	2 HOURS WITH 90-MINUTE DOORS
LESS THAN 4 STORIES	1 HOUR WITH 60-MINUTE DOORS

ELEVATORS (707 14)
CONNECTING 4 STORIES 2 HOURS WITH 90-MINUTE DOORS (INCLUDING MACHINE RM)
ELEVATOR LOBBY SEPARATION NOT REQUIRED - SPRINKLERED NFPA 13 (707 14 1 4)
ELEVATOR HOISTWAY VENT REQUIRED PER 3004 1

INTERIOR EXIT STAIRS (1020)
CONNECTING 4 STORIES OR MORE 2 HOURS WITH 90-MINUTE DOORS

FLOORS-CEILINGS
INCLUDING SUPPORTING BEAMS AND JOISTS 1 HOUR

ROOF-CEILINGS
INCLUDING SUPPORTING BEAMS AND JOISTS 1 HOUR

PARAPETS (704 11) NOT REQUIRED WHERE EXTERIOR WALL PERMITTED TO HAVE AT LEAST 25% OF EXTERIOR WALL AREA UNPROTECTED OPENINGS

MINIMUM CORRIDOR WIDTH = 44 INCHES (1016 21)

MAXIMUM TRAVEL DISTANCE TO EXIT ACCESS = 250 FEET
(TABLE 1015 1, SPRINKLERED NFPA 13)

OCCUPANT LOADS PER TABLE 1004 1 2

1 PER 100 GROSS SF FOR BUSINESS AREAS
1 PER 300 GROSS SF FOR STORAGE
1 PER 200 GROSS SF FOR PARKING GARAGE
1 PER 15 NET SF FOR ASSEMBLY UNCONCENTRATED
1 PER 20 NET SF FOR EDUCATIONAL CLASSROOM AND TRAINING AREAS
1 PER 35 NET SF FOR DAYCARE
1 PER 200 GROSS SF FOR COMMERCIAL KITCHENS

BASEMENT FLOOR 8,080 SF/200 (PARKING GARAGE) +3+1+1+1+1+1 = 48 OCCUPANTS
288 SF/15 (ASSEMBLY) + 1,332/100 (BUSINESS) = 19 + 13 = 32 OCCUPANTS

FIRST FLOOR 6 032 SF/35 (DAYCARE) = 172 OCCUPANTS
188 SF/200 (BUSINESS - RECEPTIONIST) = 2 OCCUPANTS
LOAVES & FISHES = 141 OCCUPANTS
(903 SF/200 KITCHEN = 5 OCCUPANTS)
(52 SF/300 STORAGE = 0 OCCUPANTS)
(2,031 SF/15 ASSEMBLY = 135 OCCUPANTS)
(96 SF/100 OFFICE = 1 OCCUPANTS)

SECOND FLOOR 11 970 SF/100 (BUSINESS) = 120 OCCUPANTS

THIRD FLOOR 11,970 SF/100 (BUSINESS) = 120 OCCUPANTS

FOURTH FLOOR 244 OCCUPANTS
(2,320/15 ASSEMBLY = 155+1 OCCUPANTS)
(8,844/100 BUSINESS = 88 OCCUPANTS)

MINIMUM EGRESS WIDTH REQUIREMENTS PER 1005 (SPRINKLERED PER NFPA 13)
BASEMENT (BUSINESS/ASSEMBLY) 32 X 0 15 = 5 INCHES / 36 INCHES MIN
BASEMENT (GARAGE) 48 X 0 15 = 8 INCHES / 36 INCHES MIN
FIRST FLOOR (144+172)/2 X 0 15 = 24 INCHES / 36 INCHES MIN
SECOND FLOOR 120 X 0 15 = 18 INCHES / 36 INCHES MIN
THIRD FLOOR 120 X 0 15 = 18 INCHES / 36 INCHES MIN
FOURTH FLOOR 244 X 0 15 = 36 6 INCHES / 37 INCHES MIN

MINIMUM STAIR WIDTH REQUIREMENTS PER 1005 (SPRINKLERED PER NFPA 13)
BASEMENT 48/2 X 0 2 = 5 INCHES / 44 INCHES MIN PER 1009 1
FIRST FLOOR (144+172)/2 X 0 2 = 32 INCHES / 44 INCHES MIN PER 1009 1
SECOND FLOOR 120/2 X 0 2 = 12 INCHES / 44 INCHES MIN PER 1009 1
THIRD FLOOR 120/2 X 0 2 = 12 INCHES / 44 INCHES MIN PER 1009 1
FOURTH FLOOR 244/2 X 0 2 = 24 4 INCHES / 44 INCHES MIN PER 1009 1

MINIMUM INSULATION VALUES (OTHER BUILDINGS) CLIMATE ZONE 1 PER TABLE 13-E
R-19 ROOFS
R-11 EXTERIOR WALLS (MASONRY OR CONCRETE WITH INTERIOR INSULATION)
R-7 5 BELOW GRADE WALLS
R-11 FLOORS OVER UNCONDITIONED SPACE

MAXIMUM AREA OF EXTERIOR WALL OPENINGS PER TABLE 704 8 AND 704 8 1
EAST FACADE NO LIMIT UNPROTECTED OPENINGS (GREATER THAN 20 FEET)
NORTH FACADE NO LIMIT UNPROTECTED OPENINGS (GREATER THAN 20 FEET)
WEST FACADE 28% UNPROTECTED OPENINGS WITH ADDITIONAL SPRINKLER COVERAGE (WATER CURTAINS) PER APPROVED BUILDING CODE APPEAL #5580
25% UNPROTECTED OPENINGS STANDARD (GREATER THAN 5 FEET)
SOUTH FACADE NO LIMIT UNPROTECTED OPENINGS (GREATER THAN 20 FEET) FLOORS 1 THRU 4
SOUTH FACADE 75% UNPROTECTED OPENINGS (15 FEET) BASEMENT

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March 6, 2009

To Lundin Cole Architects

Attn Scott Rimmer

Re Catholic Charities - Clark Family Center – Portland, OR
2740 SE Powell Blvd , Portland, OR 97202 / Application # 08-177308-000-00-CO
Response to Plan Review No 2, Dated February 24, 2009

WDY, Inc has completed the response to the structural comments of the plan review for the above mentioned project, issued by City of Portland Building Department February 24, 2009 For the purpose of clarity, the original plan review items are repeated in italics with the individual response following immediately

ITEM # 4

Comment
The dimensions for the wall openings do not appear to be shown on the architectural drawings Please indicate where those dimensions are shown

Response
Please see revised structural drawings of interior concrete wall elevations, sheets S320, S330, S340, and S350 for dimensions of wall openings

ITEM # 5

Comment
Elevation 2/A201 and section 1/A301 show that the awning occurs on grid A between grids 3 and 4 It appears that concrete exists at these locations Please coordinate

Response
Please see added detail 7/A807 for awning connection detail to concrete wall at grid A between grids 3 and 4

ITEM # 13

Comment
As discussed with the engineer, the seismic moments used for the slab-column transfer are to come from the imposed drift on the system—not the P-delta moments Please address

Response
Please see supplemental structural calculations sheets D1 – D10 for determination of design story drifts Also, see supplemental structural calculations sheet C42 for slab-column transfer analysis per ACI 318-05 Section 21 11 5 (b) Since the maximum design story drift ratio does not exceed code prescribed limit, shear reinforcement of slab at columns due to additional seismic moments is not required

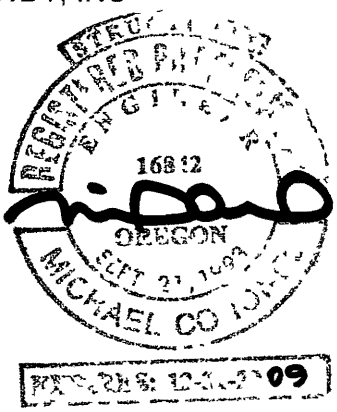
6443 SW Beaverton-Hillsdale Hwy, suite 210 Portland, OR 97221 ph 503 203 8111 fx 503 203 8122 e wdy@wdyi com

ITEM # 14

Comment
As discussed with the engineer, the columns either need to have the transverse reinforcing determined based on calculated moments (see item #13), or prescriptively The prescriptive approach does not appear to have been considered Please address

Response
Please see supplemental structural calculations sheets C43 - C47 for prescriptive approach to design of transverse reinforcement of columns based on ACI 318-05 Section 21 11 3 Also, see revised structural drawings sheet S100 notes for concrete reinforcing, sheets S200, S210, S220, S230, S240 for revised column schedule, and revised column details 1/S400, 6/S401, 5/S402, 6/S402 and 8/S402

WDY, INC



Michael Coronel, P E , S E

Kirsten Giesy, EIT

Structural Checksheet Response

Permit # 08-177308-000-00-CO **Date Feb 3, 2009**

Customer name and phone number Scott Rimmer 503-241-3174

Note *Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write* **customer** *in the last column*

#	Description of changes, revisions, additions, etc.	Checksheet and item #
	Please see attached Structural Checksheet response letter issued, stamped and signed by WDY Structural Engineers	

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(for office use only)

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February 2, 2009

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To Lundin Cole Architects

Attn Scott Rimmer

Re Catholic Charities - Clark Family Center – Portland, OR
2740 SE Powell Blvd , Portland, OR 97202 / Application # 08-177308-000-00-CO
Response to Plan Review No 1, Dated December 18, 2008

WDY, Inc has completed the response to the structural comments of the plan review for the above mentioned project, issued by City of Portland Building Department December 18, 2008 For the purpose of clarity, the original plan review items are repeated in italics with the individual response following immediately

ITEM # 1

Question
Complete and return the attached Special Inspection form prior to issuance of the permit The completed form can be fax returned to Special Inspections at 503-823-4172 or to 2nd Floor Document Services

Response
See attached special inspection report completed by architect

ITEM # 2

Question
Curtain wall, steel stairs/handrails, attachment of equipment, skylights and glazing are deferred submittals and not included in this building permit The drawings and calculations for these are required to be stamped by an Engineer registered in Oregon, and approved by the Engineer of Record prior to submitting to the Bureau of Development Services for review

Response
See revised structural deferred submittal list shown on sheet S100

ITEM # 3

Question
The roof framing over the elevator does not appear to be shown/detailed on the drawings Please submit revised drawings/calculations as appropriate

Response
Please see supplemental structural calculations sheets EL1 – EL3 and structural roof plan elevator lid partial plan detail B/S5 0

6443 SW Beaverton-Hillsdale Hwy, suite 210 Portland, OR 97221 ph 503 203 8111 fx 503 203 8122 e wdy@wdyi com

ITEM # 4

Question
The thickness of the interior concrete walls does not appear to be specified on the drawings Also, the locations of the various doors in those walls do not appear to be dimensioned in either the architectural or structural drawings Please clearly dimension these items on the drawings

Response
Please see revised structural drawings of interior concrete wall elevations, sheets S320, S330, S340, and S350 for concrete wall thicknesses Please see architectural drawings for dimensioning of wall opening locations

ITEM # 5

Question
There appears to be a conflict between the architectural and structural drawings at the awning shown on details 5/A807 and 11/S500 The architectural drawings show CMU, whereas the structural drawings show a concrete beam Please coordinate

Response
Structural detail 11/S500 does not correspond with architectural detail 5/A807 Detail 11/S500 is cut at the first floor over the basement which has concrete walls and window headers The structural detail corresponding to the awnings over the first floor walls and corresponding to detail 5/A807 is cut on the second floor plan – and is detail 4/S500

ITEM # 6

Question
Detail 11/S500 refers to the architectural drawing for the depth of the beam This information does not appear to be readily apparent from the architectural drawings Please provide the minimum required dimension on the structural drawings (note 24" was assumed in the calculations)

Response
Please see revised structural detail 11/S500 with added dimension for the beam depth

ITEM # 7

Question
Please submit calculations (bearing pressure, bending, shear, etc) for the large combined/mat foundation that supports the concrete interior shear walls

Response
Please see supplemental structural calculations sheets MF-1 through MF-19 for core wall mat foundation design Design is in accordance with Geotechnical Supplemental Report (Addendum #1) dated January 31, 2009 – see attached copy Drawing B/S200 has been added to detail the reinforcing in the mat

ITEM # 8

Question
The calculations (sheet F69) indicate that beam stirrups spaced at 6" O C are required, but the detail specifies 12" O C Please revise the drawings as appropriate

Response
Beam stirrup correct spacing was shown on detail 3/S300 – the detail note on 12/S500 has been modified to reference detail 3/S300

ITEM # 9

Question
Please provide calculations for the 'wall beam' on grids 3 and 4 to space between grids C & D at the 1st floor (for vertical loading)

Response
Please see supplemental structural calculations sheets WB1 – WB24 for 'wall-beam' calculations and revised concrete wall elevations 1/S320, 1/S330 and details 7/S402, 9/S402

ITEM # 10

Question
The horizontal reinforcing in the CMU piers is not clearly defined on the drawings For example, detail 7/S503 on the south elevation (sheet S300) refers to the wall section details In this case, that would be 11/S500, and that detail shows (2) #4, but the calculations appear to indicate that (2) #5 @ 24" O C are required I suggest specifying the required horizontal pier reinforcing on the pier cross-section details (such as 7/S503)

Response
The note for the horizontal reinforcing in detail 11/S500 was a drafting error and has been updated to (2) #5 bars For drawing consistency, we prefer for the horizontal reinforcing call-outs to remain in the wall sections where they are currently shown, as this view shows the cross-section of the horizontal bars' and allows us to emphasize the placement of the bars vertically Similarly, the vertical reinforcing is called-out in the plan sections, as they show the vertical bars in cross-section and their placement horizontally

ITEM # 11

Question
Please review the design of the slab at the northwest corner of the roof (S250) It appears that the slab between grids F and X is overstressed Submit calculations as appropriate

Response
The roof slab would be overstressed in the NW corner with the typical 2nd floor – Roof reinforcing of #5 bars at 16" O C , however, the shaded portion of the roof slab shown on structural drawing S5 0 and bound by grids 4 and D indicates the use of #5 bars at 12" O C each way in this area, which are adequate Reference structural calculations, sheets R34 –

R37 Additionally, support conditions for the slab models were conservative with respect to the slab design given that there was assumed to be no fixity at the supports only pinned connections

ITEM # 12

Question
Please review the design of the beams at the northwest corner of the roof (S250) and address the following

a) *The calculations assumed a moment of $wl^2/12$ for this beam That does not appear to be appropriate since the columns were not designed for the corresponding moment, and the small columns do not appear stiff enough to prevent rotation even if they were designed for the appropriate moment So, $wl^2/8$ appears to be appropriate for the design of these beams*
b) *The beams were designed for a tributary width of 20'-4", which appears to be less than the actual condition*
c) *The shear strength of the beams appears to be exceeded*

Response

a) The design moment of $wl^2/12$ was not a fixed end moment, rather the moment that results from a uniformly increasing ramp load with a maximum value at the center, which was our conservative approximation of the maximum positive bending Please reference the supplemental structural calculations SR1 – SR3 for further roof beam analysis Also, the concrete support columns have been designed for the end moments resulting from the roof beam loading
b) The design beam loading results from a 'to-scale' model of the entire building with uniform loading applied to the slabs and distributed to the supporting elements based upon stiffness, please see supplemental structural calculations SR1 – SR3 for further roof beam analysis
c) Please see supplemental structural calculations sheet SR2 for shear analysis of roof beam

ITEM # 13

Question
The slab design assumptions indicate that the transfer of moment from the slab to the column was evaluated with equivalent frame analysis, but that analysis does not appear to have been submitted The punching shear/slab transfer analysis on calculation sheet C3 only takes an unbalanced moment – not the actual moment based on the stiffness of the system Further, the provisions of 21 11 regarding the slab-column connection need to be considered Please submit revised calculations/drawings as appropriate

Response

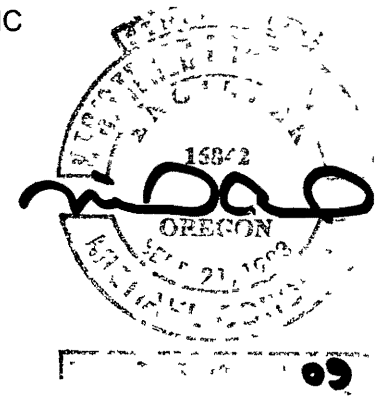
Please see building model calculations for moment transfer from slab to column in supplemental structural calculations sheets BM1 – BM37 Also, see revised structural calculations sheet C5 for punching shear / moment transfer analysis including unbalanced moment based on stiffness of system and seismic requirements per ACI 318-05 section 21 11 5 (a)

ITEM # 14

Question
The moments for which the columns are to be designed are to include the moments from the slab loading (see item #13) Simply taking an unbalanced moment does not account for this Further, the columns need to be designed/detailed to conform to ACI 318-05 §21 11 – this means they may need additional transverse reinforcing Please submit revised calculations/drawings as appropriate

Response
Please see revised structural calculations sheets C1-C41 for column design with revised moments based on stiffness of system Also refer to revised structural calculation sheet C4 and revised column schedule sheet S200 for column transverse reinforcement based on ACI 318-05 section 21 11 2 2

WDY, INC



Michael Coronel, S E

Kirsten Giesy, EIT

WDY **Structural • Civil Engineers**

April 4, 2009

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Lundin Cole Architects
208 SW Stark Street, Suite 200
Portland, OR 97205

Attn Ted Lundin

RE "CLARK FAMILY CENTER BUILDING"—Catholic Charities of Oregon
2740 SE Powell Blvd, Portland, Oregon
Existing Utilities Review in regards to Temporary Shoring for Initial Basement Excavation

Dear Mr Lundin

At your request, WDY has briefly reviewed the proposed temporary shoring plans dated March 17, 2009 produced by Kramer Gehlen Consulting Engineers and the review letter produced by Alder Geotechnical Services dated March 31, 2009 WDY's additional review was requested to comment specifically on the potential influence to existing utilities identified by Alder Geotechnical Services as a result of expected bending deflection of the temporary steel supporting piles which in turn may allow minor surface settlement and influence on existing underground utilities behind the proposed shoring

We note that along the west shoring line, between piles #20 and #21shown on the shoring plan, there is an existing light pole on the adjacent tax lot for the existing public parking lot and that on the east shoring line, very close to proposed pile #4 on the shoring plan, there is the existing sanitary sewer service line for this subject lot Both these existing utilities are to remain in place and functioning WDY recommends that the temporary pile spacing layout be field adjusted by the contractor to keep piles to each side of the existing lightpole and the existing sanitary sewer service lateral to minimize any risk of damage to these existing utilities during pile installation and removal At the light pole location, the contractor should also provide care during the installation and removal of the horizontal wood lagging between the piles to minimize the risk of soil movement In our opinion, the expected horizontal deflection of less than 1 inch at the top of these steel piles referenced in Alder Geotechnical Service's review letter would not be expected pose a risk to either of these existing utilities, and the more important concern is proper placement of the piles to each side of these existing utilities and contractor care during the actual installation and removal processes of the shoring system to minimize soil disturbance

Please call if you have any questions regarding this matter,
Sincerely,
WDY, INC

STANDARD REGISTERED PROFESSIONAL ENGINEER 12479 OREGON MAY 18, 1984 COLE G PRESTHUS

Cole G Presthus, P E , S E

EXPIRES: 12-31-2010

Life Safety Checksheet Response

Permit # **08-177308-000-00-CO** **Date Mar 4, 2009**

Customer name and phone number· Scott Rimmer (503 241-3174)

Note In the spaces below, please provide specific information concerning the changes that you have made in response to the checksheet Note the checksheet item number, your response or a description of the revision, and the location of the change on the plans (i e page number and/or detail number) Use as many lines as needed *If the item is not in response to a checksheet, write **"Applicant"** in the column labeled "Checksheet item number "*

Checksheet item number	Description of changes, corrections, additions, etc	Location on plans
10	Note for second floor showing area is B occupancy is stricken	T2
13	Door Swing for Storage Room 144 was changed to swing into storage room	1/A101
15	Note Zoning Code 33 130 240 B 2 a requires a minimum **6-foot** wide route No changes made to A//T2	A/T2
16	Note added to B/T2 "Parking shown on site plan outside the property lines is not provided for use by this building's occupants "	T2
21	Dimension of width between mechanical shaft and opposite wall (4'-1 5") was added to A102	1/A102

Plan Bin Location CO-08

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BES Source Control Plan Check Corrections Response

Permit # 08-177308-000-00-CO **Date· March 16, 2009**

Customer name and phone number Scott Rimmer 503-241-3174

Note In the spaces below, please provide specific information concerning the changes that you have made in response to the checksheet Note the checksheet item number, your response or a description of the revision, and the location of the change on the plans (i e page number and/or detail number) Use as many lines as needed *If the item is not in response to a checksheet, write **"Applicant"** in the column labeled "Checksheet item number "*

Checksheet item number	Description of changes, revisions, additions, etc	Location on plans
1	Please note that a separate Demolition Permit has been issued for all demolition work, including the removal of the underground tank, and remediation/removal of any associated contaminated soils Please see Demolition Permit #09-111777-000-00-CO Item #11 on Sheet C210 has been updated to indicate removal of tank is under separate permit #09-111777-000-00-CO	C210
2	The following comments by the Civil Engineer were added to Sheet C200 "Construction stormwater discharges from the Catholic Charities Clark Family Center site, located at the southwest corner of the intersection of SE Powell Blvd and SE 28th Ave, are anticipated to be very little, most likely none As noted in the project geotechnical report, the site soils are capable of infiltrating normal rainfalls and the groundwater depth in this area is at least 45 feet below finish grade so no groundwater pumping will be needed Note that the recent 2006 constructed Catholic Charities Kateri Housing project across the street, on the east side of SE 28th, also included full basement excavation below the main building the same as the proposed Clark Family Center building, and no offsite storm water runoff was created or any onsite pumping of the construction area required as the area soils are capable of infiltrating normal rainfalls The Clark Family Center basement area covers over 90% of the site and rainfall will be contained in the excavated basement area If an abnormally large storm event does occur during the Clark Family Center construction and the basement area requires pumping, then pump discharge will occur on the existing south paved driveway access shared with Esperanza Court, which is also a Catholic Charities project Any pump discharge runoff will surface flow to existing downstream parking lot catch basins protected by bio-filter bags as shown on the Erosion Control Plan , sheet C200 These existing catch basins flow to existing onsite bio-filtration swales located on the Esperanza site Note that the Esperanza swale that would	C200 RECEIVED MAR 17 2009 BDS DOCUMENT SERVICES RECEIVED MAR 17 BDS DOCUMENT SERVICES

	receive any construction stormwater from pumping was sized for the tributary area coming from the Clark Center site Any over-flow storm runoff from the Esperanza bio-filtration swales goes to the recently installed, 2008, 18 inch diameter combined sewer in SE 27th that was also sized for tributary storm runoff from the Clark Family Center site Refer to Portland BES Combined Sewer Project #8730 " If warranted, the civil engineer is available for additional discussion on this issue Cole Presthus, P E , S E WDY Structural - Civil Engineers 6443 SW Beaverton-Hillsdale Hwy Suite 210 Portland OR 97221 ph 503 203 8111	
3	Updated Plumbing Schedule on Sheet P210 now indicates the G1 as a grease interceptor with grease waste lines (this was also noted on Item #9, Sheet C210)	P210

Plan Bin Location CO-08

BES Plan Check Corrections Response

Permit # **08-177308-000-00-CO** **Date March 6, 2009**

Customer name and phone number Scott Rimmer 503-241-3174

Note In the spaces below, please provide specific information concerning the changes that you have made in response to the checksheet Note the checksheet item number, your response or a description of the revision, and the location of the change on the plans (i e page number and/or detail number) Use as many lines as needed *If the item is not in response to a checksheet, write **"Applicant"** in the column labeled "Checksheet item number "*

Checksheet item number	Description of changes, revisions, additions, etc	Location on plans
1 ✓	Demolition Permit #09-111777-000-00-CO for the existing building was issued on 3/4/09	
2	As discussed via phone and e-mail, an existing reciprocal access agreement is already in place for the area directly adjacent to the vacated Kelton Street	
3 ✓	A copy of the Plumbing Fixture Worksheet is attached Please note that this form was already on file for this project Please contact Development Liaison Kevin Kilduff at BDS 503-823-5361 for further information	
4	BES & BDS already reviewed the suitability of on-site subsurface disposal systems during the Pre-Application Conference for this project (Feb 26, 2008 - #08-177308-000-00-C0)	Need BDS Site Development Review / Approval 3/11/09
5 ✓	A draft of the Operations and Maintenance Agreement for the Permeable Pavers was faxed to BES on 3/6/09	

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Plan Bin Location CO-08

Fire and Life Safety Checksheet Response

Permit # **08-177308-000-00-CO** **Date January 29, 2009**

Customer name and phone number Scott Rimmer (503 241-3174)

Note In the spaces below, please provide specific information concerning the changes that you have made in response to the checksheet Note the checksheet item number, your response or a description of the revision, and the location of the change on the plans (i e page number and/or detail number) Use as many lines as needed *If the item is not in response to a checksheet, write **"Applicant"** in the column labeled "Checksheet item number"*

Checksheet item number	Description of changes, corrections, additions, etc	Location on plans
1	Understood See Deferred Submittals on Sheet T1	T1
2	Understood See Deferred Submittals on Sheet T1	T1
3	Understood See Deferred Submittals on Sheet T1 and note added to Sheet A704	T1, A704
4	Understood See note added to Sheet A201	A201
5	Understood General Notes added to Sheets A701 & A702 referencing stairway floor number signs to be provided in both stairs as indicated on Sheets A603 and A604	A701, A702 A603, A604
6	Keynote 11 added to Sheet A100 calling out generator fuel type and size of tank and referencing Electrical for required emergency power for the building	A100
7	Exit signs were added directing occupants to the South exit on Sheets E3 0 & E3 3	E3 0, E3 3
8	The proposed building is provided with the following 1 An approved automatic sprinkler system 2 There is no concealed combustible attic space 3 Both stairways are in a minimum 2-hour fire resistive enclosure and extend to the top floor (4th floor) 4 The roof is essentially flat 5 A minimum 16 square feet roof hatch is provided directly to the roof Therefore, all requirements to D105 4 Alternate to Aerial Fire Apparatus Roads are met	1 Sheet T1/Deferred Sub 2 Sheet A302 3 Sheet T2 4 Roof Slopes ¼" per ft 5 Item #11/A105 & 6/A806

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08-177308 CO

Mechanical Checksheet Response

Permit # 08-181548-000-00-MT **Date.** 2/2/09

Customer name and phone number. Brandon Schneider 503.892 1188

Note *Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write* **customer** *in the last column*

#	Description of changes, revisions, additions, etc.	Checksheet and item #
1	Weight added to M1.0	Mech #1
2	Equipment loads coordinated	Mech #2
3	CU's in garage to be mounted high	Mech #3
	and out of the way of traffic	
4	All grille, duct, & diffuser sizes have	Mech #4
	been added.	
5	Type 1 duct now has note to be	Mech #5
	fire wrap, and added to spec.	
6	FSD added to all required locations.	Mech #6
7	Duct routing now shown not routing	Mech #7
	through elevator hoistway	
8	All comments noted on M1.0	Mech #8

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Energy Checksheet Response

Permit # **<u>08-177308-000-00-CO</u>** **Date Jan 29, 2009**

Customer name and phone number Scott Rimmer 503-241-3174

Note *Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write* ***customer*** *in the last column*

#	**Description of changes, revisions, additions, etc.**	Checksheet and item #
1	This note was added to Sheet T2 "Fixed glazing and framing areas for all exterior windows shall have a U-Factor of not more than 0 35 "	1

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Transportation Plan Check Corrections Submittal

Permit # **08-177308-000-00-CO** **Date April 6, 2009**

Customer name and phone number Scott Rimmer (503) 241-3174

Note: *Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write* ***"Customer"*** *in the last column "*

#	Description of changes, revisions, additions, etc.	Checksheet and item #
1	(4) copies of the Shoring Plan (for SE 28th), (4) copies of the Bracing Plan (for SE Powell Blvd), (2) copies of the calculations for the Shoring Plan and the Bracing Plan, (2) copies of the geotechnical engineer's review of the shoring plan, and (2) copies of the civil engineer's review of the shoring plan are attached for your review	1
2	(2) copies of the right-of-way dedication are attached Sheet A003 (Site Plan) was updated for Site Plan Keynote #9 to show the additional 2-feet of sidewalk to be provided within the 2-foot dedication	2
3	Shoring/Bracing activities will not impact SE Powell, per the attached bracing and shoring plans Shoring activities along SE 28th will necessitate a new 6-foot sidewalk with a 4-foot planter	3
4	In-process Plans are in the process of being corrected to reflect the new sidewalk and planter along SE 28th as described in Item #3 A separate checksheet response will be submitted when plans are updated at the City	4

Plan Bin Location CO-08

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Site Development Checksheet Response

Permit #: **08-177308-000-00-CO** **Date. April 6, 2009**

Customer name and phone number: Scott Rimmer (503) 241-3174

Note Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write "Customer" in the last column "

#	Description of changes, revisions, additions, etc.	Checksheet and item #
1	(2) copies of the Soils Special Inspection Program Checksheet are included	1
2	(1) copy of the existing reciprocal access agreement is included for your reference	2 MICRO
3	Sheet C300 was revised to identify dimensions as requested	3
4	This item is currently under review by the geotechnical engineer	4
5	(4) copies of the Shoring Plan (for SE 28th), (4) copies of the Bracing Plan (for SE Powell Blvd), (2) copies of the calculations for the Shoring Plan and the Bracing Plan, (2) copies of the geotechnical engineer's review of the shoring plan, and (2) copies of the civil engineer's review of the shoring plan are attached for your review	5

Plan Bin Location CO-08

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City of Portland, Oregon
Bureau of Development Services
Site Development

1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201
503-823-6892
Fax 503-823-5433
TTY 503-823-6868
www.portlandonline.com/bds

Application # **08-177308-000-00-CO**

SITE DEVELOPMENT CHECKSHEET

Review Date March 23, 2009

To	APPLICANT	**SCOTT RIMMER** **LUNDIN, COLE ARCHITECTS PC** **208 SW STARK, SUITE 200** **PORTLAND, OR 97204**	Work Fax e-mail	503 241-3174 503 241-3186 srimmer@lundincole.com
From	ENGINEER	**JASON BUTLER-BROWN, P.E.**	Phone Fax e-mail	503-823-4936 503-823-5433 brownj@ci.portland.or.us
Cc	OWNER	**CATHOLIC CHARITIES** **231 SE 12TH AVE** **PORTLAND, OR 97214-1342**		

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PROJECT INFORMATION

Street Address	**2740 SE POWELL BLVD**
Description of Work	**4 STORY W/BASEMENT MIXED USE BUILDING / OFFICE / PARKING / DAYCARE / DINING HALL**

PLAN REVIEW

Based on the plans and specifications submitted, the following items appear to be missing or not in conformance with the Oregon Structural Specialty Code, Oregon One and Two Family Dwelling Specialty Code and/or other city, state, or federal requirements

Item #	Location on plans	Code Section	Clarification / Correction Required
1		OSSC 1704.7 PCC 24.20	Special inspection will be required for this permit. Please sign the attached *Soils Special Inspections* form. Return the form to the Document Services Department of the Bureau of Development Services, or fax it to (503) 823-4172. The special inspections will likely be revised to reflect the excavation and shoring plan requested in Item 5 below
2		PCC 24.10.070 C	Approximately 1000 ft^2 of existing parking lot is shown to sheet flow to stormwater swales on the adjacent private property (Esperanza Court). If there is an existing shared access agreement for the parking lot we recommend that it be modified to allow the Clark Family Center stormwater to discharge to the Esperanza Court swales in perpetuity. Otherwise a separate easement for stormwater discharge and treatment may be required. Please provide a copy (pdf file preferred) of the agreement allowing stormwater to be discharged and treated on the neighboring private property.

3	C300	OSSC 106 1 1 PCC 24 10 070 C	The drywell detail does not identify the required 2 ft minimum embedment depth or the maximum depth of the drywell sections Please revise the detail drawings to identify these dimensions and verify that the minimum 10 ft separation distance will be maintained given the observed high seasonal groundwater depth of 24 ft below site grades (elevation 76 ft) per the geotech report, reference elevation contours on Figure 2
4	A003	PCC 24 10 070 C 2008 SWMM 2 3 3	Permeable pavement (pavers) is shown to be located immediately adjacent to the building Stormwater will likely infiltrate into soil within the influence zone of the footing loads, potentially resulting in a saturated subgrade condition Please submit a memorandum prepared by the geotechnical engineer that verifies that the bearing capacity and settlement estimates are valid for the portions of the foundation adjacent to the permeable pavement during the wet season
5		OSSC 3304 1 PCC 24 10 070 C	An excavation and shoring plan will be required to demonstrate how the Right of Way will be supported during construction, see Item 1 of the December 3, 2008 Transportation Development Checksheet Therefore please provide the following A) Revised drawings that include an excavation and shoring plan that clearly depicts, in plan and detail view, the proposed shoring and/or temporary cut slopes B) Design calculations stamped by a professional engineer licensed in the State of Oregon The design must be based on lateral earth pressures recommended by a geotechnical engineer C) The Geotechnical Engineer of Record must verify that the design recommendations are consistent with the soil conditions observed if the contractor consults his/her own geotechnical engineer for design parameters D) Shoring / temporary cut slope monitoring program

INSTRUCTIONS

To respond to this checksheet, come to Document Services (1900 SW Fourth Ave , 2nd floor) between 7 30 a m and 3 00 p m and update all four sets of the originally submitted drawings To update the drawings, you may either replace the original sheets with new sheets, or edit the originally submitted sheets when corrections are of a minor nature and when approved by the Bureau of Development Services (Specific instructions for updating plans are posted in Document Services)

Please complete the attached Checksheet Response Form and include it with your re-submittal Notify Document Services Staff that you are submitting corrections for the Site Development review To ensure that the plan reviewer receives notification, verify that the computer has been updated to show that the corrections were received

If you have specific questions concerning this Checksheet, please call me at 503-823-4936 To check the status of your project, please call (503) 823-7000 and select option 4 Your Plan Review Status will be faxed to you, so please be ready to provide a fax number If you don't have a fax number, you may dial (503) 823-7357 to request a Plan Review Status or visit Document Services

You may receive separate Checksheets from other City agencies that will require separate responses

Site Development Checksheet Response

Permit #: **08-177308-000-00-CO** **Date. April 13, 2009**

Customer name and phone number Scott Rimmer (503) 241-3174

Note Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write "Customer" in the last column "

#	Description of changes, revisions, additions, etc.	Checksheet and item #
4	Please see attached memo prepared by the Geotechnical Engineer regarding the permeable pavement	4

Plan Bin Location CO-08

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Plumbing Checksheet Response

Permit # <u>**08-177308-000-00-CO**</u> **Date: March 16, 2009**

Customer name and phone number Scott Rimmer 503-241-3174

Note In the spaces below, please provide specific information concerning the changes that you have made in response to the checksheet Note the checksheet item number, your response or a description of the revision, and the location of the change on the plans (i e , page number and/or detail number) Use as many lines as needed *If the item is not in response to a checksheet, write* **"Applicant"** *in the column labeled "Checksheet item number "*

Checksheet item number	Description of changes, revisions, additions, etc	Location on plans
1	BES approvals are pending	
2	Multnomah County Environmental Health has approved the Loaves & Fishes portion (Restaurant) per #09-45 A copy of the stamp is attached Plan reviewer was Richard Mahur at 503-988-3674 Multnomah County Environmental Health has approved the Grandma's Place portion (Daycare) per the attached e-mail There are no additional areas of the proposed building that are subject to Multnomah County Health review	

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Site Development Checksheet Response

Permit # **08-177308-000-00-CO** **Date April 16, 2009**

Customer name and phone number: Scott Rimmer (503) 241-3174

Note Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write "Customer" in the last column "

#	Description of changes, revisions, additions, etc.	Checksheet and item #
5	F) The permit drawings have been revised to show the shoring drawings The Drawing Index on Sheet T1 has been updated to reflect the addition of the shoring drawings G) Sheet S2 has been changed to call out DRIVEN soldier piles The drilled soldier pile schedule was indicated to be "FOR REFERENCE ONLY " H) Understood	5

Plan Bin Location CO-08

APR 17 2009
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Transportation Plan Check Corrections Submittal

Permit #: **08-177308-000-00-CO** **Date April 16, 2009**

Customer name and phone number: Scott Rimmer (503) 241-3174

Note. *Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write* ***"Customer"*** *in the last column "*

#	Description of changes, revisions, additions, etc.	Checksheet and item #
4	Sheets C200, C210 and A103 were updated to show the new 6-foot sidewalk with a 4-foot planter along SE 28th Avenue	4

Plan Bin Location CO-08

ADD 3

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LUNDIN COLE ARCHITECTS, PC

TRANSMITTAL

DATE	*March 6, 2009*

TO	*Mr Tim Bowers* City of Portland, BES 1900 SW 4th Avenue Portland, OR 97201	***FROM***	*Scott Rimmer, AIA* *Lundin Cole Architects, PC* *208 SW Stark Suite 200* *Portland, OR 97204*
PHONE	*503-823-7116*	***PHONE***	*503-241-3174*
FAX	*503-823-7692*	***FAX***	*503-241-3186*

VIA	☒ *Fax 6 pages*	☐ *Messenger 1 hr*	☐ *Mail*	☐ *Express Mail*
REMARKS	☒ *For your review*	☐ *Reply ASAP*	☐ *Urgent*	☐ *Please Comment*
RE.	*Permit # 08-177308-000-00-CO Clark Family Center*			

Dear Tim

Attached for your review is a draft of the Operations and Maintenance Agreement for the Permeable Pavers for Permit # 08-177308-000-00-CO Clark Family Center

This item was requested by BES in your Plan Check Comment #5 dated December 8, 2008

It is curious that a similar Operations and Maintenance Agreement for the Drywells was not requested by BES Please clarify

Thank you

Scott Rimmer
Lundin Cole Architects, PC

Site Development Checksheet Response

Permit #: **08-177308-000-00-CO** **Date: April 13, 2009**

Customer name and phone number: Scott Rimmer (503) 241-3174

Note Please number each change in the '#' column Use as many lines as necessary to describe your changes Indicate which reviewer's checksheet you are responding to and the item your change addresses If the item is not in response to a checksheet, write "Customer" in the last column "

#	Description of changes, revisions, additions, etc.	Checksheet and item #
4	Please see attached memo prepared by the Geotechnical Engineer regarding the permeable pavement	4

Plan Bin Location CO-08

Jason?

PERMIT #:

08-177308 CO

Jandek

☐ Drawings (8 5x11 or 11x17)	☐ Misc Documents
☐ Geotech	☒ Structural Calcs, Reports
☐ Special Inspections Form	☐ Zoning Plan Review
☐	☐

S \P & D\MPG Files SOP\MPG Separator Page doc
Created by Malia Slusarenko 4/1/2013

08-177308 CO 2/2

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SUPPLEMENTAL

STRUCTURAL CALCULATIONS

FOR

CLARK FAMILY CENTER

PORTLAND, OREGON

FEBRUARY 2, 2009

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STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 16842 OREGON SEPT 21, 1993 MICHAEL CORONADO

DESIGN PARAMETERS	**2007 Oregon Structural Specialty Code (OSSC)**
ROOF LOAD	115 psf DL 25 psf SL
FLOOR LOAD	115 psf DL 80 psf LL (2nd to 4th Floor) 100 psf LL (1st Floor)
WIND	
BASIC WIND SPEED	95 mph (3-sec Gust)
EXPOSURE	B
IMPORTANCE	$I_W = 1\ 00$
SEISMIC	
MAPPED RESPONSE	$S_S = 0\ 993$, $S_1 = 0\ 342$
SITE CLASS	D
IMPORTANCE	$I_E = 1\ 00$

CONTENTS

BUILDING MODEL	BM-1 to BM-39
ROOF BEAM	SR-1 to SR-3
ELEVATOR LID	EL-1 to EL-3
COLLECTORS	CL-1
WALL BEAM	WB-1 to WB-24
MAT FOOTING	MF-1 to MF-19

6443 SW Beaverton-Hillsdale Hwy, suite 210 Portland, OR 97221 ph 503 203 8111 fx 503 203 8122 • e wdy@wdyi com

BUILDING MODEL

* THE BUILDING IN ITS ENTIRETY WAS MODELLED IN SAP v.12 0.1 BASIC USING "EQUIVALENT FRAME" ELEMENTS TO REPRESENT THE WALLS, & FRAME ELEMENTS TO REPRESENT THE COLUMNS FINITE ELEMENTS WERE USED TO MODEL THE SLABS — HOWEVER, A MORE REFINED FINITE ELEMENT MODEL CONSTRUCTED FOR EACH FLOOR + ROOF WAS USED FOR THE SLAB REINFORCING DESIGN. THIS MODEL WAS CREATED TO DETERMINE THE AMOUNT OF MOMENT TRANSFER TO WALL & COLUMN ELEMENTS FROM THE SLAB DUE TO DEAD & LIVE LOADS BASED UPON STIFFNESS

* CRACKED SECTION

ACI RECOMMENDED I_e VALUES → ADJUSTED IN ELEMENT PROPERTIES IN SAP

SLAB · $I_e = 0.25\ I_g$

WALLS · $I_e = 0.35\ I_g$

COLUMNS · $I_e = 0.70\ I_g$

* "EQUIVALENT FRAME" ELEMENTS — IN GENERAL RECTANGULAR FRAME ELEMENTS W/ APPROPRIATE f'_c OR f'_m W/ EFFECTIVE THICKNESS & LENGTH WERE SPECIFIED WHERE NECESSARY — EQUIVALENT SECTION DIMENSIONS WERE CALCULATED TO MODEL WALLS IN (2) DIRECTIONS AT THE SAME LOCATION (i.e BUILDING CORNERS, 6" BASEMENT WALLS, SOME INTERIOR CORE WALLS)

BUILDING MODEL, CONT

* GOVERNING LOADING FOR MOMENT & AXIAL FOR WALLS & COLUMNS WAS TOTAL DL + LL. PATTERN LOADING OF LL APPLIED PER ACI R 13 7 6 USING 0 75 LL FOR PATTERN LOADING → THIS ARRANGEMENT DID NOT GOVERN OVER THE FULL LWE LOAD CASE

* LOADING:

ROOF · DL = 115 PSF SL = 25 PSF

2ND – 4TH FLOORS · DL = 115 PSF LL = 80 PSF

1ST FLOOR · DL = 115 PSF LL = 100 PSF

* SAP OUTPUT:

GRAPHICS · BM3 – BM4

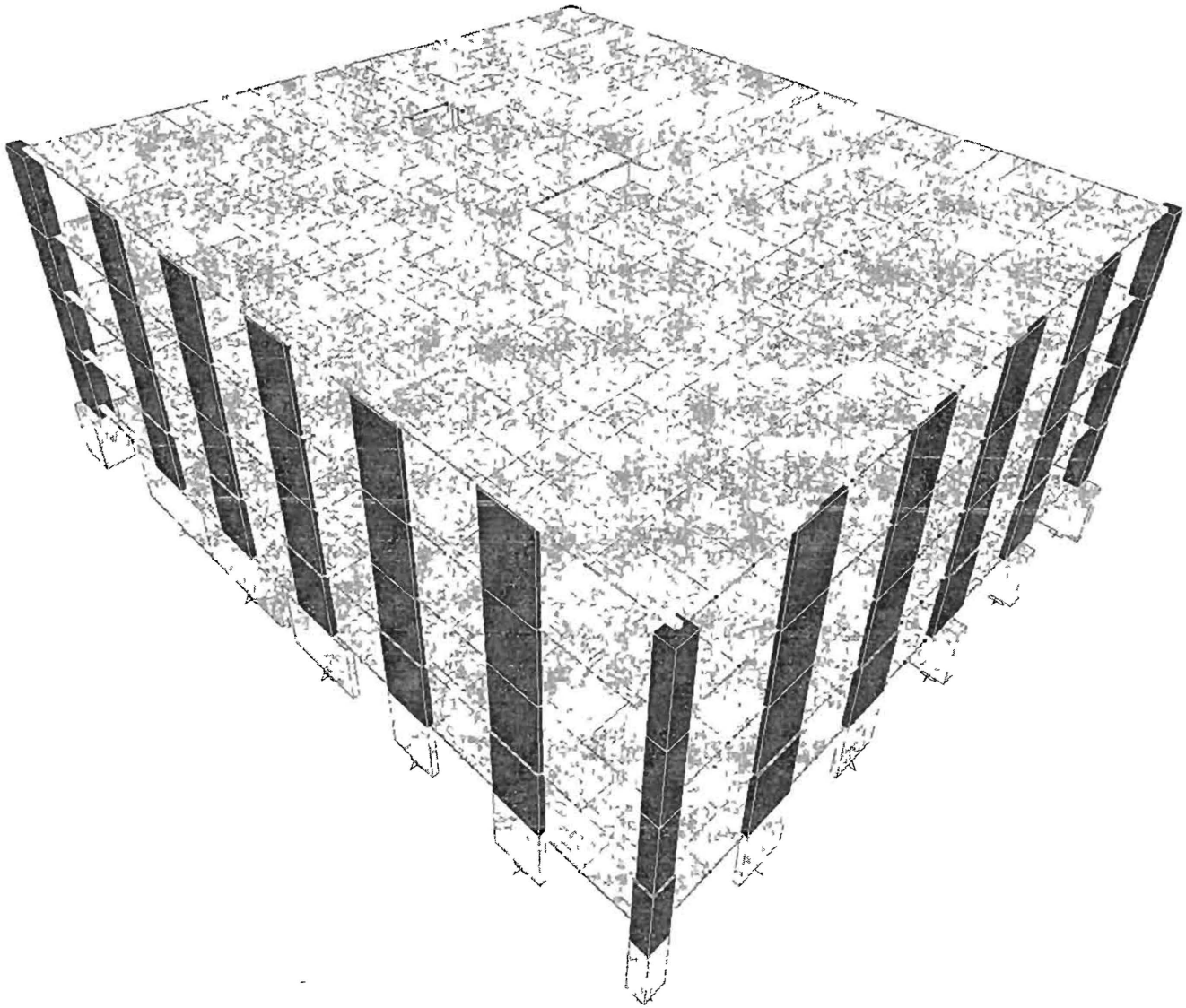
COLUMNS, 4TH FLR – BASEMENT : BM5 – BM18

CMU WALLS 4TH FLR – 1ST FLR BM19 – BM30

ROOF BEAMS BM 31 – BM37

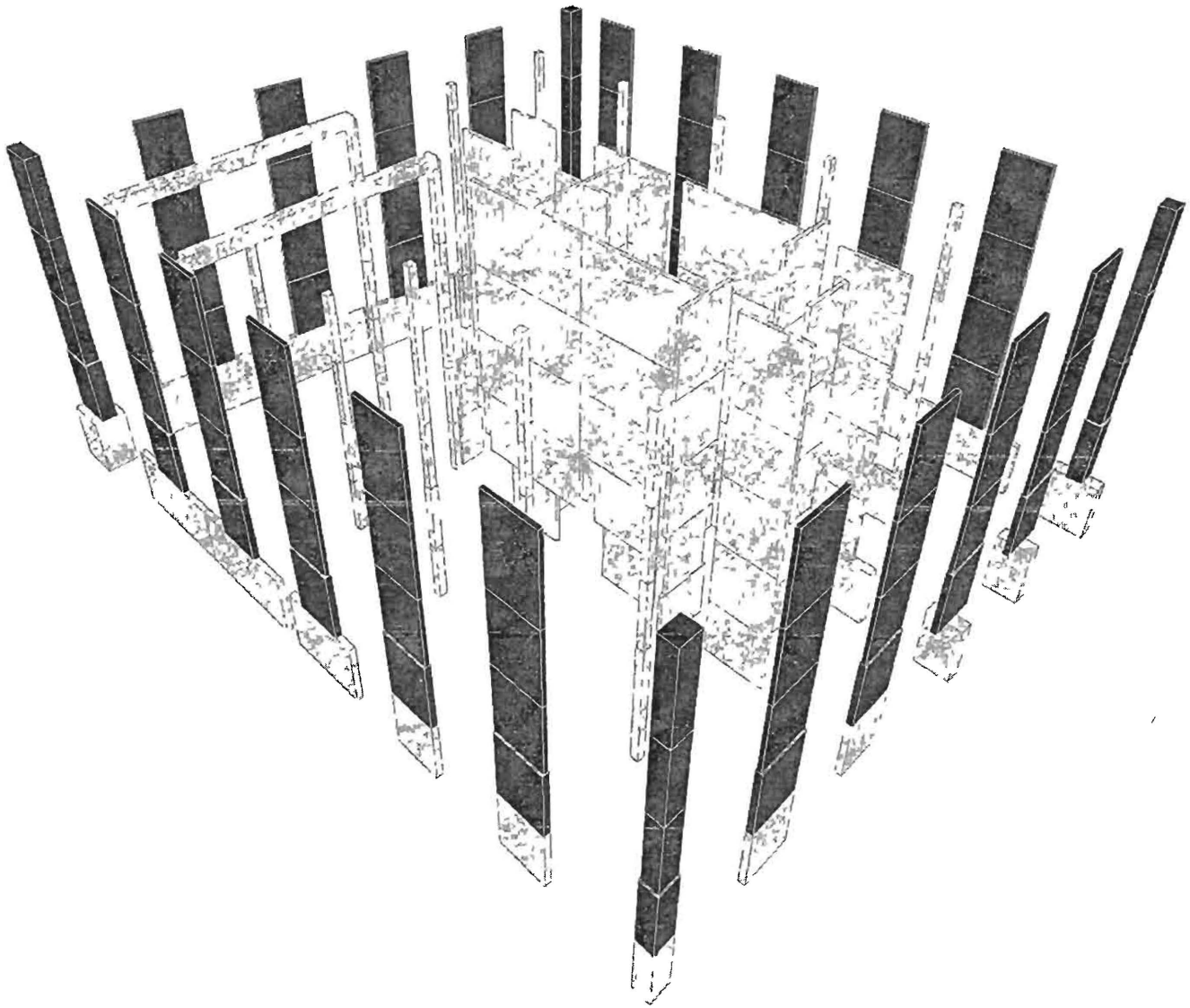
COLUMN SAP ID # S BM38

CMU WALL SAP ID # S · BM39



SAP2000 v12 0 1 - File 07081_Bldg Frame FPSlabs _ le - 3-D View - lb, ft, F Units

BM3



SAP2000 v12 0 1 - File 07081_Bldg Frame FPSlabs _ le - 3-D View - Kip, ft, F Units

08-177308 CO 1/2

WDY Structural • Civil Engineers

STRUCTURAL CALCULATIONS

FOR

CLARK FAMILY CENTER

PORTLAND, OREGON

OCTOBER 31, 2008

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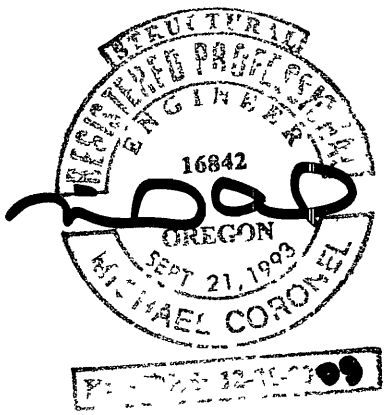
REVISED FEBRUARY 2, 2009 P



DESIGN PARAMETERS	**2007 Oregon Structural Specialty Code (OSSC)**
ROOF LOAD	115 psf DL 25 psf SL
FLOOR LOAD	115 psf DL 80 psf LL (2nd to 4th Floor) 100 psf LL (1st Floor)
WIND	
BASIC WIND SPEED	95 mph (3-sec Gust)
EXPOSURE	B
IMPORTANCE	$I_W = 1\ 00$
SEISMIC	
MAPPED RESPONSE	$S_S = 0\ 993$, $S_1 = 0\ 342$
SITE CLASS	D
IMPORTANCE	$I_E = 1\ 00$

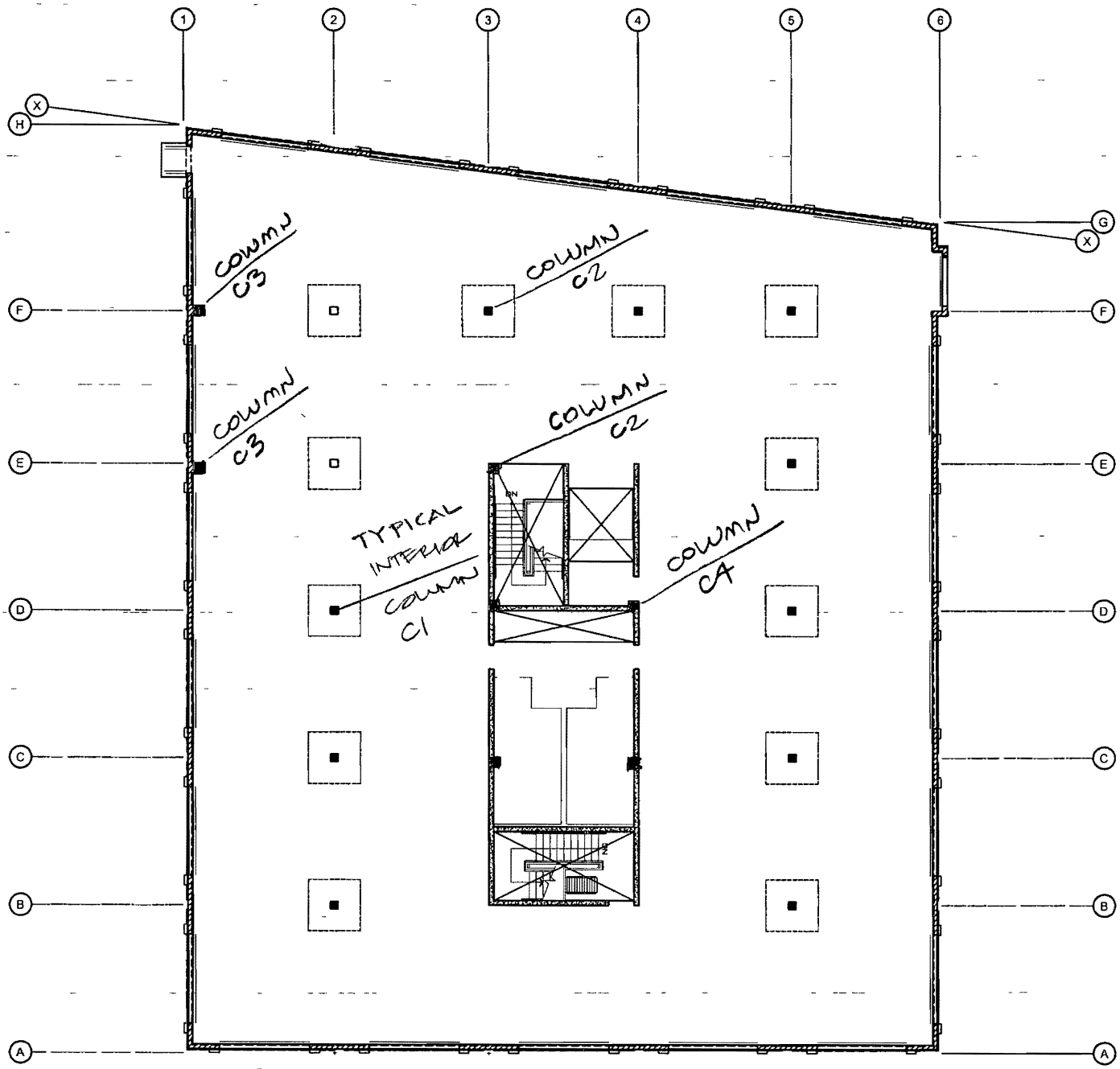
CONTENTS

COLUMNS C-1 to C-41 P

6443 SW Beaverton-Hillsdale Hwy suite 210 Portland OR 97221 ph 503 203 8111 fx 503 203 8122 e wdy@wdyi com

Name	Catholic Charities Office Building	Job No	07081	Sheet No	C1
Client	L | C | A	Date	10/2008	By	kg

COLUMN DESIGN



FLOOR PLAN

N

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SUPPLEMENTAL

STRUCTURAL CALCULATIONS

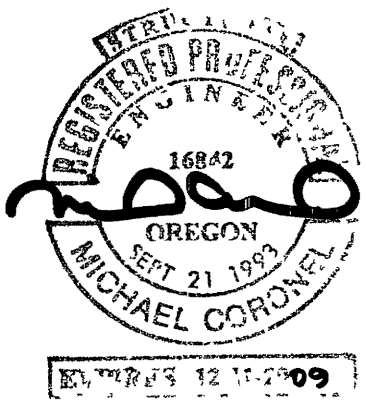
FOR

CLARK FAMILY CENTER

PORTLAND, OREGON

MARCH 6, 2009

08-177308 CO



DESIGN PARAMETERS	**2007 Oregon Structural Specialty Code (OSSC)**
ROOF LOAD	115 psf DL 25 psf SL
FLOOR LOAD	115 psf DL 80 psf LL (2nd to 4th Floor) 100 psf LL (1st Floor)
WIND	
BASIC WIND SPEED	95 mph (3-sec Gust)
EXPOSURE	B
IMPORTANCE	$I_W = 1\ 00$
SEISMIC	
MAPPED RESPONSE	$S_S = 0\ 993$, $S_1 = 0\ 342$
SITE CLASS	D
IMPORTANCE	$I_E = 1\ 00$

CONTENTS

BUILDING DRIFT	D-1 to D-10
COLUMNS	C-42 to C-47

6443 SW Beaverton-Hillsdale Hwy, suite 210 Portland, OR 97221 ph 503 203 8111 fx 503 203 8122 e wdy@wdyi com

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KGA

CLARK FAMILY CENTER

Wall Bracing

Portland Oregon

For

Scheffler Northwest, Inc

KRAMER GEHLEN ASSOCIATES

Consulting Engineers / Structural / Civil

400 Columbia St Suite 240

Vancouver WA 98660-3117

360 / **693-1621** – 503 / **289-2661**

Fax 360 / 696-1572

KGA

STRUCTURAL CALCULATIONS

CLARK FAMILY CENTER

Wall Bracing

Portland, Oregon

For

Scheffler Northwest, Inc

March 27, 2009

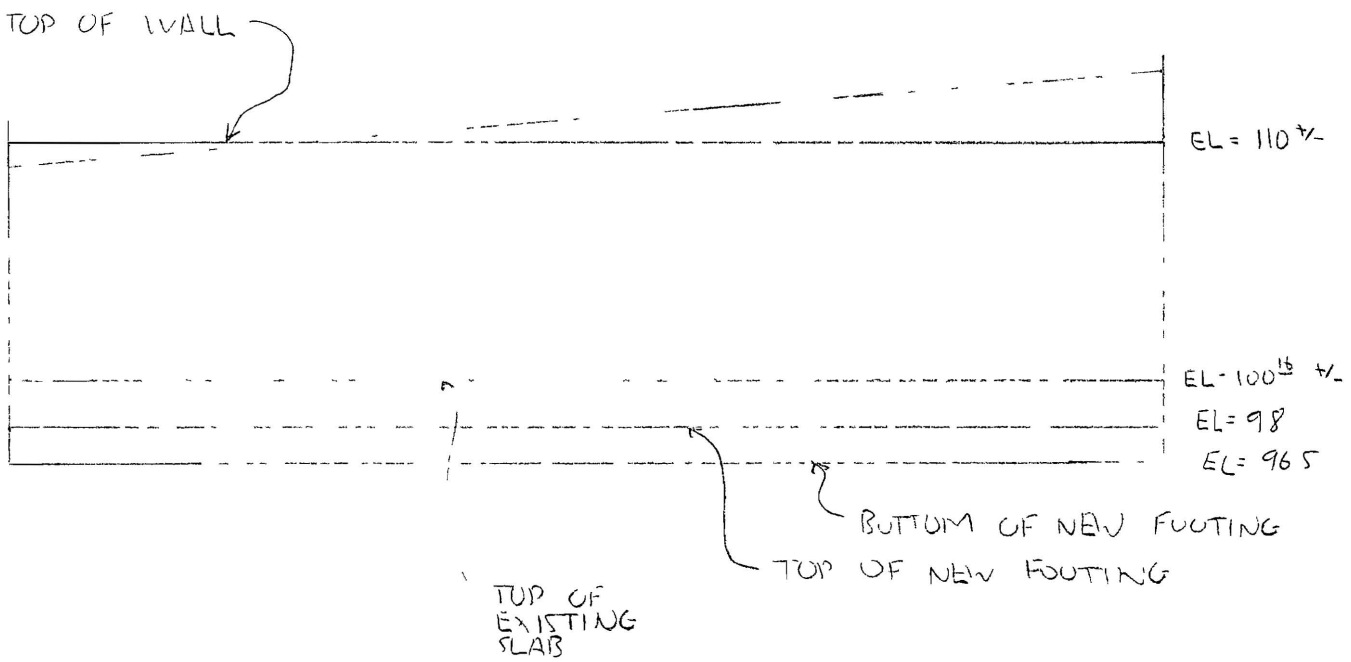
ALL COMPUTATION AND STRUCTURAL ENGINEERING
FOR THIS PROJECT HAVE BEEN PERFORMED
BY MYSELF OR UNDER MY DIRECT SUPERVISION

STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
70009
OREGON
DEC 15, 1978
JOSEPH C. GEHLEN, P.E.
3/27/09
EXPIRES: 6-30-20 09

KRAMER GEHLEN & ASSOCIATES, INC
CONSULTING ENGINEERS
400 Columbia Street, Suite 240
Vancouver, Washington 98660-3413
(360) 693-1621 (503) 289-2661
Fax (360) 696-1572

NORTH WALL BRACING

- AT REST EQUIV FLUID PRESSURE = 52 pcf



- MAX BRACED WALL H = 10'-0"
- CHECK ADEQUACY OF 5x8 DF-L No 2 OR BETTER @ 8'-0" O.C w/ 1:1 SLOPE, SEE ATTACHED DETAIL

  ⇒ MODIFY SPACING TO 6'-0"

KRAMER GEHLEN ASSOCIATES

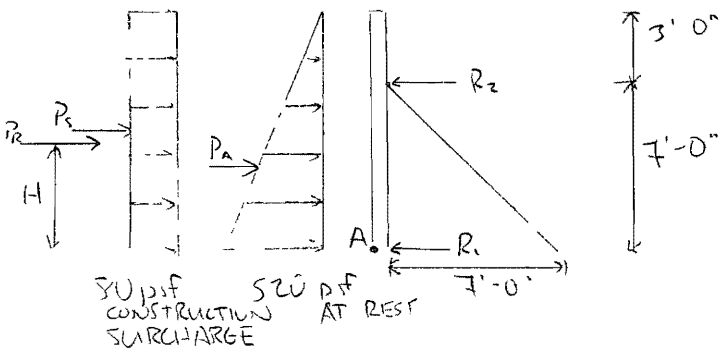
CONSULTING ENGINEERS – STRUCTURAL/CIVIL
400 Columbia St
Suite 240
Vancouver WA
98660-3413
360 / 693-1621
503 / 289-2661
Fax 360 / 696-1572
www.kga.cc

PROJECT	WALL BRACING
CLIENT	Rall CONSTRUCTION
	GENERAL
DATE	3/23/09
DESIGN	SWS
PROJECT NO	09088
SHEET	1

NORTH WALL BRACING

WALL LOADING

* MODEL ASSUMES ONE-WAY ACTION OF VERTICAL CONCRETE & THAT BOTTOM OF WALL ACTS AS A PIN



$P_A = (520)(10)(\frac{1}{2})$
$= 2600$ lb/ft

$P_S = (80)(10)$
$= 800$ lb/ft

$P_{RESULTANT} = 3400$ lb/ft

$$H = \frac{(2600)(10/3) + (800)(5)}{3400}$$

$= 37'$

$\Sigma M_A \Rightarrow (P_{RESULTANT})(37) = R_2(7.0)$

$R_2 = 1797$ lb/ft

w/ 6'-0' SPACING $R = 10800$ lb

$\Sigma F_y \Rightarrow P_{RESULTANT} - R_2 = R_1$

$R_1 = 1602$ lb/ft

COMPRESSION IN BRACE $= [(10800)^2(2)]^{1/2}$
$= 15275$ lb

UNBRACED $L = [(2)(7)^2]^{1/2}$
$= 10'$

KRAMER GEHLEN ASSOCIATES	PROJECT: WALL BRACING	WALL LOADING
	CLIENT: R+H	
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	PROJECT NO: 09088	SHEET: 2/

NORTH WALL BRACING

BRACE DESIGN.

$F_c' = F_c\, C_D\, C_M\, C_t\, C_F\, C_i\, C_p$

w/ $C_D = 1.25$ FOR CONSTRUCTION LOAD

$C_i = C_M = C_t = 1.0$

$C_F = 1.0$

$$C_p = \frac{1 + (F_{cE}/F_c^*)}{2c} - \left[\left(\frac{1 + F_{cE}/F_c^*}{2c}\right)^2 - \frac{F_{cE}/F_c^*}{c}\right]^{1/2}$$

w/ $F_c = 1350$ psi

$F_c^* = 1687$ psi

$c = .80$

$$F_{cE} = \frac{.822\, E'_{min}}{(l_e/d)^2}$$

w/ $E'_{min} = 580{,}000$ psi

$d = 7.5''$

$l_e = K l$

$= (1.0)(10)$

$= 10'$

$= 120''$

$F_{cE} = 2900$ psi

$F_{cE}/F_c^* = 1.10$

$$C_p = \left(\frac{2.10}{1.6}\right) - \left[\left(\frac{2.10}{1.6}\right)^2 - \frac{1.1}{.80}\right]^{1/2}$$

$= .72$

$F_c' = (1350)(1.25)(.72)$

1220 psi

CAPACITY $= (1220)(7.5)(7.5)$

$= 68{,}000$ lb $\Rightarrow$ ok

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	CLIENT: Ralt	
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	PROJECT NO: 09088	SHEET: 31

NORTH WALL BRACING

REQ'D END BEARING AREA

$F_c^* = (1350)(1.25)$ $\qquad F_{c\perp}' = 625$ psi

$= 1687$ psi

$$\text{BEARING @ } 45° = \frac{F_c^* F_{c\perp}'}{F_c^* \sin^2\theta + F_{c\perp}' \cos^2\theta}$$

$$= \frac{(1687)(625)}{(1687)\sin^2(45) + (625)\cos^2(45)}$$

$$= 912 \text{ psi}$$

$$\text{REQ'D BEARING AREA IN EACH DIRECTION} = \frac{10800}{912}$$

$$= 11.8 \text{ in}^2$$

W/ 7.5" WIDE TIMBER NEED H = 1.6"

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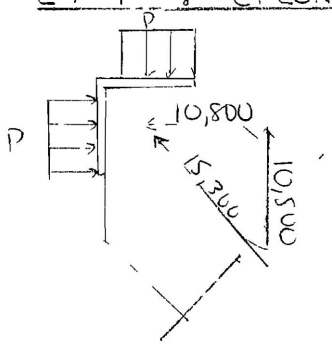
PROJECT WALL BRACING	REQ'D BEARING
CLIENT R+H	
DATE 3/25/09	DESIGN SWJ
PROJECT NO 09088	SHEET 41

NORTH WALL BRACING

L 4×4×3/8 CHECKS

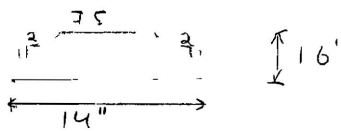


CHECK FLANGE BENDING -

$M = (10800\ lb)(1.6")(\frac{1}{2})$

$= 8640$ in lb → REQ'D FLANGE FOR BEARING

→ DISTRIBUTE 75 OF LOAD OVER 14"



$S = \frac{bh^2}{6}$

$= \frac{(14 \times .375)^2}{6}$

$= .328\ in^3$

$\phi M_n = (.7)(.328)(30)(1000)$

$= 10,600$ in lb

1.2 LOAD FACTOR USED FOR TEMPORARY LOADING

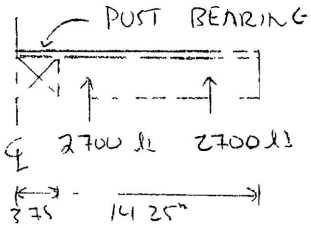
$M_u = (1.2)(8640)$

$= 10,400$ in lb $\leq \phi M_n$ ⇒ OK

SHEAR -

OK BY INSPECTION

CHECK L BENDING



* TAKE BENDING @ EDGE OF 8×8

LOADING = $(10500)(\frac{1}{4})$ @ EACH BOLT

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	CLIENT: R+H		
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	PROJECT NO: 09088	SHEET: 51	

NORTH WALL BRACING

MAX M ON L $= [(2700)(1.75) + (2700)(12.75)](\frac{1}{12})$
$= 3262$ ft lb

L BENDING CAPACITY

LIMIT STATE OF LOCAL BUCKLING WILL CONTROL

$L/t = 10.7$

$L/t \leq 54\sqrt{E/F_y} = 1532$ SO

$M_n = 1.5 F_y S_c$ w/ $S_c = 196 in^3$
$= (1.5)(36)(1.5)$
$= 81$ in k
$= 6.75$ ft k ≥ 3.3 ft k $\Rightarrow$ OK

L SHEAR -

OK BY INSPECTION

KRAMER GEHLEN ASSOCIATES	PROJECT: WALL BRACING	L 4×4×3/8
	CLIENT: R+H	
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	PROJECT NO: 09088	SHEET: 61

NORTH WALL BRACING

- CHECK L4x4x3/8 @ BRACE BASE

FLANGE YIELDING.

$M_u = 10{,}400$ in lb

$$T_{REQ'D} = \frac{10{,}400}{(9)(36)(1000)}$$

$= .32 \text{ in}^2$ OVER 8" WIDE ANGLE

$t = .49"$

- CHECK WELD

8" OF 4/16" WELD LOADED ⊥ CAPACITY = (15)(1392)(4)(8)(2)

= 133 kips ⇒ OK

KRAMER GEHLEN ASSOCIATES	PROJECT WALL BRACING	BASE PL	
	CLIENT RUH		
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	PROJECT NO 09088	SHEET 71	

* REVISED SPACING TO 6'-0", WALL CALCS. FOR 8'-0" ⇒ OK

NORTH WALL BRACING

WALL CAPACITY — NEED TO CHECK CAPACITY IN HORIZONTAL DIRECTION

- ASSUME WALL t = 8"
- DO NOT KNOW HOW MUCH STEEL IS IN THE WALL SO WILL USE VALUE FOR TEMP + SHRINK $\rho = .0018$

$A_{s\,min} = (6)(12)(.0018)$ w/ d = 6'

$= .13 \text{ in}^2/\text{ft}$

→ ASSUME #3's @ 12" O.C. EACH FACE

$M_{max} = A_s f_y (d - a/2)$ w/ $a = \frac{(.11)(\frac{12}{.76})(60)}{(.85)(2.5)(6)}$ w/ f'_c ASSUMED = 2.5 ksi

$= (.11)(\frac{12}{.76})(60)(6 - \frac{.39}{2})(\frac{1}{12})$ $= .39$ in

$= 2.4$ ft k/ft

$\phi M_n = 2.2$ ft-k/ft

- FIND w TO PRODUCE 2.2 ft k/ft MOMENT

$M_{n\,max}$ FOR MULTIPLE CONTINUOUS SPANS = $\frac{wl^2}{10}$

$2.2 = \frac{w(8)^2}{10}$

$w = .343$ k/ft

w/ 52 pcf AS EFP, .343 k/ft OK FOR 10' TALL WALL AS PURELY BEAM BENDING OF WALL OCCURS ONLY VERY NEAR THE TOP EDGE, R ACTION GOVERNS ELSEWHERE + BEAM CHECK IS CONSERVATIVE

- BENDING IN VERTICAL DIRECTION → OK BY INSPECTION, WALL IS CURRENTLY SPANNING 10', NEW CONDITION WILL BE A 7' SPAN w/ 3' CANT

KRAMER GEHLEN ASSOCIATES	PROJECT: WALL BRACING	WALL BENDING CAPACITY
	CLIENT: RCH	
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	PROJECT NO: 09088	SHEET: 81

NORTH WALL BRACING

WALL SHEAR CAPACITY

ONE WAY SHEAR - OK BY INSPECTION OF EXISTING CONDITION W/ 10' WALL SPAN, SHEAR ON 7' SPAN W/ 3' CANT WILL BE LESS THAN 1 10' SPAN

TWO-WAY SHEAR

PUNCHING LOAD (4.7)(10)(1.2)

= 128 kips

LOADED AREA 4" x 5" RECTANGLE

d/2 FROM LOADED AREA CREATES 10" x 14' FAILURE RECTANGLE

$b_o = (2)(10+14)$ = 48"

$\beta_c = \frac{14}{10}$ = 1.4

V_c = MIN OF

$(2 + 4/\beta_c)$ = 4.86

$(\frac{40}{b_o/d} + 2)$ = 7

(4) ⇒ CONTROLS

$\times \sqrt{f'_c}\, b_o d$

$\phi V_c = (.75)(4)\sqrt{2500}\,(48)(6)(\frac{1}{1000})$

= 43 kips ⇒ OK

* REVISED SPACING TO 6'-0", WALL CHECKS FOR 8'-0" ⇒ OK

KRAMER GEHLEN ASSOCIATES	PROJECT: WALL BRACING	WALL SHEAR CAPACITY
	CLIENT: RaH	
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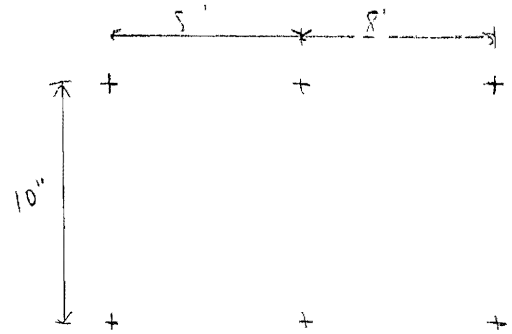
	PROJECT NO: 09088	SHEET: 91

NORTH WALL BRACING

- (2) CONDITIONS

1) BASE w/ (6) FASTENERS ON 3/16 PL



- UNFACTORED V LOAD = 10.8 kips
- UNFACTORED N LOAD = 10.8 kips
- t CONCRETE ASSUME = 6"

V_{uu} = 12.9 kips w/ 1.2 LOAD FACTOR FOR TEMP. LOADS

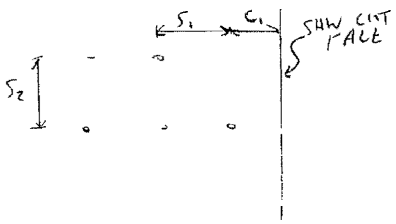
2) ON WALL w/ (4) FASTENERS ON L4×4×1/2

- ASSUME t CONCRETE 8'
- SAME LOAD AS ABOVE

CASE 1.

- TRY TITAN HD

FOR 6" SLAB MAX TITAN HD ϕ = 1/2 w/ 3 1/4" EMBED



EMBED - 3 1/4"

S_1 = 8" C_1 = 5" → = 9'+½ - 1'-7" - 7'

S_2 - 10" → 1.2 LOAD FACTOR FOR TEMPORARY LOADS

FACTORED V = (1.2)(10.8)
= 12.8 kips

- STEEL CAPACITY IN SHEAR

$\phi V_{sa} \geq V_{uu}$

V_{sa} = 7455 lb

ϕ - .60

KRAMER GEHLEN ASSOCIATES	PROJECT WALL BRACING	FASTENERS	
	CLIENT R&H		
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	PROJECT NO C9058	SHEET 101	

NORTH WALL BRACING

$\phi V_{rA} = \phi n V_{sA}$

$= (.6)(6)(7455)$

$= \underline{26.8\ k} \geq V_{uA} \Rightarrow$ ok

- CONCRETE BREAKOUT

$\phi V_{cbg} = \phi \frac{A_{vc}}{A_{vco}} \psi_{ec,V} \psi_{ed,V} \psi_{c,V} V_b$

w/ $\phi = .70$ FOR CONDITION B

$A_{vco} = 4.5 (c_{a1})^2$

$c_{a1} = 4''$ → LIMITED BY $h_a/1.5$

$= 72\ in^2$

$A_{vc} = (10 + (1.5)(2)(21))(6)$ → t → END DISTANCE FROM BACK RUN TO SAWCUT FACE

$= 438\ in^2$

$\phi V_{cbg} = (.70)\left(\frac{438}{72}\right)(1.0)(1.0)(1.4)(2700)$

$= \underline{16.1\ kips} \geq V_{uA} \Rightarrow$ ok

$V_b = 7\left(\frac{l_e}{d_o}\right)^2 \sqrt{d_o}\sqrt{f'_c}\,(c_{a1})^{1.5}$

$= 7\left(\frac{2.35}{.5}\right)^2 \sqrt{.5}\sqrt{2500}\,(4)^{1.5}$

$= 2700\ \#$

$\psi_{ec,V} = 1.0$

$\psi_{ed,V} = 1.0$

$\psi_{c,V} = 1.4$ ⇒ FOR UNCRACKED CONCRETE

- CONCRETE PRYOUT

$\phi V_{cpg} = \phi k_{cp} N_{cbg}$

w/ $k_{cp} = 1.0$ FOR $h_{ef} \leq 2.5$ $\quad h_{ef} = 2.35''$

$\phi = .70$

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	CLIENT: R&H	
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	PROJECT NO: 09088	SHEET: 11

NORTH WALL BRACING

$$N_{cbg} = \frac{A_{Nc}}{A_{Nco}} \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$$

w/ $A_{Nco} = 9 h_{ef}^2$
$= 497 \text{ in}^2$

$A_{Nc} = (6)(497)$ $\quad 5 > (3)(h_{ef})$
$= 298 \text{ in}^2$

$N_{cbg} = 18360$ lbs

$N_b = k_c \sqrt{f'_c}\, h_{ef}^{1.5}$
$= 17 \sqrt{2500}\,(2.75)^{1.5}$
$= 3060$ lb

$\psi_{ec,N} = 1.0$
$\psi_{ed,N} = 1.0$
$\psi_{c,N} = 1.0$
$\psi_{cp,N} = 1.0$ FOR $c_{a,min} \geq c_{ac} = 8''$

$\phi k_{cp} N_{cbg} = (.70)(1)(18360)$
$= 12850$ lbs $\geq \phi V_{un} \Rightarrow$ ok

$\Rightarrow$ USE (6) 1/2" ϕ TITAN HD w/ 3 1/4" EMBEDMENT

KRAMER GEHLEN ASSOCIATES	PROJECT WALL BRACING	FASTENERS
	CLIENT R+H	
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	PROJECT NO 09083	SHEET 121

NORTH WALL BRACING

CASE 2

- TRY TITAN HD

FOR 8" WALL MAX TITAN HD - 1/2"Ø w/ 4" EMBED

EMBED = 4" $n = 4$

$S_1 = 11"$

$S_2 = N/A.$

NO EDGE DISTANCE OR END DISTANCE REDUCTIONS (MIN = 36")

FACTORED $V = (1.2)(10.8)$
$= 12.9$ kips

* 1.2 LOAD FACTOR FOR TEMPORARY LOADS

- STEEL SHEAR CAPACITY

$\phi V_{sA} \geq V_{uA}$

$V_{sA} = 7455$ lb

$\phi = .60$

$\phi V_{sA} = (.60)(4)(7455)$
$= 17.9$ kips $\geq V_{uA} \Rightarrow$ OK

KRAMER GEHLEN ASSOCIATES	PROJECT WALL BRACING	FASTENERS	
	CLIENT R & H		
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	PROJECT NO 09058	SHEET 131	

NORTH WALL BRACING

- CONCRETE BREAKOUT

$$\phi V_{cbg} = \phi \frac{A_{vc}}{A_{vco}} \psi_{ec,V} \psi_{ed,V} \psi_{c,V} V_b$$

$\phi = .70$

$A_{vco} = 4.5 (c_{a1})^2$ w/ $c_{a1} = 5.33'$ ⇒ LIMITED BY $h_a/1.5$

$= 128 \text{ in}^2$ → DISTANCE TO EDGE

$A_{vc} = (33 + (2)(1.5)(36))(8)$ → t

$= 1128 \text{ in}^2$

$V_b = 7 \left(\frac{l_e}{d_o}\right)^2 \sqrt{d_o} \sqrt{f'_c} (c_{a1})^{1.5}$

$= (7)\left(\frac{2.99}{.50}\right)^2 \sqrt{.5} \sqrt{2500} (5.33)^{1.5}$

$= 4355 \text{ lb}$

$\phi V_{cbg} = (.70)\frac{(1128)}{(128)}(1.0)(1.0)(1.0)(4355)$

$= 268 \text{ kips} \geq V_{uA}$ ⇒ ok

$\psi_{ec,V} = \psi_{ed,V} = \psi_{c,V} = 1.0$

- CONCRETE PRYOUT

$$\phi V_{cpg} = \phi k_{cp} N_{cbg}$$

$\phi = .70$

$k_{cp} = 1.0$

$$N_{cbg} = \frac{A_{Nc}}{A_{Nco}} \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$$

$A_{Nco} = 9 h_{ef}^2$

$= (9)(2.99)^2$

$= 81 \text{ in}^2$

$A_{Nc} = (11 + 9)(9)$

$= 180 \text{ in}^2$ PER SIDE

$= 360 \text{ in}^2$ TOTAL

$\psi_{ec,N} = \psi_{ed,N} = \psi_{c,N} = 1.0$

NORTH WALL BRACING

$$\psi_{cp,N} = \frac{C_{a,min}}{C_{ac}} \geq \frac{(1.5)h_{ef}}{C_{ac}}$$

$$= \frac{7}{8} \geq \frac{(1.5)(2.99)}{8}$$

$$= .875 \geq .75$$

$$\psi_{cp,N} = .875$$

$$N_{cpg} = \left(\frac{360}{51}\right)(1.0)(1.0)(1.0)(.875)N_b$$

$$= 17.1\ k \geq V_{ua} \Rightarrow \text{OK}$$

w/ $N_b = k_c\sqrt{f'_c}\,h_{ef}^{1.5}$

$= 17(2500)^{1/2}(2.99)^{1.5}$

$= 4395$ lb

$\Rightarrow$ USE (4) ½" Ø TITAN AD w/ 4" EMBEDMENT

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	CLIENT: R&H	
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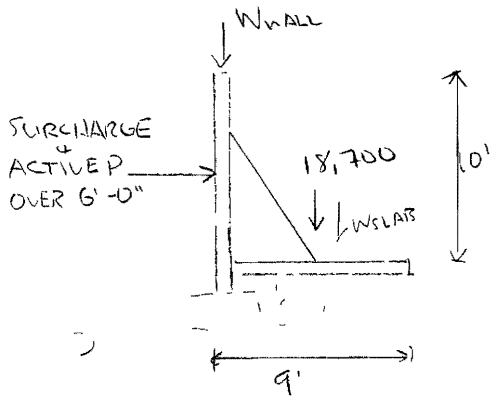
NORTH WALL BRACING

SLIDING

$\mu = .50$



$W_{WALL} = (150)(\frac{8}{12})(10)(6)$
$= 6000$ lb PER 6'

$W_{SLAB} = (150)(\frac{6}{12})(9)(6)$
$= 4050$ lb PER 6'

ACTIVE P = 32 psf

FOR 10' $P = (32)(10)(10)(\frac{1}{2})$
$= 1600$ lb/ft

SURCHARGE = 800 lb/ft

TOTAL LATERAL P OVER 6' = $(1600 + 800)(6)$
$= 14{,}400$ lb

w/ $\mu = 50$ RESISTING FORCE = $(18{,}700 + 6000 + 4050)(.50)$
$= 14{,}375$ lb

F.S. SLIDING = 1.0 ⇒ OK FOR TEMPORARY CASE IN WHICH PASSIVE RESISTANCE ON WALL FOOTING HAS BEEN IGNORED DUE TO INSUFFICIENT INFO REGARDING ITS DEPTH

KGA

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CLARK FAMILY CENTER

Shoring

Portland, Oregon

For

Schuffler Northwest, Inc

KRAMER GEHLEN ASSOCIATES

Consulting Engineers / Structural / Civil

400 Columbia St / Suite 240

Vancouver WA 98660 3117

360 / **693-1621** / 503 / **289-2661**

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STRUCTURAL CALCULATIONS

CLARK FAMILY CENTER

Shoring

Portland, Oregon

For

Scheffler Northwest, Inc

March 27, 2009

ALL COMPUTATION AND STRUCTURAL ENGINEERING
FOR THIS PROJECT HAVE BEEN PERFORMED
BY MYSELF OR UNDER MY DIRECT SUPERVISION

STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
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3/27/09
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Clark Family Center Shoring
Portland, OR
Soldier Pile Wall
Design Calculations
Project Number 09074

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2006 International Building Code (IBC)
"Principles of Foundation Engineering" 5th Edition, Braja M Das 2004

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GENERAL

SCOPE: DESIGN SOLDIER PILE W/ TIMBER LAGGING SHORING FOR CONSTRUCTION OF NEW CLARK FAMILY CENTER EXPOSED H VARIES FROM 8 TO 16'

- SOIL PROPERTIES:

$P_A = 32$ psf EFFECTIVE ACTIVE WIDTH = 1 × PILE Ø

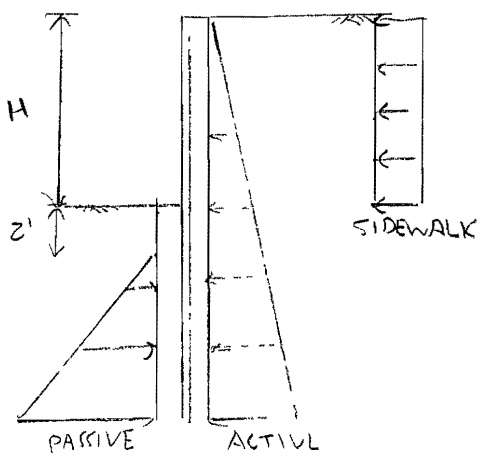
$P_P = 500$ psf EFFECTIVE PASSIVE WIDTH = 2 × PILE Ø

PILL Ø => USE b_f OF SECTION USED

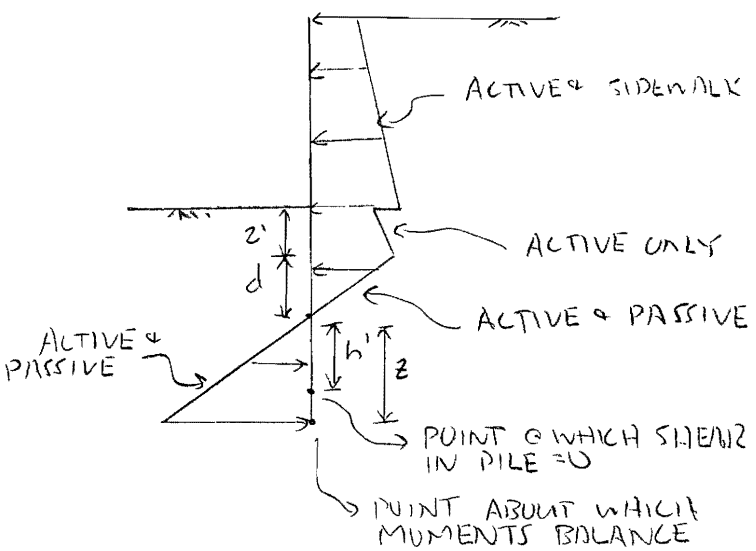
- SIDEWALK SURCHARGE OF 250 psf PRODUCES 50 psf LATERAL FORCE ON EAST SIDE, USED LATERAL OF 20 psf ON WEST SIDE

- NEGLECT 2' OF PASSIVE PRESSURE & THAT LAGGING EXTENDS 2' BELOW BOTTOM OF EXPECTED EXCAVATION

PRESSURE ON PILING.



PILE LOADING



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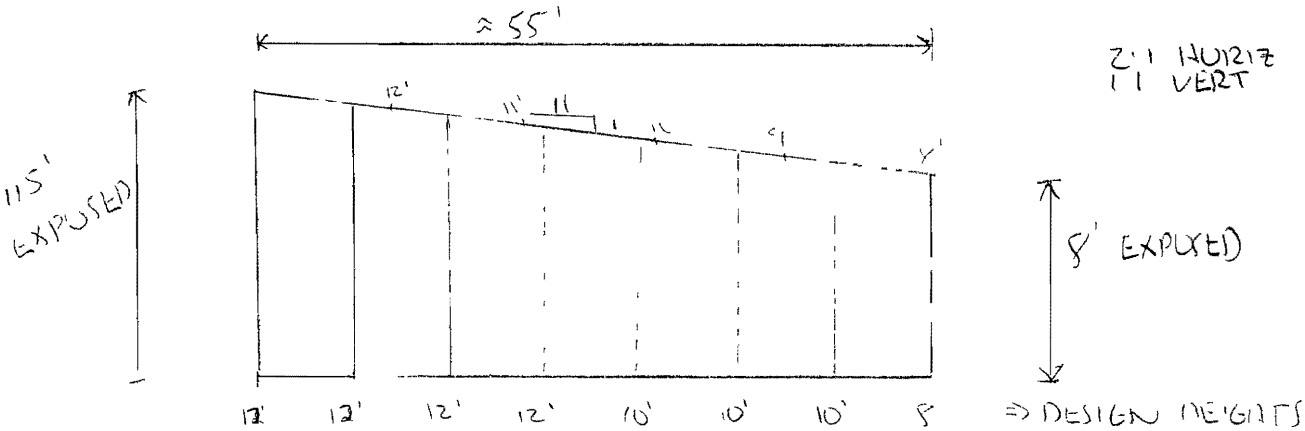
PROJECT	CLARK FAMILY CENTER SHORING
CLIENT	SCHEFFLER
	GENERAL
DATE	3/12/09
DESIGN	SLS
PROJECT NO	09074
SHEET	1/

WEST WALL LAYOUT

- REQ'D FROM 2' PAST NORTH END OF EXISTING BLD. TO APPROXIMATELY WHERE GRADE IS @ 103' (WALL HEIGHT = 8')
  - ABOUT 55' OF PILE & LAGGING
  - H VARIES FROM 13' TO 8'



⇒ USE 8' SPACING, REQUIRES 8 PILE FOR A TOTAL OF 56'

		EMBED L (ft)	~ DRILLED SHAFT (24"Ø)	
≤ 12' PILE	HP 14×73	19	W 18×50	16
≤ 10' PILE	HP 12×53	18	W 16×36	14.5
≤ 8' PILE	HP 12×53	16	W 16×36	12.5

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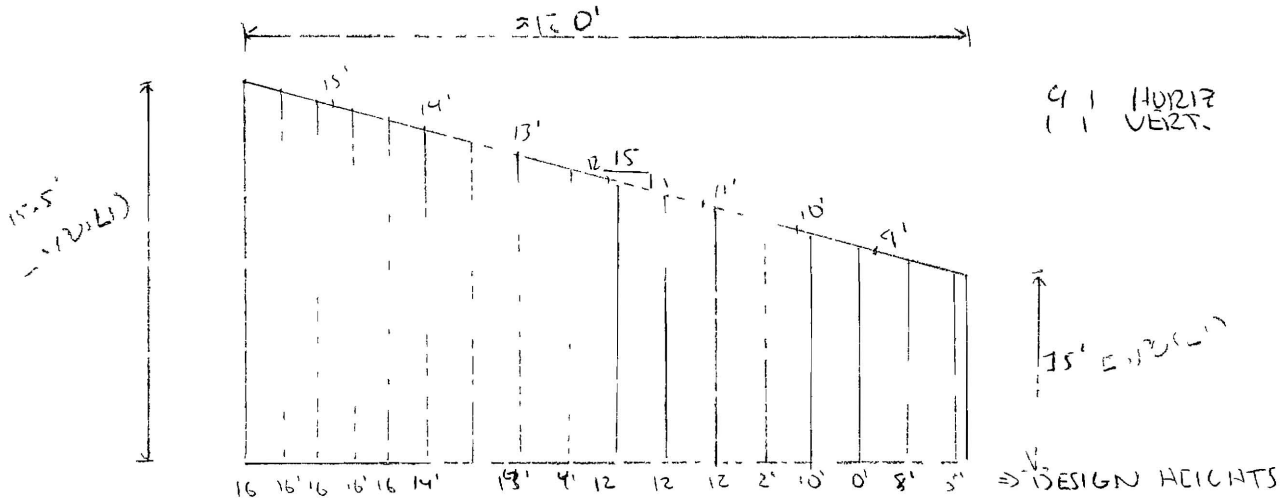
PROJECT: CLARK FAMILY CENTER
CLIENT: SCHEFFLER
WEST WALL

DATE	DESIGN
3/12/09	SWJ
PROJECT NO	SHEET
09074	2/

EAST WALL LAYOUT

- REQ'D FROM NORTH END OF NEW BUILDING TO 8' PAST SOUTH END

  - ABOUT 120' OF PILE & LAGGING
    IT VARIES FROM ≈16 TO 8'



- USE 6' ℄ TO ℄ SPACING FROM 16' H TO 14' H, 5 SPACES, 6 PILE

- 5' ℄ TO ℄ FROM 14' → 8' H, 11 SPACES

w/ DRILLED SHAFT (Ø-24)

			EMBED L (ft)		EMBED (ft)
≤16'	PILE	HP14×102	23	W15×76	20
≤14	PILE	HP14×102	23	W W18×76	20
≤12'	PILE	HP14×89	21	W 18×60	18
≤10'	PILE	HP 12×63	18	W 18×50	16
≤8'	PILE	HP 12×53	18	W 16×36	14

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PROJECT CLARK FAMILY CENTER
CLIENT SCHEFFLER

EAST WALL

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98660-3413 www kga com

DATE	DESIGN
3/12/09	TW
PROJECT NO	SHEET
14074	3/

CANTILIVERED SHORING - H = 8'

East Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	8	ft
Diameter	1 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	2688	
3	2560	
4	320 0	
5	0	
6	968 00	*h'

d 0 331 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	5120	
2 minus 1	8192	
3	5120	
2 minus 3	128	
4	52 89	
6	484 00	$*h'^2$

h' 6 20 ft

h 8 53

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
5120	12 53	64163 33
8192	11 20	91738 66
5120	7 53	38563 33
128	7 87	1006 75
52 89256	6 42	339 66
-18612 89	2 07	-38474 84
		157336 88

(Sx)req'd
50 35

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W16X36	56 5	15 9	7	17 37	10 89%
HP12x53	66 7	11 8	12	16 83	24 52%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
5120	6 33	32412 56
8192	5 00	40937 43
5120	1 33	6812 56
128	1 66	212 98
52 89	0 22	11 66
484 00	0 33	161 33

a + b*z = c*z^3

a	80387 19
b	18612 89
c	161 33

z =	12 45 ft
Total Embedment =	14 78 ft
Embed x 1 2 (F S) =	17 74 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
26		8		18		17 74		1 48%
28		8		20		17 74		12 76%
30		8		22		17 74		24 04%

CANTILIVERED SHORING - H = 8'

West Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	8	ft
Diameter	1 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	2208	
3	2560	
4	320 0	
5	0	
6	968 00	*h'

d 0 331 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1280	
2 minus 1	8192	
3	5120	
2 minus 3	-352	
4	52 89	
6	484 00	$*h'^2$

h'	h
5 43 ft	7 76

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1280	11 76	15058 94
8192	10 43	85454 58
5120	6 76	34635 78
-352	7 10	-2498 54
52 89256	5 65	299 09
-14292 89	1 81	-25890 25
		107059 60

(Sx)req'd
34 26

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W16X36	56 5	15 9	7	17 37	39 36%
HP12x53	66 7	11 8	12	16 83	48 64%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1280	6 33	8103 14
8192	5 00	40937 43
5120	1 33	6812 56
-352	1 66	-585 70
52 89	0 22	11 66
484 00	0 33	161 33

a + b*z = c*z^3

a	55279 09
b	14292 89
c	161 33

z =	10 95 ft
Total Embedment =	13 28 ft
Embed x 1 2 (F S) =	15 94 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
26		8		18		15 94		12 95%
28		8		20		15 94		25 50%
30		8		22		15 94		38 05%

CANTILIVERED SHORING - H = 10'

East Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	10	ft
Diameter	1 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	3200	
3	3072	
4	384 0	
5	0	
6	968 00	*h'

d 0 397 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	6400	
2 minus 1	12800	
3	6144	
2 minus 3	128	
4	76 17	
6	484 00	*h'^{2}

h'	h
7 27 ft	9 66

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
6400	14 66	93837 15
12800	13 00	166340 97
6144	8 66	53219 67
128	9 00	1151 41
76 16529	7 53	573 51
-25548 17	2 42	-61872 21
		253250 49

(Sx)req'd
81 04

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X50	88 9	18	7 5	19 50	8 84%
HP12x63	79 1	11 9	12 1	16 97	-2 45%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
6400	7 40	47338 84
12800	5 73	73344 35
6144	1 40	8581 29
128	1 73	221 44
76 17	0 26	20 14
484 00	0 33	161 33

a + b*z = c*z^3

a	129506 07
b	25548 17
c	161 33

z =	14 60 ft
Total Embedment =	17 00 ft
Embed x 1 2 (F S) =	20 40 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
32		10		22		20 40		7 86%
34		10		24		20 40		17 67%
36		10		26		20 40		27 48%

CANTILIVERED SHORING - H = 10'

West Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	0	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	10	ft
Diameter	1 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	2720	
3	3072	
4	384 0	
5	0	
6	1000 00	*h'

d 0 384 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1600	
2 minus 1	12800	
3	6144	
2 minus 3	-352	
4	73 73	
6	500 00	$*h'^2$

h'	h
6 37 ft	8 75

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1600	13 75	22000 69
12800	12 08	154672 20
6144	7 75	47618 65
-352	8 08	-2845 49
73 728	6 62	488 26
-20265 73	2 12	-43006 79
		178927 52

(Sx)req'd
57 26

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X50	88 9	18	7 5	19 50	35 59%
HP12x53	66 7	11 8	12	16 83	14 16%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1600	7 38	11814 40
12800	5 72	73181 87
6144	1 38	8503 30
-352	1 72	-604 50
73 73	0 26	18 87
500 00	0 33	166 67

a + b*z = c*z^3

a	92913 94
b	20265 73
c	166 67

z =	12 85 ft
Total Embedment =	15 23 ft
Embed x 1 2 (F S) =	18 28 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
32		10		22		18 28		20 34%
34		10		24		18 28		31 29%
36		10		26		18 28		42 23%

CANTILIVERED SHORING - H =12'

East Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	12	ft
Diameter	1 23	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	3712	
3	3584	
4	551 0	
5	0	
6	1190 64	*h'

d 0 463 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	7680	
2 minus 1	18432	
3	7168	
2 minus 3	128	
4	127 51	
6	595 32	*h'^{2}

h'	h
7 51 ft	9 97

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
7680	15 97	122636 30
18432	13 97	257463 13
7168	8 97	64284 55
128	9 30	1190 61
127 5134	7 81	996 39
-33535 51	2 50	-83899 80
		362671 17

(Sx)req'd
116 05

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X71	127	18 5	7 64	20 02	8 62%
HP14x89	131	13 8	14 7	20 16	11 41%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
7680	8 46	64994 38
18432	6 46	119122 51
7168	1 46	10485 42
128	1 80	229 91
127 51	0 31	39 34
595 32	0 33	198 44

a + b*z = c*z^3

a	194871 56
b	33535 51
c	198 44

z =	15 25 ft
Total Embedment =	17 71 ft
Embed x 1 2 (F S) =	21 26 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
38		12		26		21 26		22 32%
40		12		28		21 26		31 73%
42		12		30		21 26		41 14%

CANTILIVERED SHORING - H =12'

West Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	0	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	12	ft
Diameter	1 22	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	3232	
3	3584	
4	546 6	
5	0	
6	1220 00	*h'

d 0 448 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1920	
2 minus 1	18432	
3	7168	
2 minus 3	-352	
4	122 43	
6	610 00	$*h'^2$

h'	h
6 69 ft	9 14

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1920	15 14	29062 42
18432	13 14	242135 24
7168	8 14	58323 71
-352	8 47	-2981 44
122 4294	6 99	855 46
-27290 43	2 23	-60845 63
		266549 75

(Sx)req'd
85 30

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X71	127	18 5	7 64	20 02	32 84%
HP14x73	107	13 6	14 6	19 95	20 28%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1920	8 45	16220 16
18432	6 45	118849 54
7168	1 45	10379 26
-352	1 78	-627 03
122 43	0 30	36 57
610 00	0 33	203 33

a + b*z = c*z^3

a	144858 50
b	27290 43
c	203 33

z =	13 65 ft
Total Embedment =	16 10 ft
Embed x 1 2 (F S) =	19 32 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
38		12		26		19 32		34 59%
40		12		28		19 32		44 95%
42		12		30		19 32		55 30%

CANTILIVERED SHORING - H = 14'

East Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	13 5	ft
Diameter	0 93	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	4096	
3	3968	
4	461 3	
5	0	
6	900 24	*h'

d 0 512 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	8640	
2 minus 1	23328	
3	7936	
2 minus 3	128	
4	118 18	
6	450 12	$*h'^2$

h'	h
9 44 ft	11 96

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
8640	18 71	161627 70
23328	16 46	383906 80
7936	10 96	86954 04
128	11 29	1445 15
118 1792	9 79	1156 51
-40150 18	3 15	-126399 64
		508690 57

(Sx)req'd
162 78

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X86	166	18 4	11 1	21 49	1 94%
HP14x10.	150	14	14 8	20 37	-8 52%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
8640	9 26	80027 11
23328	7 01	163585 19
7936	1 51	12002 38
128	1 85	236 25
118 18	0 34	40 37
450 12	0 33	150 04

a + b*z = c*z^3

a	255891 30
b	40150 18
c	150 04

z =	18 90 ft
Total Embedment =	21 41 ft
Embed x 1 2 (F S) =	25 69 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
44		13 5		30 5		25 69		18 70%
46		13 5		32 5		25 69		26 48%
48		13 5		34 5		25 69		34 27%

CANTILIVERED SHORING - H = 16'

East Wall

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	15 5	ft
Diameter	0 93	ft
Spacing	6	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	480	
2	3456	
3	3360	
4	520 8	
5	0	
6	900 24	*h'

d 0 579 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	7440	
2 minus 1	23064	
3	6720	
2 minus 3	96	
4	150 64	
6	450 12	$*h'^2$

h' 9 12 ft

h 11 70

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
7440	19 45	144726 09
23064	16 87	389068 88
6720	10 70	71920 34
96	11 04	1059 43
150 6446	9 51	1432 57
-37470 64	3 04	-113959 71
		494247 60

(Sx)req'd
158 16

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X86	166	18 4	11 1	21 49	4 72%
HP14x102	150	14	14 8	20 37	-5 44%
W14x99	157	14 2	14 6	20 37	-0 74%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
7440	10 33	76844 13
23064	7 75	178634 81
6720	1 58	10607 60
96	1 91	183 54
150 64	0 39	58 10
450 12	0 33	150 04

a + b*z = c*z^3

a	266328 18
b	37470 64
c	150 04

z =	18 60 ft
Total Embedment =	21 18 ft
Embed x 1 2 (F S) =	25 41 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
44		15 5		28 5		25 41		12 14%
46		15 5		30 5		25 41		20 01%
48		15 5		32 5		25 41		27 88%

CANTILIVERED SHORING - H = 8'

EAST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	8	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	2688	
3	2560	
4	640 0	
5	0	
6	1936 00	*h'

d 0 331 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	5120	
2 minus 1	8192	
3	5120	
2 minus 3	128	
4	105 79	
6	968 00	$*h'^2$

h'	h
4 39 ft	6 72

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
5120	10 72	54895 62
8192	9 39	76910 33
5120	5 72	29295 62
128	6 06	775 06
105 7851	4 61	487 84
-18665 79	1 46	-27321 87
		135042 60

(Sx)req'd
43 21

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W16X36	56 5	15 9	7	17 37	23 52%
HP12x53	66 7	11 8	12	16 83	35 21%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
5120	6 33	32412 56
8192	5 00	40937 43
5120	1 33	6812 56
128	1 66	212 98
105 79	0 22	23 31
968 00	0 33	322 67

a + b*z = c*z^3

a	80398 85
b	18665 79
c	322 67

z =	9 20 ft
Total Embedment =	11 53 ft
Embed x 1 2 (F S) =	13 84 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
22		8		14		13 84		1 18%
23		8		15		13 84		8 41%
24		8		16		13 84		15 63%

CANTILIVERED SHORING - H = 8'

WEST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	8	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	2208	
3	2560	
4	640 0	
5	0	
6	1936 00	*h'

d 0 331 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1280	
2 minus 1	8192	
3	5120	
2 minus 3	-352	
4	105 79	
6	968 00	$*h'^2$

h'	h
3 85 ft	6 18

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1280	10 18	13030 73
8192	8 85	72474 00
5120	5 18	26522 92
-352	5 51	-1940 78
105 7851	4 07	430 55
-14345 79	1 28	-18408 89
		92108 53

(Sx)req'd
29 47

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W16X36	56 5	15 9	7	17 37	47 83%
HP12x53	66 7	11 8	12	16 83	55 81%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1280	6 33	8103 14
8192	5 00	40937 43
5120	1 33	6812 56
-352	1 66	-585 70
105 79	0 22	23 31
968 00	0 33	322 67

a + b*z = c*z^3

a	55290 75
b	14345 79
c	322 67

z =	8 10 ft
Total Embedment =	10 43 ft
Embed x 1 2 (F S) =	12 52 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
20		8		12		12 52		-4 13%
21		8		13		12 52		3 86%
22		8		14		12 52		11 85%

CANTILIVERED SHORING - H = 10'

EAST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	10	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	3200	
3	3072	
4	768 0	
5	0	
6	1936 00	*h'

d 0 397 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	6400	
2 minus 1	12800	
3	6144	
2 minus 3	128	
4	152 33	
6	968 00	$*h'^2$

h' 5 15 ft

h 7 54

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
6400	12 54	80267 09
12800	10 88	139200 84
6144	6 54	40192 40
128	6 88	880 01
152 3306	5 41	824 03
-25624 33	1 72	-43946 05
		217418 32

(Sx)req'd
69 57

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X50	88 9	18	7 5	19 50	21 74%
HP12x63	79 1	11 9	12 1	16 97	12 04%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
6400	7 40	47338 84
12800	5 73	73344 35
6144	1 40	8581 29
128	1 73	221 44
152 33	0 26	40 29
968 00	0 33	322 67

a + b*z = c*z^3

a	129526 21
b	25624 33
c	322 67

z =	10 80 ft
Total Embedment =	13 20 ft
Embed x 1 2 (F S) =	15 84 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
25		10		15		15 84		-5 28%
26		10		16		15 84		1 04%
27		10		17		15 84		7 35%

CANTILIVERED SHORING - H = 10'

WEST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	0	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	10	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	2720	
3	3072	
4	768 0	
5	0	
6	2000 00	*h'

d 0 384 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1600	
2 minus 1	12800	
3	6144	
2 minus 3	-352	
4	147 46	
6	1000 00	$*h'^2$

h' 4 51 ft

h 6 89

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1600	11 89	19030 29
12800	10 23	130908 95
6144	5 89	36212 30
-352	6 23	-2192 00
147 456	4 77	702 76
-20339 46	1 50	-30576 50
		154085 81

(Sx)req'd
49 31

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W16X36	56 5	15 9	7	17 37	12 73%
HP12x53	66 7	11 8	12	16 83	26 08%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1600	7 38	11814 40
12800	5 72	73181 87
6144	1 38	8503 30
-352	1 72	-604 50
147 46	0 26	37 75
1000 00	0 33	333 33

a + b*z = c*z^3

a	92932 81
b	20339 46
c	333 33

z =	9 50 ft
Total Embedment =	11 88 ft
Embed x 1 2 (F S) =	14 26 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
24		10		14		14 26		-1 83%
25		10		15		14 26		5 18%
26		10		16		14 26		12 20%

CANTILIVERED SHORING - H =12'

EAST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	12	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	3712	
3	3584	
4	896 0	
5	0	
6	1936 00	*h'

d 0 463 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	7680	
2 minus 1	18432	
3	7168	
2 minus 3	128	
4	207 34	
6	968 00	*h'^{2}

h'	h
5 89 ft	8 36

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
7680	14 36	110252 06
18432	12 36	227740 94
7168	7 36	52725 92
128	7 69	984 20
207 3388	6 20	1285 81
-33615 34	1 96	-66030 91
		326958 02

(Sx)req'd
104 63

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X60	108	17 6	7 5	19 13	3 12%
HP14x89	131	13 8	14 7	20 16	20 13%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
7680	8 46	64994 38
18432	6 46	119122 51
7168	1 46	10485 42
128	1 80	229 91
207 34	0 31	63 97
968 00	0 33	322 67

a + b*z = c*z^3

a	194896 19
b	33615 34
c	322 67

z =	12 35 ft
Total Embedment =	14 81 ft
Embed x 1 2 (F S) =	17 78 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
29		12		17		17 78		-4 36%
30		12		18		17 78		1 26%
31		12		19		17 78		6 89%

CANTILIVERED SHORING - H =12'

WEST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	0	
Surcharge	20	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	12	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	160	
2	3232	
3	3584	
4	896 0	
5	0	
6	2000 00	*h'

d 0 448 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	1920	
2 minus 1	18432	
3	7168	
2 minus 3	-352	
4	200 70	
6	1000 00	$*h'^2$

h'	h
5 23 ft	7 68

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
1920	13 68	26264 66
18432	11 68	215276 74
7168	6 68	47878 73
-352	7 01	-2468 52
200 704	5 53	1109 93
-27368 7	1 74	-47726 56
		240334 99

(Sx)req'd
76 91

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X50	88 9	18	7 5	19 50	13 49%
HP14x73	107	13 6	14 6	19 95	28 12%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
1920	8 45	16220 16
18432	6 45	118849 54
7168	1 45	10379 26
-352	1 78	-627 03
200 70	0 30	59 94
1000 00	0 33	333 33

a + b*z = c*z^3

a	144881 87
b	27368 70
c	333 33

z =	11 00 ft
Total Embedment =	13 45 ft
Embed x 1 2 (F S) =	16 14 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
28		12		16		16 14		-0 85%
29		12		17		16 14		5 34%
30		12		18		16 14		11 54%

CANTILIVERED SHORING - H = 14'

EAST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	13 5	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	4096	
3	3968	
4	992 0	
5	0	
6	1936 00	*h'

d 0 512 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	8640	
2 minus 1	23328	
3	7936	
2 minus 3	128	
4	254 15	
6	968 00	$*h'^2$

h'
6 45 ft

h
8 96

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
8640	15 71	135765 44
23328	13 46	314078 68
7936	7 96	63199 07
128	8 30	1062 01
254 1488	6 79	1726 38
-40286 15	2 15	-86631 27
		429200 29

(Sx)req'd
137 34

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X76	146	18 2	11	21 27	5 93%
HP14x10:	150	14	14 8	20 37	8 44%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
8640	9 26	80027 11
23328	7 01	163585 19
7936	1 51	12002 38
128	1 85	236 25
254 15	0 34	86 82
968 00	0 33	322 67

a + b*z = c*z^3

a	255937 75
b	40286 15
c	322 67

z =	13 55 ft
Total Embedment =	16 06 ft
Embed x 1 2 (F S) =	19 27 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
32		13 5		18 5		19 27		-4 02%
33		13 5		19 5		19 27		1 17%
34		13 5		20 5		19 27		6 36%

CANTILIVERED SHORING - H = 16'

EAST WALL

w/ 2 ft Diameter Drilled Shafts

Soil Parameter

Active Pressure (E F P	32	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	500	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	15 5	ft
Diameter	2 00	ft
Spacing	6	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	480	
2	3456	
3	3360	
4	1120 0	
5	0	
6	1936 00	*h'

d 0 579 ft

Sum Horizontal Forces to Find h'

	Load (lb)	
1	7440	
2 minus 1	23064	
3	6720	
2 minus 3	96	
4	323 97	
6	968 00	*h'^{2}

h' 6 24 ft

h 8 81

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
7440	16 56	123240 39
23064	13 98	322463 21
6720	7 81	52513 90
96	8 15	782 20
323 9669	6 62	2145 22
-37643 97	2 08	-78249 96
		422894 95

(Sx)req'd
135 33

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
W18X76	146	18 2	11	21 27	7 31%
HP14x102	150	14	14 8	20 37	9 78%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
7440	10 33	76844 13
23064	7 75	178634 81
6720	1 58	10607 60
96	1 91	183 54
323 97	0 39	124 95
968 00	0 33	322 67

a + b*z = c*z^3

a	266395 03
b	37643 97
c	322 67

z =	13 35 ft
Total Embedment =	15 93 ft
Embed x 1 2 (F S) =	19 11 ft

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
35		15 5		19 5		19 11		2 02%
36		15 5		20 5		19 11		7 25%
37		15 5		21 5		19 11		12 48%

TIMBER LAGGING

(2) DESIGN CASES:

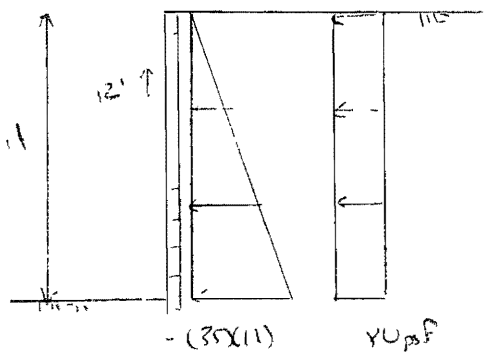
1) 6' SPACING @ BOTTOM OF 16 EXCAVATION

2) 8' SPACING @ BOTTOM OF 14 EXCAVATION

LOADING ON LAGGING.

* USE 2½' BEARING ON PILE FLANGES, CONTROLED BY W16×45 b_f = 7"

* USE 12' LAGGING FOR CALCS



CASE 1

MAX PRESSURE = (35)(16) + 80

= 640 psf

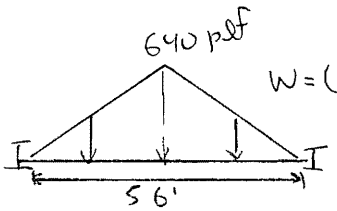
OVER 12' WIDTH = 640 psf ON LAGGING

SPAN = 6' - (5/12)

= 5.6'

$M_{max} = \frac{wl}{6}$

= 1670 ft lb



$W = (\frac{1}{2})(5.6)(640)$

= 1800 lb

* TRY 3× DF-L No. 2

$F_b = F_b' C_D C_M C_t C_L C_F C_{fu} C_r C_F$

$F_b' = (1.25)(1.2)(900)$

= 1350 psf

w/ C_D = 1.25 FOR CONSTRUCTION LOAD

$C_F = C_M = C_t = C_L = C_r = C_F = 1.0$

$C_{fu} = 1.2$

KGA KRAMER GEHLEN ASSOCIATES	PROJECT CLARK FAMILY CENTER SHORING	TIMBER LAGGING
	CLIENT SCHEFFLER	
CONSULTING ENGINEERS – STRUCTURAL/CIVIL 400 Columbia St 360 / 693-1621 Suite 240 503 / 289-2661 Vancouver WA Fax 360 / 696 1572 98660-3413 www.kga.com	DATE 7-13-09 / DESIGN SRS	
	PROJECT NO 090744 / SHEET 36	

TIMBER LAGGING

$S_{REQ'D} = \frac{(12)(1670)}{1350}$

$= 14.9 \ in^3 \Rightarrow 3\times12$ NO GOOD

GO TO 4×12

$F_b' = 1360$ psi

$S_{REQ'D} = 14 \ in^3 \Rightarrow 4\times12$ OK

$V_{max} = \frac{W}{2}$

$= 835$ lb

$f_v = \frac{(3)(835)}{(2)(4)(12)}$

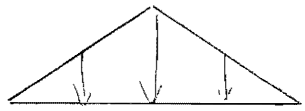
$= 26$ psi $\Rightarrow$ OK

CASE 2

PRESSURE $= (14)(35) + 80$

$= 570$ psf

OVER 12' $= 570$ plf



$W = (\frac{1}{2})(570)(7.6)$

$= 2170$ lb

SPAN $= 7.6'$

$M_{max} = 2745$ ft lb

$V_{max} = 1085$ lb

w/ 4×12 $F_b' = 1360$ psi

$S_{REQ'D} = 24 \ in^3 \Rightarrow$ USE 4×12

✓ OK BY INSPECTION

KRAMER GEHLEN ASSOCIATES	PROJECT: CLARK FAMILY CENTER SHORING	TIMBER LAGGING
	CLIENT: SCHLITTLER	
CONSULTING ENGINEERS – STRUCTURAL/CIVIL 400 Columbia St, Suite 240, Vancouver WA 98660 3413 360 / 693-1621 503 / 289-2661 Fax 360 / 696-1572 www.kga.com	DATE: 3/13/09	DESIGN: SWJ
	PROJECT NO: 09074	SHEET: 37/

APPENDIX A

SOLIDIER PILE WALL HAND CALCS

GENERAL

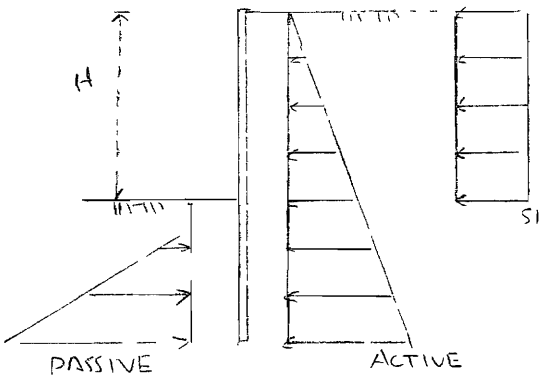
SOIL PRESSURES

$P_A = 35$ psf

$P_P = 300$ psf

EFFECTIVE PILE WIDTH = 2 × GROUTED Ø

NEGLECT 2' OF PASSIVE SOIL & ASSUME LAGGING 1' BELOW EXPECTED PRESSURE ON PILING



SIDEWALK SURCHARGE

= 80 psf ($\approx (\frac{1}{3})(250)$)

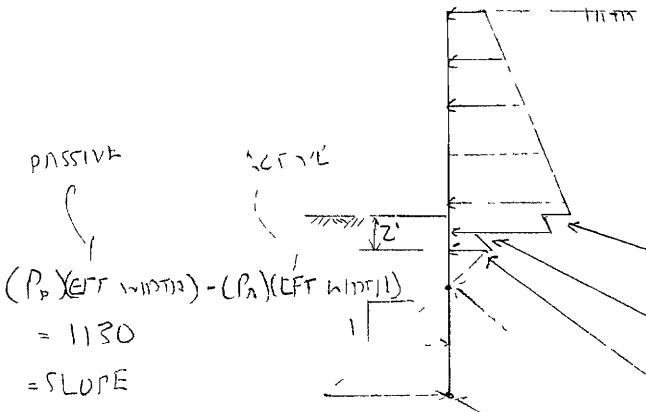
H VARIES FROM ≈ 5' → 18'

PILING LOADING

PILE SPACING = 8'-0"

EFFECTIVE WIDTH = 2' FOR ACTIVE

= 4' FOR PASSIVE



$(P_P)(\text{EFF WIDTH}) - (P_A)(\text{EFF WIDTH})$

= 1130

= SLOPE

- SURCHARGE PRESSURE TAKEN BY SOIL
- LATERAL LOADING NO LONGER ON LAGGING, ONLY PILING
- PASSIVE PRESSURE BEGINS TO RESIST ACTIVE
- POINT OF ZERO PRESSURE ⇒ POINT "A"
- POINT OF ZERO SHEAR ⇒ POINT "O"

KRAMER GEHLEN ASSOCIATES

CONSULTING ENGINEERS – STRUCTURAL/CIVIL

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Fax 360 / 696-1572
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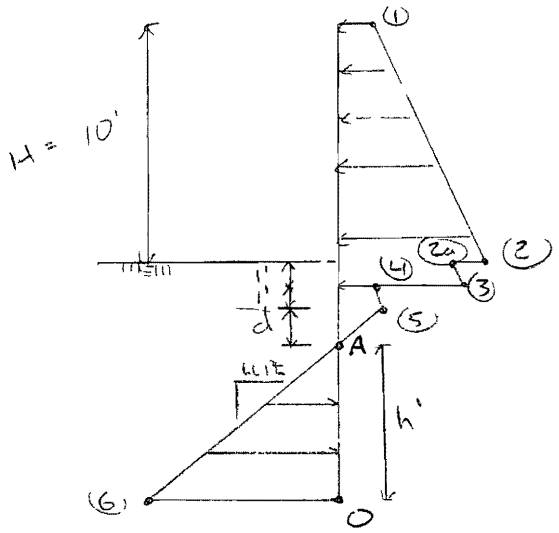
PROJECT: CLARK FAMILY CENTER SHORING	GENERAL
CLIENT: SCHEFFLER	
DATE: 3/9/09	DESIGN: SWD
PROJECT NO: 09074	SHEET: 1

PILE LOADING.



SLOPE = 1130

(1) = (8' SPACING)(80 psf SURCHARGE)
= 640 lb/ft

(2) = (8' SPACING)(80 psf SURCHARGE) + (10')(35 psf ACTIVE)(8' SPACING)
= 3440 lb/ft

(3) = (1')(35 psf ACTIVE)(8' SPACING)
= 3080 lb/ft

(4) = (3) $\frac{\text{2' EFFECTIVE ACTIVE WIDTH}}{\text{8' SPACING}}$
= 770 lb/ft

(5) = (4) + (2' EFFECTIVE ACTIVE WIDTH)(35 psf)(1')
= 840 lb/ft

(2a) = (2) - (8' SPACING)(80 psf SURCHARGE)
= 2800 lb/ft

$d = (5)\left(\frac{1}{1130}\right)$
= .74'

(6) = (SLOPE)(h')
= 1130 (h')

KGA KRAMER GEHLEN ASSOCIATES	PROJECT CLARK FAMILY CENTER SHORING	10' WALL HEIGHT
	CLIENT CHEFFLER	
CONSULTING ENGINEERS – STRUCTURAL/CIVIL 400 Columbia St 360 / **693-1621** Suite 240 503 / **289-2661** Vancouver WA *Fax 360 / 696-1572* 98660-3413 www kga com	DATE 3/10/09	DESIGN SWJ
	PROJECT NO 091074	SHEET 2

ΣF HORIZONTAL FOR h'

Σ ACTIVE FORCES $= (10')① + (10')(\frac{1}{2})(②-①) + ②a(1') + (1')(\frac{1}{2})(③-②a) + (1')④ + (1')(\frac{1}{2})(⑤-④) + ⑤(\frac{1}{2})(d)$

$= (10)(640) + (10)(.5)(2800) + (2800) + (5)(280) + (770) + (\frac{1}{2})(70) + (840)(\frac{1}{2})(74)$

$= 24460$ lb

Σ PASSIVE FORCES $= (E)\, h'\, (\frac{1}{2})$
$= 565(h')^2$

EQUATE & SOLVE h'

$\underline{h' = 6.6'}$

DEPTH TO POINT OF ZERO SHEAR = 9.34' FROM BOTTOM OF EXCAVATION

CALL 9.34' BELOW EXCAVATION POINT 0"

ΣM_0:

ACTIVE $= (10)(640)(9.34+5) + (10)(5)(2800)(9.34+\frac{10}{3}) + (2800)(9.34-5) + (5)(280)(9.34-2/3) + (770)(9.34-1.5) + (\frac{1}{2})(70)(9.34-1.66) + (840)(\frac{1}{2})(.74)(9.34-(2+(\frac{1}{3})(.74)))$

$= 303650$ ft lb

PASSIVE $= (1130)(6.6)(6.6)(\frac{1}{2})(6.6)(\frac{1}{3})$
$= 54145$ ft·lb

$\Sigma M = 249{,}500$ ft lb

$= 2994$ in k

$S_{REQ'D}$ w/ $F_{allow} = 1.75(.55)$

$S_{REQ'D} = 80$ in³

PROJECT: CLARK FAMILY CENTER SHORING		10' WALL HEIGHT
CLIENT: SCHEFFLER		

KRAMER GEHLEN ASSOCIATES

CONSULTING ENGINEERS – STRUCTURAL/CIVIL
400 Columbia St, Suite 240, Vancouver WA 98660-3413
360 / 693-1621
503 / 289 2661
Fax 360 / 696 1572
www.kga.com

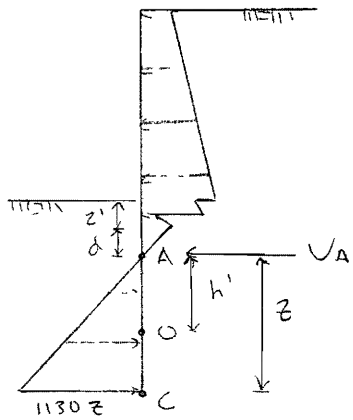
DATE	DESIGN
3/10/09	SWS
PROJECT NO	SHEET
09074	3/

SUM MOMENTS TO FIND z REQ'D FOR MOMENT EQUILIBRIUM

ΣM_A

ACTIVE = $(10)(640)(2.74+5)+(10)(.5)(2800)(2.74+\frac{10}{3})+$
$(2800)(2.74-.5)+(.5)(2800)(2.74-2/3)+$
$(710)(.74+.5)+(.710)(.5)(.74+\frac{1}{3})+$
$(840)(.5)(.74)(\frac{.74}{3})$

$M_A = 142194$ ft lb



⇒ DEFINE POINT "C" @ DEPTH @ WHICH OVT STABILITY IS ACHIEVED

TRANSFER M_A TO M_C

$$M_C = M_A + V_A(z) - (1130)(z)(\frac{z}{2})(\frac{z}{6})$$

w/ $V_A = \Sigma$ ACTIVE $= 24{,}460$ lb

EQUATE $M_C = 0$

$$0 = M_A + (24{,}460)(z) - 188\,z^3$$

$z = 13.6'$

TOTAL EMBEDMENT $= z + d + 2'$

$= 16.34'$

w/ 1.2 F.S. $= 19.6'$

EMBEDMENT = 19.6'

KRAMER GEHLEN ASSOCIATES	PROJECT: CLARK FAMILY CENTER SHORING	10' WALL HEIGHT
	CLIENT: SCHEFFLER	
CONSULTING ENGINEERS – STRUCTURAL/CIVIL 400 Columbia St, Suite 240, Vancouver WA 98660-3413 360 / 693-1621 503 / 289-2661 Fax 360 / 696 1572 www kga com	DATE: 3/10/09	DESIGN: SRJ
	PROJECT NO: 09074	SHEET: 4/

- PERFORMED HAND CALC (SHEETS 1-4) & CHECKED RESULTS w/ CANTILEVER SHORING SPREADSHEET (SHEETS 6-8) SPREADSHEET RESULTS WERE SLIGHTLY CONSERVATIVE RELATIVE HAND CALCS DUE TO MODELING OF PILE LOADING @ REGION FROM BOTTOM OF EXCAVATION TO A DEPTH OF 2' @ WHICH PASSIVE PRESSURE TAKES EFFECT

	HAND CALCED	SPREADSHEET
d	.74'	.743'
h'	5.6	6.95
h	9.34	9.72'
S_{REQD}	50 in³	55 in³
z	13.6'	14.2'
EMBED DEPTH w/ FS = 1.2	19.6'	20.4'

ADEQUATE SECTIONS

HP 12×74

HP 14×73

MIN TOTAL LENGTH = 32'

LAGGING ⇒ 4 × DF-L No 2

KRAMER GEHLEN ASSOCIATES

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www.kga.com

PROJECT: CLARK FAMILY CENTER SHORING
CLIENT: SCHEFFLER

SUMMARY

DATE: 3/10/09
DESIGN: SWJ
PROJECT NO: 09074
SHEET: 5/

CANTILIVERED SHORING - H = 10'

Soil Parameter

Active Pressure (E F P	35	pcf
Effective Width (xDIA)	1	
Surcharge	80	psf
Passive Pressure	300	pcf
Effective Width (xDIA)	2 00	

Pile Information

Excavation (H)	10	ft
Diameter	2 00	ft
Spacing	8	ft
Passive Soil to Neglect	2	ft

Distributed Load per Pile

	w (lb/ft)	
1	640	
2	3440	
3	3360	
4	840 0	
5	0	
6	1130 00	*h'

d 0 743 ft

HAND CALC d = .74'

Sum Horizontal Forces to Find h'

	Load (lb)	
1	6400	
2 minus 1	14000	
3	6720	
2 minus 3	80	
4	312 21	
6	565 00	*h'^{2}

h'
6 98 ft

HAND CALC h' = 6 6'

h
9 72

HAND CALC h = 9 34'

Sum Moments About 'o' to Find Max Moment on Pile

Load (lb)	r (ft)	M (ft*lb)
6400	14 72	94217 50
14000	13 05	182767 45
6720	8 72	58608 38
80	9 05	724 39
312 2124	7 47	2333 38
-27512 21	2 33	-63994 52
		274656 57

(Sx)req'd
87 89

HAND CALC S = 80 in^3

Possible Selections

	Sx	d	bf	DIAG	% Extra Capacity
HP12X74	93 8	12 1	12 2	17 18	6 30%
HP14X73	107	13 6	14 6	19 95	17 86%

Sum Moments About 'o' to Find Req'd Embedment Depth, z

Load (lb)	r (ft)	M (ft*lb)
6400	7 74	49557 52
14000	6 08	85073 75
6720	1 74	11715 40
80	2 08	166 14
312 21	0 50	154 72
565 00	0 33	188 33

a + b*z = c*z^3

a	146667 53
b	27512 21
c	188 33

z =	14 20 ft
Total Embedment =	16 94 ft
Embed x 1 2 (F S) =	20 33 ft

HAND CALC = 19 6'

Overall Pile Length

Overall Pile Length	-	Depth at Excavation	=	Net Embed Depth	/	Computed Embed Depth	=	% Incr
32		10		22		20 33		8 20%
36		10		26		20 33		27 88%
40		10		30		20 33		47 55%

APPENDIX B

Alder Geotechnical Services

3910 NE 10th Avenue
Portland, Oregon 97212
(503) 282-7482
Fax (503) 282-7402
aldergeo@teleport com

July 24, 2008
Project No 568-2

Ms Terri Silvis, Ph D
Project Manager
Catholic Charities of Oregon
231 SE 12th Avenue
Portland, Oregon 97214

GEOTECHNICAL INVESTIGATION REPORT
CATHOLIC CHARITIES SERVICES CENTER
2740 SE POWELL BOULEVARD
PORTLAND, OREGON

Dear Ms Silvis

This report presents the results of a geotechnical investigation for your proposed services center building at 2740 SE Powell Boulevard (Figure 1) The purpose of the investigation was to evaluate soil and groundwater conditions on the site and provide design and construction recommendations for site excavating and shoring, foundations, retaining walls, and seismic ground shaking Our scope of services included performing field explorations, laboratory and field tests, and engineering analyses

This work was performed in general accordance with our agreement dated September 23, 2005

PROJECT DESCRIPTION
The project consists of demolishing a two-story commercial building with a basement on the 17,740 square-foot site and building a new, four-story commercial building with basement parking level The new building will be concrete construction with some CMU block and steel framing Maximum dead plus live column loads are anticipated to range between about 325 and 400 kips Maximum dead plus live loads on perimeter wall footings are anticipated to be about 14 to 17 kips per lineal foot Maximum dead plus live loads on interior core wall footings are anticipated to be about 22 to 26 kips per lineal foot Horizontal seismic forces will be resisted by concrete shear walls arranged around north and south elevator and stairwell shafts

The proposed 12,000 square foot footprint is approximately 4,000 square feet larger than the existing building footprint All of the old building will be demolished except for the north basement wall, which will be incorporated into the shoring scheme along SE Powell Boulevard Excavations up to a maximum of about 12 to 15 feet deep are anticipated along SE Powell Boulevard and SE 28th Avenue The design finish floor of the new parking level is 99 feet

Stormwater will be collected and discharged into several drywells installed south of the building

FIELD AND LABORATORY INVESTIGATIONS

The field investigation was performed in October and November 2005 as part of a larger investigation of former St Vincent de Paul property located south of SE Powell Boulevard between SE 26th and SE 28th Avenues The complete results of that investigation were presented in a report titled "Preliminary Geotechnical Report, Proposed Housing and Office Development, St Vincent de Paul Site, Between SE 26th and 28th Avenues on SE Powell Boulevard, Portland, Oregon," dated December 15, 2005

Three soil borings were drilled on and near the subject parcel The borings were advanced 11½ and 36½ feet deep Soil samples were collected from the borings at regular intervals for examination and laboratory testing The approximate locations of the explorations are shown on Figure 2

The field investigation is described in Appendix A Final logs of the Borings 8, 9 and 16 are presented in Appendix A The descriptions on the logs are based on field logs, sample inspection and laboratory testing Results of laboratory moisture content tests and percent passing the No 200 sieve are shown at the corresponding sample locations on the exploration logs

SITE CONDITIONS

Surface Conditions

The trapezoidal-shape property is approximately 108 feet wide and 160 feet to 206 feet long A two-story commercial building with a basement currently occupies the east two-thirds of the property and an asphalt paved parking lot occupies the west third The existing basement floor is located at about elevation 99 75 feet The ground surface outside the building slopes down to the south, with elevations ranging from about 112 feet in the northeast corner to 95 feet in the southwest corner

Subsurface Conditions

Fine- and coarse-grained flood deposits underlie the site These silty, sandy and gravelly sediments were deposits at least 13,000 years ago during repeated, massive glacial flooding of the ancient Columbia River A generalize geologic cross-section drawn north-south and looking east is shown in Figure 3

The near surface soils are primarily brown, interlayered, silts and fine sandy silts With increasing depth, the silty soils become increasingly gray and sandy The deeper layers are typically fine silty sands Dense to very dense gravelly soils were encountered in Boring 8 at a depth of 36 feet below the existing ground surface and in Boring 9 at a depth of 28 feet

Standard penetration test blow counts (N-values) recorded in the silty and sandy soils ranged from 9 to 23, and averaged about 13 blows per foot The N-values indicate relative densities ranging from loose to medium dense and averaging medium dense Measured moisture contents ranged from 11 to 29 percent, and averaged 20 percent

Dense to very dense gravels interlayered with fine sands and silts are present 28 to 36 feet below the existing ground surface at elevations of 68 to 70 feet

Groundwater
Groundwater was encountered in Boring 9 at a depth of 24 feet below the ground surface and at elevation of approximately 72 feet

CONCLUSIONS AND RECOMMENDATIONS

General
field and laboratory investigations indicate that the site is mantled with 28 to 36 feet of moderately compressible silts, sandy silts and silty fine sands Strong gravel layers with low compressibility underlie the finer grained soils Groundwater was found 24 feet below the ground surface and at about elevation 72 feet in October 2005

Recommendations are provided in the following sections for supporting the building on shallow wall and column footings bearing on undisturbed silts and sands

Where space allows, the excavation for the building's parking level may be sloped using the guidelines presented in this report The excavation will need to be properly shored where space is not available for construction slopes

Site Liquefaction Potential
Our field exploration program and review of available geotechnical information indicates that the site is not subject to liquefaction damage and possess a low potential for soil densification and ground surface settlement during strong seismic shaking The soil profile consists of at least 28 feet of loose to medium dense silts and sands The upper 24 feet of these soils are located above the water table and not subject to liquefaction Dense to very dense gravels are present below 28 feet which also are not subject to liquefaction Medium dense silty sands located between a depth of 24 feet and 28 feet are potentially liquefiable, but are located at such a depth that they will not cause shallow foundations to lose bearing capacity The potential for significant ground surface settlement resulting from the liquefaction of this thin layer is low

Site Preparation and Earthwork
Building Pad Excavation and Slopes
The surface elevation of the parking level floor slab is anticipated to be about 99 feet The soil subgrade will be excavated at least 1 to 1½ feet lower, assuming an approximately 5 inch thick concrete floor slab and 6 inches to 12 inches of gravel base rock Given the existing site grades, the maximum depth of excavation will range from 10 to 14 feet deep along the north property line Digging footings will increase the maximum excavation depth to 12 to 16 feet. The proposed depth of excavation along the south property line ranges from 0 to 5 feet The southwest corner of the building will actually require up to 3 feet of structural fill

Temporary construction slopes and/or shoring will be necessary to construct the parking level The owner and the Contractor should be familiar with applicable local, state and federal regulations for both temporary construction slopes, and shoring, including the current OSHA Excavation and Trench Safety Standards The Contractor should be solely responsible for the design, construction and performance of temporary shoring

Temporary excavations should be designed assuming Type "B" soils will be exposed in the side slopes OSHA requires that Type "C" soil slopes be excavated no steeper than 1 horizontal to 1 vertical The on-site soils are classified as Type "B" because of their silty and sandy compostion and moderate strength

All excavated slopes must be protected with plastic sheeting during wet weather Surface water runoff must be directed way from the top of slopes

Construction Shoring

Unsupported, temporary construction slopes should not be excavated in areas where adjacent improvements are located within a horizontal distance less than or equal to half the depth of the excavation (measured from the top of the excavation) Excavation shoring will be required when the recommended maximum excavation slope inclination cannot be maintained, particularly in areas adjacent to existing improvements, including structures, roadways, and underground utilities

The contract should select a shoring system appropriate for the site and soil conditions Suitable shoring systems include (1) bracing and using the north basement wall of the existing building, (2) combining 1H 1V construction slopes with temporary walls constructed using 2-foot square, pre-cast concrete blocks and (3) installing steel H-pile and timber lagging walls

The geotechnical engineer should be consulted for specific design recommendations and parameters when selecting and designing the appropriate shoring systems

Structural Fill

Imported crushed gravel should be used to construct all structural fills in the building pad and behind the basement walls The fill should consist of 1-inch minus crushed gravel or similar size gravel product

Structural fill for the building pad should be placed in horizontal lifts that are no more than 9 inches thick before compaction Each lift should be compacted to at least 90 percent of the maximum dry density determined in accordance with ASTM Test Method D 1557 (Modified Proctor)

Wall backfill should be placed in horizontal lifts that are no more than 12 inches thick before compaction Each lift should be compacted while at or above the optimum moisture content and to 90 percent of the maximum dry density determined in accordance with ASTM Test Method D

1557 Only manually guided compactors should be used within 3 feet of retaining walls Over compaction of the wall backfill should be avoided, especially behind tall walls

Foundations
The proposed building can be supported on conventional foundations bearing on native silty and sandy soils The bottom of the footing excavations should be protected from disturbance during wet weather by 2 to 3 inches of compacted crushed gravel

Spread and continuous footings should be designed for a maximum allowable soil bearing pressure of 3,000 psf (dead plus live loads) A one-third increase in the allowable bearing pressure is allowed for loading conditions that include wind and seismic forces

The bottoms of all footings should be located at least 18 inches below lowest adjacent grade and the basement floor slab Continuous and spread footings should have minimum widths of 24 inches All footings should be reinforced as specified by the structural engineer

A geotechnical engineer should review the foundation plans to verify that these recommendations have been properly interpreted and incorporated into the project documents

In addition, a geotechnical engineer should observe all footing excavations before the contractor places reinforcing steel or concrete The purpose of this work is to evaluate whether actual soil conditions are similar to those encountered in the borings and backhoe test pits or whether different conditions are present that require design changes

Seismic Site Coefficient
Based on our interpretation of site geology, the soil conditions at this site are most similar to 2007 OSSC Site Class D

Retaining Walls
Geotechnical design recommendations for retaining walls are provided in the following paragraphs The recommended static equivalent fluid weights and seismic resultant thrusts assume that (1) the wall backfill is level and fully drained by a foundation drain system, (2) the recommended earth pressures act horizontally (normal to the wall) because friction between the wall and backfill will be prevented by drainage membranes or impervious wall coatings, and (3) the backfill has a maximum wet, compacted unit weight of 135 pcf and consists of imported crushed gravel

Static Design
Retaining walls that are free to rotate, such as free-standing cantilever or segmental block walls, should be designed to resist static, horizontal earth pressure forces calculated using an equivalent fluid weight of 32 pcf This fluid weight was calculated using the Rankine earth pressure theory

Retaining walls that are restrained at the top and bottom, such as basement walls, should be designed to resist static, horizontal earth pressure forces calculated using an equivalent fluid weight of 52 pcf This fluid weight was calculated using the Jaky equation for normally consolidated soils

A friction coefficient of 0 5 times the vertical load may be used to evaluate the frictional resistance along the bottom of concrete foundations in direct contact with either the undisturbed weathered basalt bedrock or at least 3 inches of 1½-inch minus crushed gravel The structural plans for all retaining wall footings should include a note stating that the foundation subgrade must consist of either undisturbed weathered basalt or 3 inches of imported crushed 1½-inch minus gravel The structural note should also state that geotechnical special inspection of all retaining wall footing excavations is required before constructing forms

Passive pressure may be used to resist sliding if the ground in front of the foundation is level for at least 10 feet or three times the height of the surface generating passive resistance The static horizontal passive resistance may be calculated using an equivalent fluid weight of 500 pcf This passive equivalent fluid weight was calculated using the Coulomb earth pressure theory with $\delta=\frac{1}{2}\Phi'$

Only two-thirds of the passive resistance should be used if friction and passive resistance are combined to resist lateral forces

Seismic Design

Ground accelerations during earthquakes temporarily increase lateral earth pressures on retaining walls The resultant horizontal seismic thrust should be added to the horizontal static force calculated using the equivalent fluid weights listed above Seismic thrusts have been calculated assuming a 2007 Oregon Structural Specialty Code peak ground acceleration a_{max} of 0 3g

Unrestrained walls should be designed to resist a seismically-induced resultant horizontal thrust of $6H^2$ pounds, where H is the height of the wall in feet. The resultant seismic thrust acts 0 6H above the base of the wall This thrust was calculated using the Mononobe-Okabe method assuming the unrestrained walls are free to displace and assuming a pseudostatic horizontal acceleration equal to ½ a_{max}

Restrained basement walls should be designed to resist a seismic resultant horizontal thrust of $13H^2$ pounds, where H is the height of the wall in feet The resultant seismic thrust acts 0 6H above the base of the wall This thrust was calculated using the Mononobe-Okabe method and assuming a pseudostatic horizontal acceleration equal to a_{max}

A friction coefficient of 0 5 times the vertical load may be used to evaluate the frictional resistance along the bottom of concrete foundations in direct contact with either the undisturbed weathered basalt bedrock or at least 3 inches of 1½-inch minus crushed gravel The structural plans for all retaining wall footings should include a note stating that the foundation subgrade must consist of either undisturbed weathered basalt or 3 inches of imported crushed 1½-inch

minus gravel The structural note should also state that geotechnical special inspection of all retaining wall footing excavations is required before constructing forms

Passive pressure may be used to resist sliding during seismic loading if the ground in front of the foundation is level for at least 10 feet or three times the height of the surface generating passive resistance The seismic passive resistance may be calculated using an equivalent fluid weight of 350 pcf This seismic passive equivalent fluid weight was calculated using the Mononobe-Okabe method with $\delta=\frac{1}{2}\varphi'$ and a pseudostatic horizontal acceleration equal to a_{max}

Only two-thirds of the passive resistance should be used if friction and passive resistance are combined to resist lateral forces

The minimum recommended factors of safety for seismic design of sliding, overturning and bearing capacity are taken as 75% of the values recommended for statically loaded structures Therefore, the minimum static factors of safety for sliding, overturning, and bearing capacity of 1 5, 1 5, and 2 0 are reduced to 1 1, 1 1, and 1 5, respectively, when evaluating seismic stability

Drainage

The entire back (soil face) of basement walls should be covered with appropriate waterproofing Retaining walls must include foundation and backfill drainage provisions Perforated foundation drainpipes should be located below the finish floor elevation of the interior floor slab The perforated drainpipes should be at least 4 inch diameter and surrounded by at least 1-foot of 1½"-3/4" crushed drain rock that has been completely wrapped in a non-woven geotextile Prefabricated foundation drains such as *ezflow* (www ezflowlp com) may be installed as an alternative to drain rock The *ezflow* system consists of a flexible, perforated pipe surrounded by expanded polystyrene (EPS) aggregate A geotextile wrap holds the lightweight aggregate around the drain pipe The system is sold in 10-foot long lengths that snap together Drainpipes should outlet to an appropriate drainage facility

Floor Slab and Parking Slab

We recommend that the slab-on-grade floor be designed using an allowable modulus of subgrade reaction of up to 150 pci The subgrade soils must be in a firm, non-yielding condition at the time of slab construction Any soft areas encountered should be excavated and replaced with structural fill Concrete slabs supporting car traffic should be at least 5 inches thick Floor slabs in building areas should be at least 4 inches thick

A capillary break consisting of at least 6 inches of gravel should be placed underneath the concrete slabs This minimum gravel thickness may need to be increased to 12 inches depending on construction traffic use and whether construction occurs during the wet winter and spring months

If the slab will be covered by moisture-sensitive material, we recommend placing a vapor barrier on top of the gravel capillary break and below the slab

CLOSURE

Geotechnical review is of paramount importance in engineering practice The poor performance of many foundations has been attributed to inadequate construction review On-site grading and earthwork should be observed and, where necessary, tested by a qualified geotechnical engineering firm to verify compliance with the recommendations contained in this report Foundation excavations should also be observed to compare the generalized site conditions assumed in this report with those found on the site at the time of construction If the plans for site development are changed, or if variations or undesirable geotechnical conditions are encountered during construction, the geotechnical engineer should be consulted for further recommendations

Geotechnical engineering is characterized by uncertainty Professional judgments presented are based partly on an understanding of the proposed construction, and partly on general experience The engineering work performed and judgments rendered for this study meet current professional standards ordinarily provided by members of the engineering profession in this area practicing under similar conditions at this time No other warranties, either expressed or implied, are made

Sincerely,

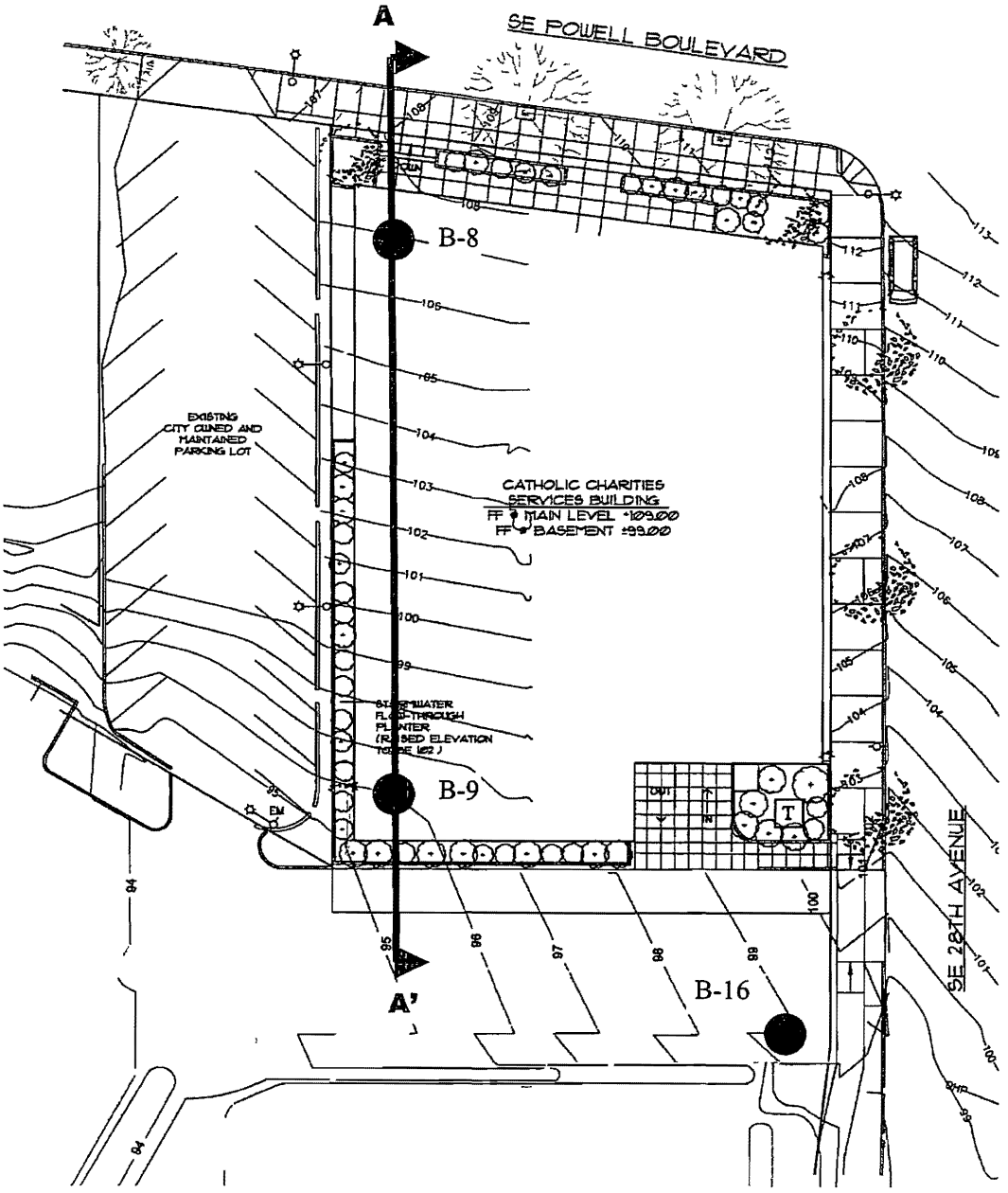
ALDER GEOTECHNICAL SERVICES, LLC

REGISTERED PROFESSIONAL ENGINEER
13507
OREGON
March 19, 1987
JOHN N. CUNNINGHAM

EXP 12-31-09

John N Cunningham, P E , G E
Oregon Geotechnical Engineer No 13,507

(1) Addressee via pdf
(1) Lundin Cole Architects via pdf
(1) WDY, Inc via pdf



Site Plan from Lundin Cole Architects

Legend

B-8 ● Approx location of soil boring

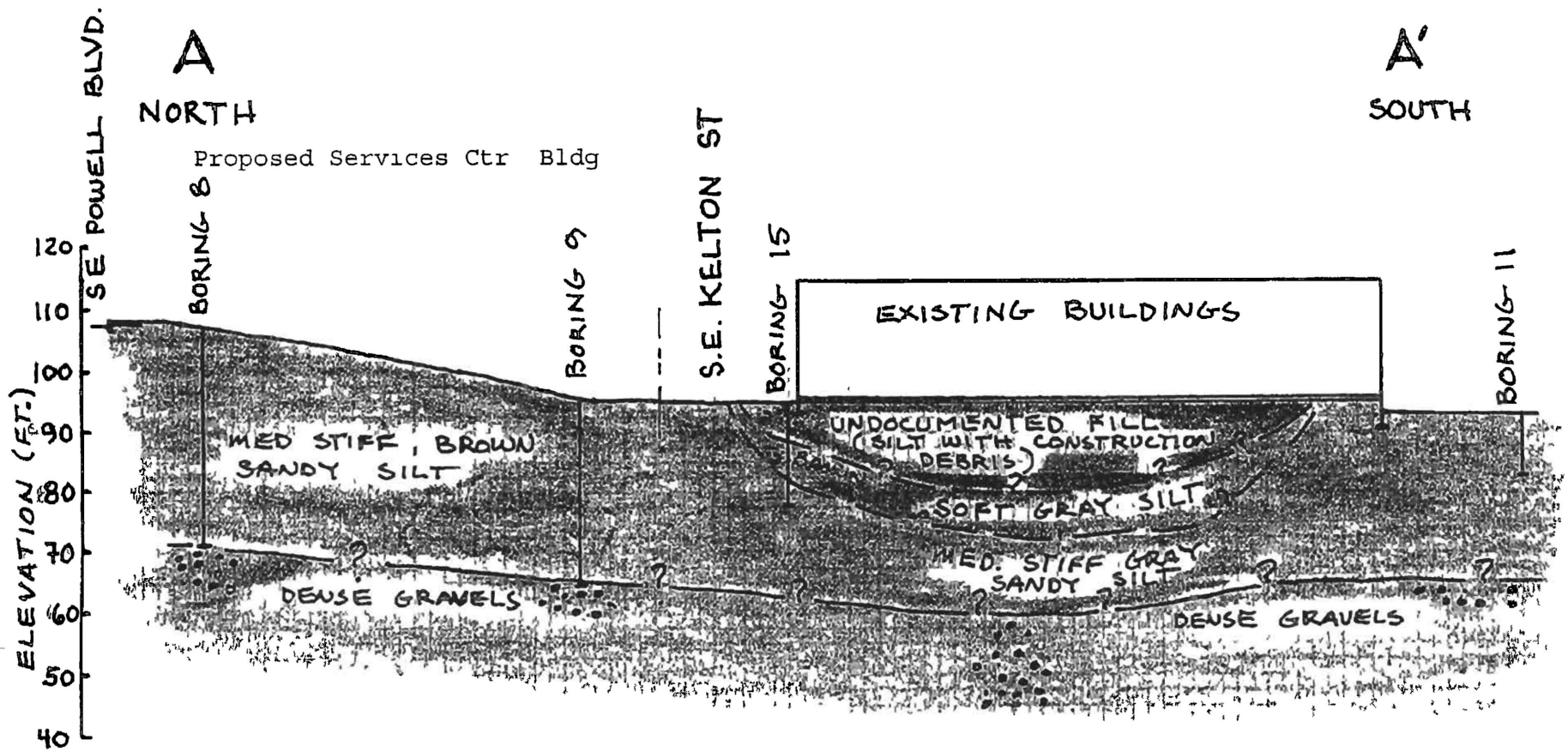
A ▶ Geologic Cross-Section, See Fig 3

A'

N

Alder Geotechnical Services, LLC

Job 568-2 Catholic Charities Services Center Figure 2
July 2008 Portland, OR Site Plan


A
NORTH
A'
SOUTH
Proposed Services Ctr Bldg
SE POWELL BLVD.
S.E. KELTON ST
BORING 8
BORING 9
BORING 15
BORING 11
EXISTING BUILDINGS
ELEVATION (FT.)
120
110
100
90
80
70
60
50
40
MED STIFF, BROWN SANDY SILT
UNDOCUMENTED FILL (SILT WITH CONSTRUCTION DEBRIS)
SOFT GRAY SILT
MED. STIFF GRAY SANDY SILT
DENSE GRAVELS
DENSE GRAVELS

APPENDIX A

FIELD INVESTIGATION

Sixteen soil borings and six backhoe test pits were drilled and excavated on St Vincent de Paul property in October and November 2005 Borings B-8, -9 and 16 were located on the subject site The borings were drilled about 11½ to 36½ feet deep

The approximate locations of the explorations are shown on Figure 2

The borings were drilled using truck-mounted drill rigs equipped with 8-inch hollow stem augers Disturbed samples were collected from the power auger borings using a standard split spoon sampler (2" outside diameter, 1 675" inside diameter) The sampler was generally driven 18 inches into the material at the bottom of the boring by a 140-pound hammer falling 30 inches The collected soil samples were sealed in plastic bags, and brought to our office for examination and testing

The locations and elevations of the explorations are approximate The location of each exploration was estimated by using the site topographic plan prepared by W B Wells and Associates, Inc

The soils encountered in the explorations were generally described using the Unified Soil Classification System A Key to Logs is presented as Page 1 Final logs of the explorations are attached

BORING:	Surface Elev Logged By:	Drilling Date Drilling Method

DEPTH	STRATA	GWT	MATERIAL DESCRIPTION	SAMPLE NO	TYPE	SPT-N	SPT, blow/ft / MOISTURE % (0 20 40 60 80 100)	MOISTURE (%)
0			STANDARD PENETRATION SAMPLER Sample with recorded blows per foot was obtained using a standard split spoon sampler (1 675" inside dia , 2" outside dia) The sampler was generally driven into the soil with a 140 lb hammer falling 30 inches	1-1				
5			SHELLBY TUBE SAMPLER Sample was obtained using a Shelby tube sampler (2 875" inside diamter, 3 0" outside diameter) The sampler was generally pushed 12" to 30" into the soil using the exploration equipment hydraulic system	1-2				
10			Soil sample not recovered from sampler	1-3				
15			DISTURBED SAMPLE LOCATION Sample was obtained by collecting auger cuttings or backhoe excavated materials in a plastic bag	1-4				
			PP = pocket penetration index strength test, in tons per square foot					
		1030a	Groundwater level and time of measurement					
20			FILL					
			SILT (ML)					
			LEAN CLAY (CL)					
			FAT CLAY (CH)					
			WELL GRADED SAND (SW)					
25			POORLY GRADED SAND (SP)					
			SILTY SAND (SM)					
			CLAYEY SAND (SC)					
			WELL GRADED GRAVEL (GW)					
			POORLY GRADED GRAVEL (GP)					
30			SILTY GRAVEL (GM)					
			CLAYEY GRAVEL (GC)					
			ORGANICS / FOREST DUFF/ PEAT					
			BEDROCK					
35								

SuperLog V2 6 CivilTech Software USA www civiltech com File C \Documents\ttings\John\My Documents\Forms\LOGKEY log Date 9/28/2005

Alder Geotechnical Services

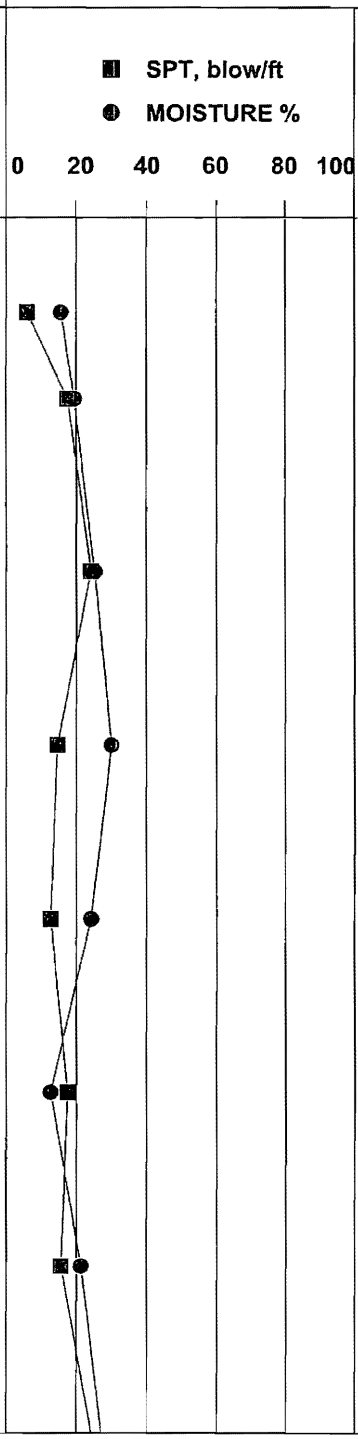
KEY TO LOGS

Exploration: B-8

Surface Elev 107'
Logged By BWG

Drilling Date. 10-5-05
Drilling Method 8" HSA

DEPTH	STRATA	GWT	MATERIAL DESCRIPTION	SAMPLE NO	TYPE	SPT-N	MOISTURE (%)
0			2" Asphalt pavement over minimal crushed gravel base				
			SILTY SAND (SM), brown, moist, loose, fine grained with occasional gravel (FILL) P200= 33%	8-1		4	14
5			SILTY SAND (SM), brown, moist, medium dense, fine grained (FLOOD DEPOSITS)	8-2		16	18
10			SANDY SILT and SILT (ML), brown, moist, medium dense, with fine grained sand, interbedded layers of silt and sand (FLOOD DEPOSITS)	8-3		23	24
15				8-4		13	29
20				8-5		11	23
25			SILTY SAND (SM), brown, moist medium dense, fine grained (FLOOD DEPOSITS) P200 = 45%	8-6		16	11
30				8-7		14	20
35							



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Exploration: B-8

Surface Elev 107'
Logged By. BWG

Drilling Date 10-5-05
Drilling Method 8" HSA

DEPTH	STRATA	GWT	MATERIAL DESCRIPTION	SAMPLE NO	TYPE	SPT-N	SPT, blow/ft ■ / MOISTURE % ● (0 20 40 60 80 100)	MOISTURE (%)
35			SILTY SAND (SM), brown, moist medium dense, fine grained (FLOOD DEPOSITS)	8-8		23		26
			gravel in tip of sampler					
			Boring completed at depth of 36 5 feet					
			Groundwater not encountered					
40								
45								
50								
55								
60								
65								
70								

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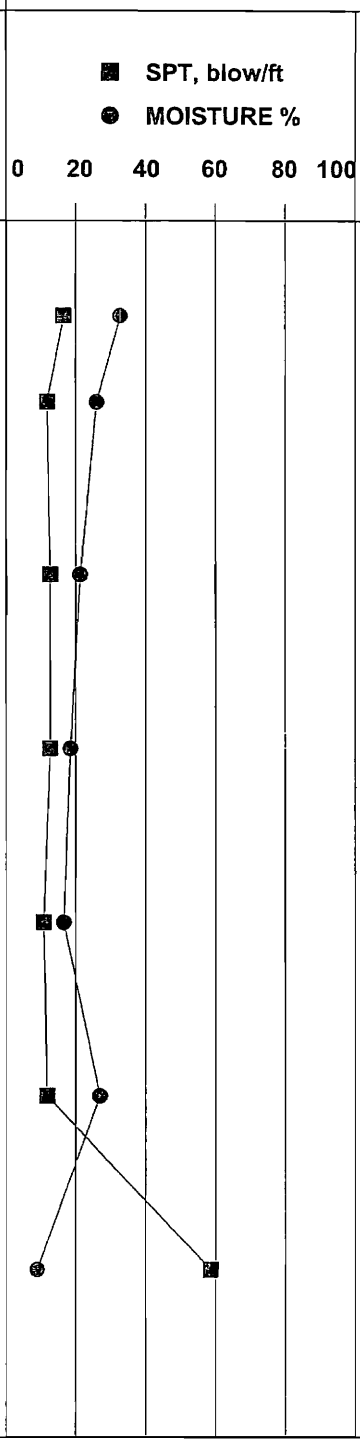
Exploration: B-9

Surface Elev 96'
Logged By. BWG

Drilling Date 10-4-05
Drilling Method: 8" HSA

DEPTH	STRATA	GWT	MATERIAL DESCRIPTION	SAMPLE NO	TYPE	SPT-N	MOISTURE (%)
0			Asphalt pavement over gravel base rock				
			SILT (ML), brown, moist, medium dense, some fine sand (FLOOD DEPOSITS)	9-1		15	32
5			SILTY SAND (SM), brown, moist, medium dense, fine grained (FLOOD DEPOSITS)	9-2		10	25
10				9-3		11	20
15			P200 = 45%	9-4		11	17
20			P200 = 21%	9-5		9	15
25			trace gravel @ 24', fine to medium grained sand, free water encountered	9-6		10	26
30			POORLY GRADED GRAVEL (GP), brown, moist, dense to very dense rounded, in a matrix of fine to coarse sand and trace silt (FLOOD DEPOSITS)	9-7		59	7
			Boring completed at depth of 31 5 feet Groundwater encountered at 24 feet				
35							



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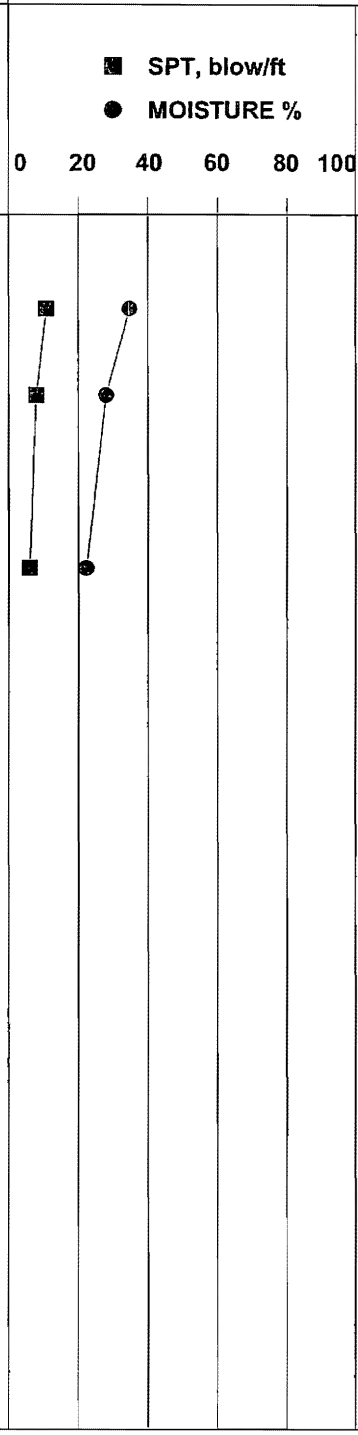
Exploration: B-16

Surface Elev 97'
Logged By. BWG

Drilling Date 11-10-05
Drilling Method 8" HSA

DEPTH	STRATA	GWT	MATERIAL DESCRIPTION	SAMPLE NO	TYPE	SPT-N	MOISTURE (%)
0			2" Asphalt concrete over 4" crushed gravel base rock				
			SILT (ML), brown, moist, firm to medium stiff, with some to much fine sand (FLOOD DEPOSITS)	16-1		9	34
5				16-2		6	27
10			SILTY FINE SAND (SM), brown, moist, loose, fine grained (FLOOD DEPOSITS)	16-3		4	21
			Boring completed at depth of 11 5 feet.				
15							
20							
25							
30							
35							



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WDY Structural • Civil Engineers

ONSITE
STORM DRAINAGE
CALCULATIONS

FOR

CATHOLIC CHARITIES

CLARK FAMILY CENTER
2740 SE POWELL BLVD.
PORTLAND, OREGON 97202

October 31, 2008

REGISTERED PROFESSIONAL ENGINEER 12479 OREGON May 18, 1984 COLE G PRESTHUS

REN 12-31-10

08-177308-CO

TABLE OF CONTENTS/INCLUSIONS:

Storm Drainage Calculations:
....ST.D-1 to ST.D-6

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WDY Structural • Civil Engineers

Clark Family Center Stormwater Narrative

The proposed Clark Family Center office building is located at 2740 SE Powell Blvd , Portland, Oregon The property is approximately 17,500 SF (40 acres) in size All new impervious area is proposed to infiltrate on the site except for an existing 10 ft x 108 ft area (1,080 SF) of existing parking lot paving shared with the adjacent Esperanza Court Apt site located immediately south of the Clark Family Center building Due to the natural topographic slope of these two properties, the existing 1,080 SF paved area surface drains to the existing Esperanza Court onsite storm drain system The Esperanza Court site was developed in 2007 as part of this same land division approval Existing vegetated storm swales on the Esperanza site are designed to treat impervious pavement area storm runoff draining from the shared parking lot area Following, please find a listing of all proposed impervious areas on the Clark Family Center site and the corresponding stormwater hierarchy category

1) The entire roof area of the Clark Center building, (12,130 SF), is proposed to be infiltrated onsite Due to space constraints on the site created by the large building footprint relative to lot size and shape, drywells are proposed to infiltrate all roof storm water This conforms to moving from stormwater hierarchy category 1 to category 2 per the city's stormwater manual while still providing onsite infiltration
2) The impervious north entry walk paving totals less than 500 SF and is proposed to surface drain directly to the adjacent existing public sidewalk at the Powell Blvd frontage as allowed by exception to the hierarchy standards
3) Onsite impervious area reduction is achieved by using pervious pavers for the south vehicle entrance paving into the basement parking garage as well as the truck and passenger car parking areas (1742 SF) Additional onsite impervious area treatment reduction consists, as mentioned above, by the remaining onsite impervious area of the shared parking lot (1,080 SF) draining to the existing treatment swales of the adjacent Esperanza Court site

4) Large storm event overflow from the Clark Family Center site is to the low southern shared parking lot area draining downslope to the existing onsite swales of the Esperanza Court site whose swales overflow by pipe connection to the recently installed (2008) 18 inch diameter public combined sewer in SE 27th This new 18 inch combined sewer was designed to receive stormwater overflow from both these sites as well as the adjacent existing public parking lot directly west of the Clark Family Center site and tributary residential lots on both sides of SE 27th Please refer to BES Project #8730

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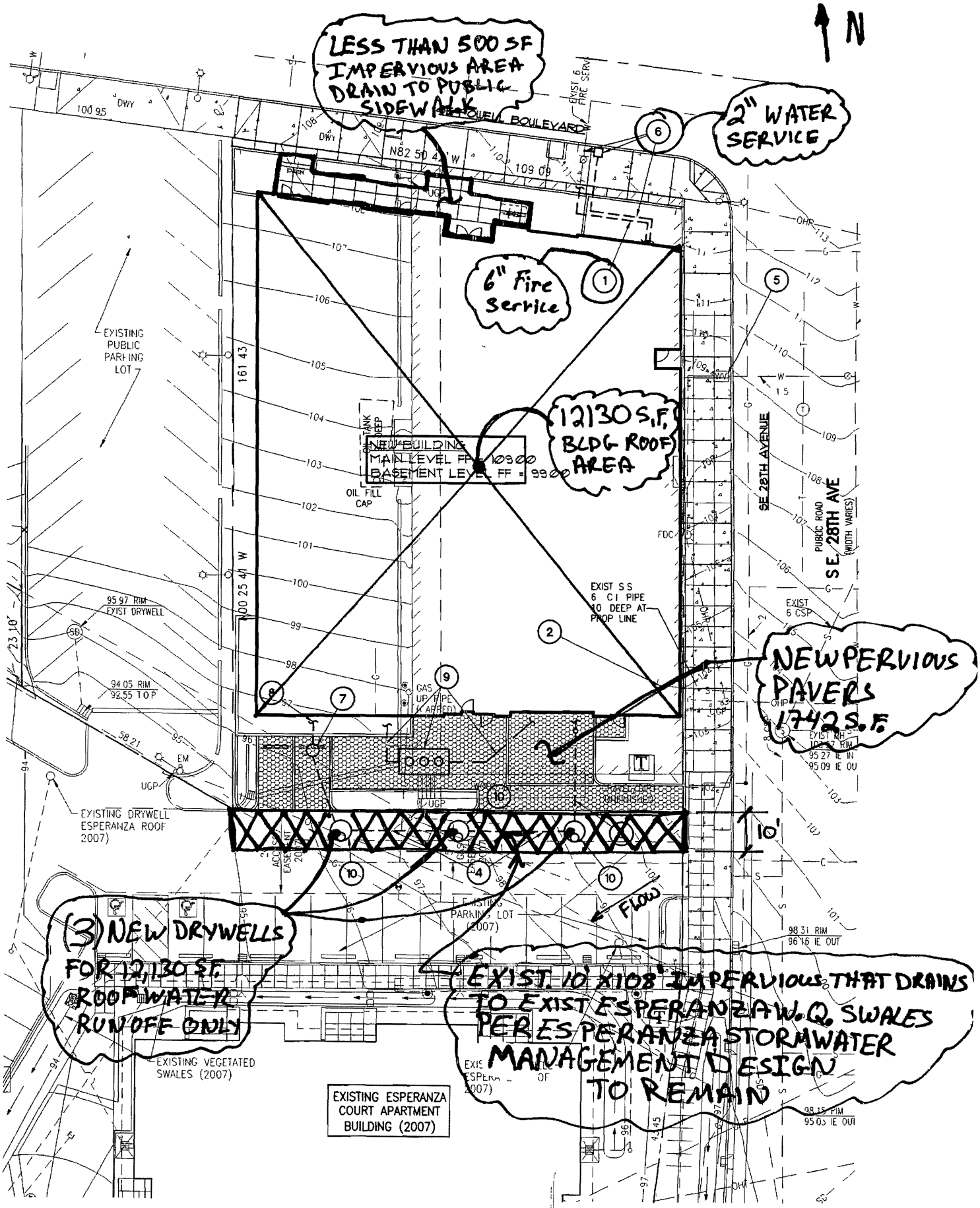
ST.D-2



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ST.D-3

FORM 1 SIMPLIFIED APPROACH

Date October '08

Permit Number _____

If total impervious area for submitted development proposal is less than 10,000 square feet, the Simplified Approach form may be used for sizing stormwater facilities

If total impervious area for submitted development proposal is equal to or greater than 10,000 square feet or includes public or private street improvements, the Presumptive or Performance Approach must be used and a Stormwater Management Report will be required For more information, refer to the 2008 Stormwater Management Manual (SWMM) Sections 2 2 2 and 2 2 3, respectively

1 Site Address 2740 SE Powell BLVD
PORTLAND, OR 97202

2 State Property ID (R number) R328226

3 Brief Description of Proposed Development Multi-Story office building with 12,130 S.F. Building Footprint On A 17,500 S.F. LOT. Entire building roof run off will go to (3) onsite drywells (12,130 S.F.) 1742 S.F. of Pervious Pavers is Proposed. 1080 S.F. of existing impervious pavement is to remain that currently drains to & is treated by W.Q. Swales on adjacent Esperanza Court Apts. Which overflows to the New Combined Sewer In SE 27th St. (BES Proj. # 8730)

4 Total Amount of Proposed Impervious Area 12,630 S.F.

Site Evaluation

Please refer to Stormwater Management Manual (SWMM) References and Resources section for site evaluation maps (including soil drainage class, slopes and groundwater)

S1 NRCS Soil Drainage Class "B" URBAN LAND 51B

S2 Is the slope anywhere on the project area greater than 20%? ☐ yes ☒ no

S3 Are there known seeps, springs, or a high groundwater table in the project area? ☐ yes ☒ no

If answered yes to questions S2 or S3, then a flow-through or partial infiltration facility is required with overflow to an approved discharge point If no, see S4

S4 Required Infiltration Testing Applicant may conduct a simple open pit test or any of the infiltration testing methods prescribed for the Presumptive Approach (See Appendix F2 for specifications)

Please Note Each individual tax lot is required to manage the stormwater it generates on the same lot to the maximum extent feasible If the proposal is unable to meet this requirement, the applicant must submit a Special Circumstances request

Form 1 - SIMPLIFIED APPROACH

Simplified Approach Infiltration Testing Instructions (Open Pit Test)

1. A simple open pit infiltration test should be conducted where the facility is proposed, or within the direct vicinity
2. Excavate a test hole to the depth of the bottom of the proposed facility (up to 4 feet) The test hole can be excavated with small excavation equipment or by hand using a shovel, auger, or post-hole digger
3. If you encounter a layer that is hard enough to prevent further excavation, or if you come across noticeable moisture/water in the soil, stop and measure this depth from the surface and record S5 below Proceed with the test at this depth
4. Fill the hole with water to a height of about 12 inches from the bottom of the hole (or to one half the maximum depth of the proposed facility), and record the exact time Check the water level at regular intervals (every 1 minute for fast-draining soils to every 10 minutes for slower-draining soils) for a minimum of one hour or until all of the water has infiltrated Record the distance the water has dropped from the top edge of the hole
5. Repeat this process two more times, for a total of three rounds of testing These tests should be performed as close together as possible to accurately portray the soil's ability to infiltrate at different levels of saturation The third test should provide the best measure of the saturated infiltration rate

For each test pit required, submit all three testing results

S5 Infiltration Test Results *For each test include date, time, initial and final water height, duration of test, and infiltration rate in inches per hour*

Depth of Evacuation _____

Test 1	Test 2	Test 3
Date _____	Date _____	Date _____
Time _____	Time _____	Time _____
Initial water depth _____	Initial water depth _____	Initial water depth _____
Final water depth _____	Final water depth _____	Final water depth _____
Duration of test _____	Duration of test _____	Duration of test _____
Infiltration rate _____	Infiltration rate _____	* Infiltration rate _____

SEE ATTACHED GEOTECHNICAL REPORT BY ALDER GEOTECHNICAL FOR INFILTRATION TEST DATA AND FINAL DRYWELL SIZING CALCULATIONS

* The pit infiltration rate is the result of the third test

$$\text{Pit Infiltration Rate} = \frac{\text{Initial Water Depth - Final Water Depth (inches)}}{\text{Duration of test (hours)}}$$

If the pit infiltration rate is greater than or equal to 2 inches per hour then onsite infiltration is required Applicants may choose either a surface infiltration facility with overflow to a drywell or soakage trench or a surface infiltration facility with an overflow to an approved discharge point If the tested infiltration rate is below 2 inches per hour, then a flow-through or partial infiltration facility is required with overflow to an approved discharge point

Projects that infiltrate roof runoff with private soakage trenches or drywells are not required to provide pollution reduction prior to infiltration This exemption does not apply to projects that discharge stormwater offsite Single-family residential (up to three units) roofs and footing drains are excluded from UIC registration Refer to Section 1 4 for specific pollution reduction requirements for UICs

Form 1 - SIMPLIFIED APPROACH

FACILITY SIZING WORKSHEET

Total impervious area being developed or redeveloped ➤ 14,952 S.F. BOX 1

1 Impervious Area Reduction

Ecoroof Ø sf
Pervious asphalt or concrete Ø sf
Permeable pavers 1742 sf
Flow to Esperanza Swales = 1080 S.F.
Total Impervious Area Reduction ➤ 2822 SF BOX 2

Total impervious area requiring stormwater management ➤ 12,130 SF BOX 3

2 Surface Facilities

	Impervious Area Managed		Sizing Factor		Facility Surface Area
Planter	Ø sf	x	0 06	=	— sf
Swale	Ø sf	x	0 09	=	— sf
Basin	Ø sf	x	0 09	=	— sf
Vegetated Filter Strip for walks and driveways	Ø sf	x	0 20	=	— sf

Overflow will be directed to *(check all that apply)*

☐ Subsurface facility ☐ Surface water
☐ Stormwater sewer ☒ Combined Sewer

3 Subsurface Facilities

The following subsurface facilities can receive overflow from the facilities listed above or can be used independently to manage stormwater from residential roofs If stormwater is generated from anything other than residential roofs, the facilities are subject to the UIC (Underground Injection Control) requirements

		(See Section 2 3 3 for sizing information)	Facility Size
Drywell (3)	12,130 sf	4 FT. Diameter	14 FT. Depth
Soakage Trench	Ø sf	— Length	— Width

Sum of Total Impervious Area Managed ➤ 12,130 BOX 4

(BOX 4 should be greater than or equal to BOX 3)

4 Escape Route

In the event the stormwater facility temporarily fails or rainfall exceeds the facility design capacity, describe where flows will drain to in order to maintain public safety and avoid property damage Depending on site conditions, this may include storage in an overflow structure, parking lot, street, or landscaped area Adjacent existing parking lot at Esperaza Court Apts. to public storm sewer in SE 27th AVE installed in 2008 as part of this land division during construction of Esperanza Court Apts. Project ⇒ BES PROJ. #8730

ONSITE STORM CONVEYANCE

• ENTIRE ROOF AREA TRIBUTARY TO DRYWELLS = .40 AC
SIZE SINGLE PIPE FROM ROOF TO DRYWELLS:

$Q = CIA$, $C = .90$, $I = 2.83$ IN/HR, $A = .4$ AC

$Q = .9(2.83).4 = 1.0$ cfs

CAPACITY OF 8" ø @ 1.0% SLOPE

$Q = \frac{.463}{.013}(.67)^{8/3}\sqrt{.01} = 1.22$ cfs > 1.0 cfs, OK

USE 8" ø PIPE @ 1.0% SLOPE – OK

CLARK FAMILY CENTER

08-177308-CO

APPENDIX C

January 30, 2007
Tree Survey and Tree Preservation Plan
Site: Catholic Charities Project
SE Powell Boulevard and SE 28th Avenue
Portland, Oregon

Collier Arbor Care

11814 SE Jennifer Street
Clackamas, Oregon 97015
TEL 503 722-7267 FAX 503 723-5531

COLLIER
ARBOR CARE

Environmentally Friendly...Since 1937

January 30, 2007

Tree Survey and Tree Preservation Plan

Site Catholic Charities Project
SE Powell Boulevard and SE 28th Avenue, Portland OR

Prepared for
Scott Rimmer
Lundin Cole Architects PC
208 SW Stark St Suite 200
Portland, OR 97204

Prepared by
Lyle J Feilmeier
Consulting Arborist
ISA Board Certified Master Arborist MW-0173B

Introduction

Background
Scott Rimmers of Lundin Cole Architects, PC contacted Collier Arbor Care on January 19, 2007 concerning land division and re-development of the St Vincent De Paul property on SE 28th Ave and SE Powell Blvd in Portland OR The site is under review to be developed into three areas of office space, apartments and single-family housing Each area of the site requires separate land division submittal requirements According to Scott, the City of Portland requires a tree preservation plan for land division under review for the following

- Area 1 (Appendix 1- Proposed Site Plan) Type I land division submittal for the proposed Office Building Esperanza Court (70 unit- apartment complex) and Howard House portions of the property
- Area 2 (Appendix 1- Proposed Site Plan) Type IIx land division submittal for the proposed single-family housing units one thru five (between SE 26th Ave and SE 27th Ave)
- Area 3 (Appendix 1- Proposed Site Plan) Type IIx land division submittal for the proposed single-family housing units six thru thirteen (between SE 27th Ave and SE 28th Ave)

The site is polygon in shape It is currently parking and warehouse space on the east half and the southeast corner of the property The northwest corner has the Howard House which will remain on site The west area is a vacant lot enclosed with chain link fence There are twelve trees on this property, including eight street trees along SF Powell and SE 26th Ave

Assignment
At the request of Lundin Cole Architect PC, my assignment is as follows

- Conduct a tree survey to provide the identity, size and species and the preservation potential of all trees within Areas 1, 2 and 3 as required by the city of Portland for the land division submittal for the Catholic Charities site
- Provide a Tree Preservation Plan as required by the City of Portland Chapter 33 630 Tree Preservation for Type IIx and Type I procedure as described in Chapter 33 662 (Review of Land Division in Commercial, Employment, and Industrial Zones)

Because of the small number of trees involved, this report will cover all three land division submittals

Observations

Area 1
Area 1 (Appendix 1 Proposed Site Plan) is currently parking and warehouse space and covers approximately two-thirds of the northern half of the property The northwest corner has the Howard House which will remain on site This area involves the proposed Esperanza Court, the Howard House and a Catholic Charities Service Building

There are seven trees on this area of the property (Appendix 2 - Tree Survey) Five lindens (*Tilia cordata*) are street trees along SE Powell Blvd between SE 26th Ave and SE 28th Ave (Appendix 3 – Photo 1) The diameter at four and a half feet above ground level (D B H) ranges from seven inches to fourteen inches All five trees are recommended to be preserved

A Norway maple (*Acer platanoides*) located near the northeast corner of the Howard House along the west property line has a D B H of 18 inches A Tree-of-Heaven (*Ailanthus altissima*) located in the middle of the property next to the loading docks of one of the warehouses has a D B H of 25 inches Both trees are included as nuisance trees on the City of Portland plant list and are exempt from tree preservation requirements

This area is under review for a Type I procedure land division review

Area 2
Area 2 (Appendix 1 Proposed Site Plan) is currently a vacant lot enclosed with chain link fencing This area is proposed to be developed into five single family dwelling lots There are only four trees within its property lines (Appendix 2 Tree Survey)

Two Norway maples, along the west side are street trees with have a D B H of 24 and 25 inches respectfully (Appendix 3 – Photo 2) The trees are located under utility-lines and have been pruned to provide clearance away from the lines Large deadwood was observed within the canopies Two clumps of multi-stemmed, volunteer sweet cherries (*Prunus avium*) are located inside the fence line of this area along the north property line (Appendix 3 – Photo 3)

This area is under review for a Type IIx procedure land division review

Area 3
Area 3 (Appendix 1 Proposed Site Plan) is currently warehouse space on the north half of the area and the remaining is all parking or paved driveway No trees exist within its property lines (Appendix 2 Tree Survey) No tree preservation plan will be needed for this land division submittal

Analyisis

Using Chapter 33 630 100 Tree Preservation Standards Option A- 1 Preserve at least 35 percent of the total tree diameter on the site the preservation percentage on each area is as follows

Area 1
Five street trees, lindens along SE Powell Blvd have a total diameter of 58 inches All five trees are preservable and will not be removed 100 percent of the total tree diameter will be preserved The Norway maple and the Tree-of-Heaven are exempt from the total diameter inches because they are listed on the City of Portland Nuisance Tree List

Area 2
Two street, Norway maples along the SE 26th Ave have a total diameter of 49 inches Both trees are recommended to be preserved however both trees are excempt from being preserved because they are listed as nuisance trees on the City of Portland Nuisance Tree List The sweet cherries are also exempt from tree preservation

Area 3
No trees exist with in this area, therefore no preservation is required

Discussion

Tree Health Definitions
Tree health (Appendix 2 Tree Survey) is determined based upon visible signs and symptoms in the trees canopy and trunk above ground that may indicate tree problems such as disease, decay and abiotic (mechanically caused) conditions found above and/or below ground

Tree health definitions referenced in Appendix #2 will be defined as the following

- Excellent- Trunk and crown have no significant problems observed and growth rate is excellent
- Good- Trunk and crown have few significant problems observed, and growth rate is normal
- Fair- Trunk and crown have some significant problems observed, growth rate is reduced
- Poor- Very significant trunk and crown problems observed that limits life span and has a high failure potential Growth rate on these trees is poor

Conclusion and Recommendations

Area 1
All five lindens along SE Powell Blvd are good candidates for tree preservation as required by the city One hundred percent of the total diameter will be preserved Follow the Tree Preservation Specifications and Recommendations (Appendix 4)
Remove the Norway maple and the Tree-of-Heaven

Area 2
The two Norway maples along SE 26th Ave are of size to be Significant trees (a tree with a diameter of 20 inches and larger), however both are exempt from the tree preservation requirements and are considered nuisance trees A decision whether or not to preserve the two street Norway maples needs to be made If preservation is decided on follow the Tree Preservation specifications and Recommendations (Appendix 4)
Remove the two clumps of sweet cherries along the north fence

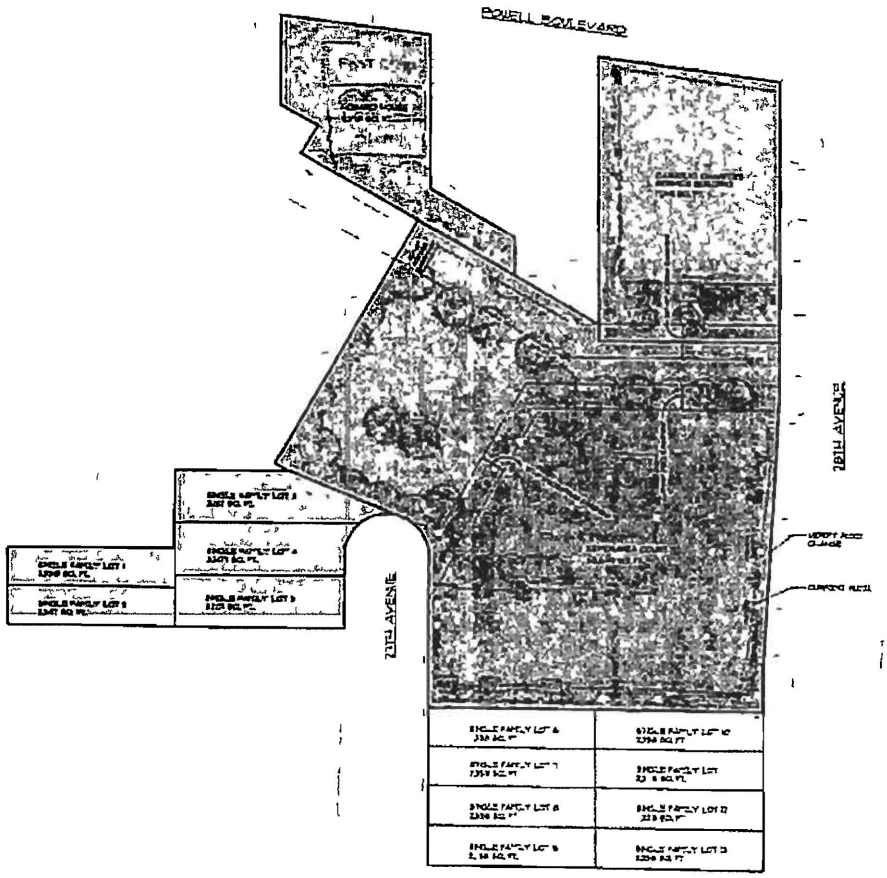
Area 3
This area has no trees within its property lines Tree preservation is not required

Care has been taken to obtain all information from reliable sources All data has been verified insofar as possible however, the arborist can neither guarantee nor be responsible for the accuracy of information provided by others The information contained in this report reflects the condition of those items at the time of inspection There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the trees in question may not arise in the future

Respectfully submitted,

Lyle J Feilmeier
Consulting Arborist
Board Certified Master Arborist MW-0173B

Appendix 1 Proposed Site Plan
Appendix 2 Tree Survey
Appendix 3 Photos
Appendix 4 Tree Preservation Specifications



KEY

Area 1 Howard House, Catholic Charities service building and Esperanza Court Type I

Area 2 Single family housing units one through five Type IIx

Area 3 Single family housing units six through thirteen Type IIx

Area 1 Tree Survey

Tree #	Comon Name	Species	DBH*	Height	Health Condition	Action	Comments
1	Linden	*Tilia cordata*	14	35	good	save	Street tree in 4x4 foot planter in sidewalk in front of current building on SW orner of intersection of SE Powell and SE 28th Ave
2	Linden	*Tilia cordata*	14	35	good	save	Street tree in 4x4 foot planter in sidewalk in front west of tree #1
3	Linden	*Tilia cordata*	7	12	fair	save	Street Tree in 4x4 foot planter in sidewalk west of tree #2 Tree is surpressed
4	Linden	*Tilia cordata*	14	35	good	save	Street tree in 4x4 planter in sidewalk located on the north side of the Howard House
5	Linden	*Tilia cordata*	9	20	good	save	Street tree in 4x4 planter in sidewalk located on the north side of the Howard House
6	Norway Maple	*Acer platanoides*	18	35	good	remove	Volunteer tree located above retaining wall on NE corner of Howard House Portland Plant list nuisance tree
7	Tree-of-Heaven	*Ailanthus altissima*	25	45	good	remove	Tree is located next to loading dock in the middle of the property Portland Plant list nuisance tree

DBH = Diameter of trunk measured at 4 5 feet above ground level

Area 2 Tree Survey

Tree #	Comon Name	Species	DBH*	Height	Health Condition	Action	Comments
1	Norway Maple	*Acer platanoides*	24	30	good	save	Street tree located on the west side Tree is among utility lines with visual deadwood inside the canopy Significant tree
2	Norway Maple	*Acer platanoides*	25	30	good	save	Street tree located on the west side Tree is among utility lines with visual deadwood inside the canopy Significant tree
3	Sweet cherry	*Prunus avium*	6	25	good	remove	Volunteer multi-stemmed
4	Sweet cherry	*Prunus avium*	12	25	good	remove	Volunteer multi-stemmed

DBH = Diameter of trunk measured at 4 5 feet above ground level

Area 3 Tree Survey

Tree #	Comon Name	Species	DBH*	Height	Health Condition	Action	Comments
No trees exist in this area							

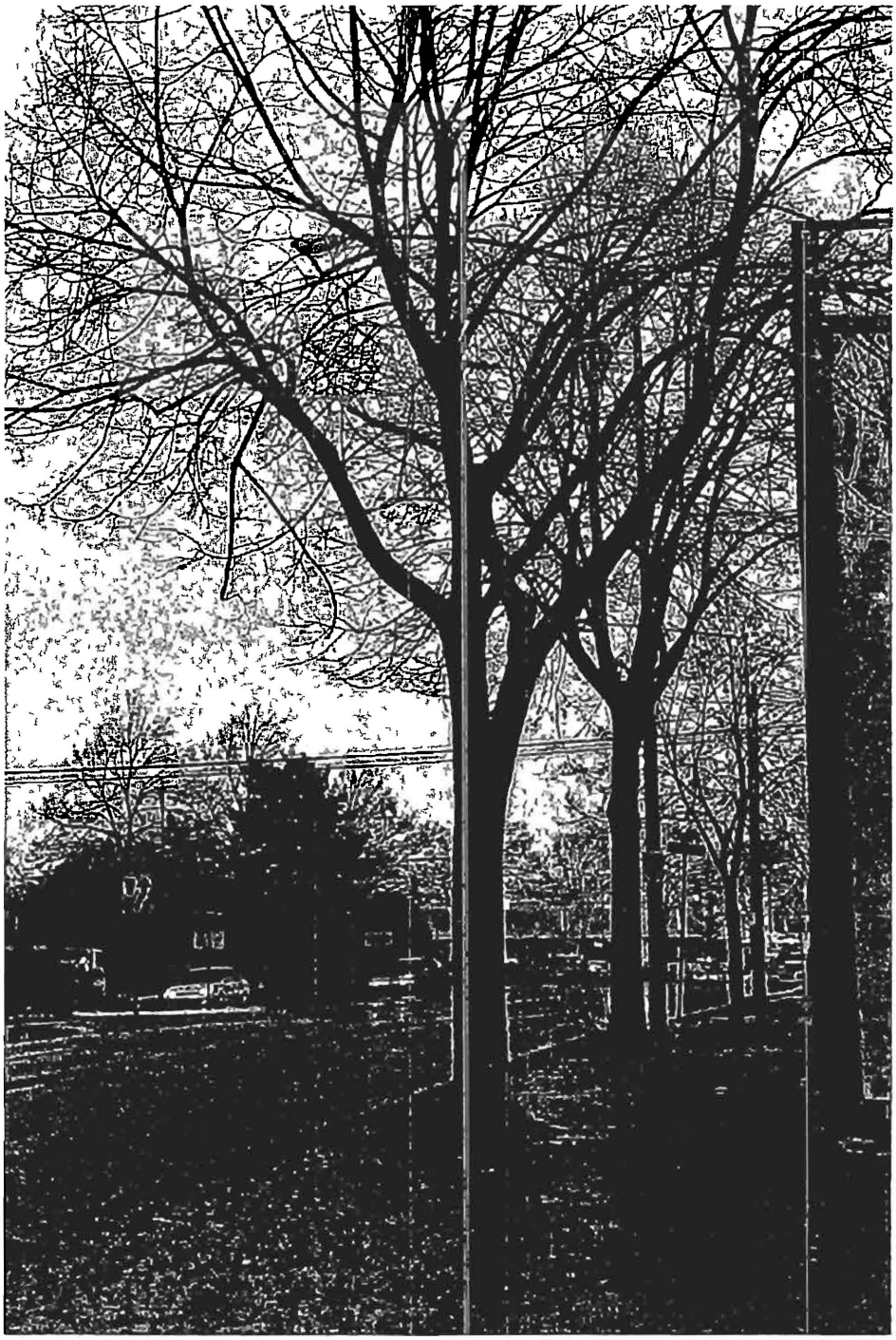


Photo 1 Two lindens on NE corner of SE Powell and SE 28th Ave

Photo 2 Norway maples along SE 26th Ave, on west side of Area 2

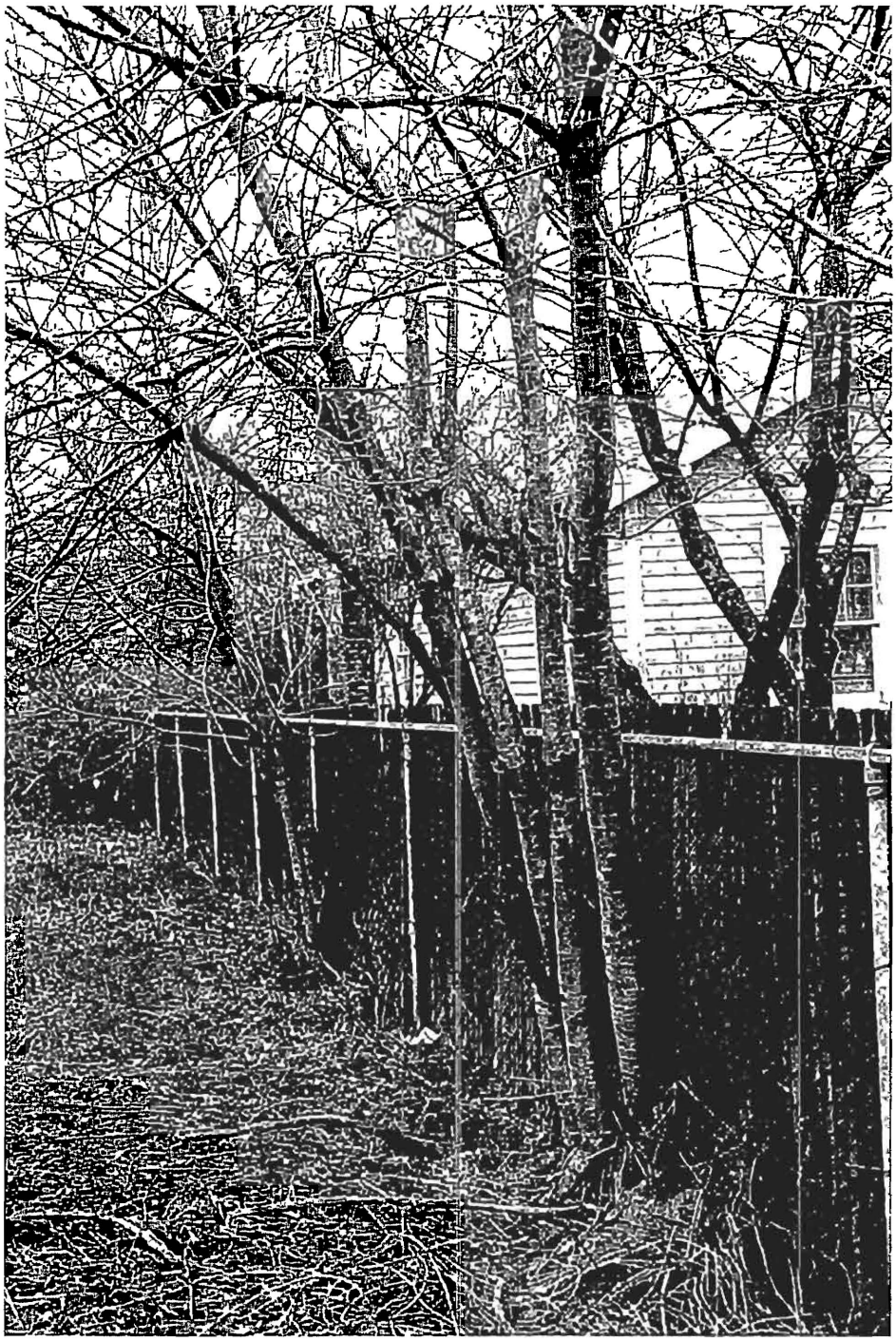


Photo 3: Sweet cherries along north fence of Area 2

Tree Preservation Recommendations

1 The site contractor should get advice from a certified arborist on the site prior to beginning work to review all work procedures, access and haul routes, and tree protection measures

2 Establish a Tree Protection Zone as directed by the certified arborist to protect and preserve the trees and their root systems Install temporary protective fencing such as chain link or snow fencing affixed to metal "T" posts to establish a Tree Protection Zone Place the protective fencing around the edge of the drip line of the tree Tree Protection Zones should be established prior to construction and remain until all construction is complete or consulting arborist permits the removal of the fencing

3 Equipment shall stay at least 5 feet away from trunks of all trees Care shall be taken to prevent damage to tree trunks and exposed roots Do not operate equipment when soil is wet and saturated when possible, only when dry

4 Trees having branches extending into construction area outside the Protection Fencing must be removed by a qualified arborist and not by demolition or construction contractors The qualified arborist shall remove the branches in a manner that causes no damage to the trees

5 If temporary haul or access roads must pass over the root area of trees to be retained a road bed of 6 inches of mulch or gravel shall be created to protect the soil The road bed material shall be replenished as necessary to maintain a 6 inch depth

Tree Preservation Specifications

1 The building contractor and all sub contractors involved with site work around trees such as grading, utilities, building, landscaping, etc are required to meet with the certified arborist at the site prior to beginning work to review all work procedures, access and haul routes, and tree protection measures

2 Construction activities within the Tree Protection Zone are prohibited except by permission and supervision of the consulting arborist Contractor will contact the consulting arborist beforehand, for any construction within the Tree Protection Zone

3 Protect the lindens along SE Powell Blvd from construction damage by installing a protective fence around the drip zone of this group of trees Protect trees 8-13 by installing a protective fence beginning at the north property line around the western drip zone of trees 8 and 9, along the southern drip zone of tree 11 and projecting eastward encompassing the remainder of the trees in this group connecting to the existing wood fence at the east property line This preservation specification is recommended in lieu of preserving 1 foot of radius per diameter inch around each designated to be preserved This specification will provide sufficient protection zones around each of the trees recommended for preservation

4 Stockpiling of materials, vehicle operation, and parking is prohibited in the Tree Protection Zone

5 Maintain existing grade within the Tree Protection Zone Raising or lowering grades are prohibited except as permitted by and under the supervision of the consulting arborist Final grades may need to be adjusted from what is shown on the grading plan to further protect trees Contractor shall contact the consulting arborist for recommendations where trees being saved or potential save conflict with grading

6 Removal of branches or root pruning of trees to remain is to be performed by a qualified arborist under the supervision of the consulting arborist

7 Cut branches and roots with sharp pruning instruments that do not chop or tear

8 Excavation and trenching around tree roots within the Tree Protection Zone is prohibited except by permission and under the supervision of the consulting arborist

9 When trenching is required within the Tree Protection Zone, tunnel under roots by hand digging Do not cut roots larger than 2 inches in diameter Cut smaller roots only if they interfere with new work and only with a sharp instrument

10 Do not allow any exposed or cut roots to dry out before permanent backfill is placed Provide a temporary earth cover or mulch to keep exposed roots moist until permanent backfill is placed

11 Water trees which are to remain, as necessary, to maintain their health during the course of construction

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SECTION 15738 – PACKAGED ROOFTOP AIR CONDITIONING UNITS – LARGE CAPACITY

PART 1 GENERAL

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1 1 SUMMARY

A Section Includes

1 Packaged rooftop air conditioning unit
2 Roof curb

B Related Sections

1 Section 15172 - Variable Frequency Controllers Variable frequency controller connections to unit
2 Section 15410 - Plumbing Piping Gas piping connections
3 Section 15820 – Duct Accessories Flexible connections
4 Section 15975 - Digital Control Equipment Sequences of operation applying to units in this section
5 Division 16 – Wiring Connections Electrical connection to units

1 2 REFERENCES

A ARI 210/240 (Air-Conditioning and Refrigeration Institute) - Unitary Air-Conditioning and Air-Source Heat Pump Equipment

ARI 270 (Air-Conditioning and Refrigeration Institute) - Sound Rating of Outdoor Unitary Equipment

B ASHRAE 52 (American Society of Heating, Refrigerating and Air Conditioning Engineers) - Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter

C NFPA 54 (National Fire Protection Association) - National Fuel Gas Code

D NFPA 90A (National Fire Protection Association) - Installation of Air Conditioning and Ventilation Systems

1 3 SUBMITTALS

A Section 01330 - Submittal Procedures Requirements for submittals

B Product Data Submit data indicating

1 Cooling and heating capacities
2 Dimensions
3 Weights

4 Rough-in connections and connection requirements
5 Duct connections
6 Electrical requirements with electrical characteristics and connection requirements
7 Controls
8 Accessories

C Manufacturer's Installation Instructions Submit assembly, support details, connection requirements, and include start-up instructions

D Manufacturer's Certificate Certify products meet or exceed specified requirements

E Manufacturer's Field Reports Submit start-up report for each unit

1 4 CLOSEOUT SUBMITTALS

A Section 01700 - Execution Requirements Requirements for submittals

B Project Record Documents Record actual locations of controls installed remotely from units

C Operation and Maintenance Data Submit manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data

1 5 QUALITY ASSURANCE

A Cooling Capacity Rate in accordance with ARI 210/240

B Sound Rating Measure in accordance with ARI 270

C Insulation and adhesives Meet requirements of NFPA 90A

D Minimum heating efficiency 80 percent

E Perform Work in accordance with all applicable codes

1 6 QUALIFICATIONS

A Manufacturer Company specializing in manufacturing Products specified in this section with minimum ten years documented experience

B Installer Company specializing in performing work of this section with minimum 3 years documented experience and approved by manufacturer

1 7 PRE-INSTALLATION CONFERENCE

A Section 01300 - Administrative Requirements Pre-installation meeting

B Convene minimum one week prior to commencing work of this section

1 8 DELIVERY, STORAGE, AND HANDLING

A Section 01600 - Product Requirements Requirements for transporting, handling, storing, and protecting products

B Accept units on site Inspect for damage

C Protect units from damage by storing off roof until roof mounting curbs are in place

1 9 COORDINATION

A Section 01300 - Administrative Requirements Requirements for coordination

B Coordinate installation of roof curbs with roof structure, roof deck and roof membrane installation

1 10 WARRANTY

A Section 01700 - Execution Requirements Requirements for warranties

B Furnish five year manufacturer's warranty for compressors

C Furnish five year manufacturer's warranty for heat exchanger **Ten year warranty is standard for modulating gas heat** 2

1 11 EXTRA MATERIALS

A Section 01700 - Execution Requirements Requirements for extra materials

B Furnish one set of fan belts for each unit

C Furnish one set of filters for each unit

PART 2 - PRODUCTS

2 1 PACKAGED ROOFTOP AIR CONDITIONING UNIT

A Manufacturers

1 Trane Series "Intellipak II"
2 Substitutions See Section 01600 - Product Requirements

B Product Description Self-contained, packaged, factory assembled and wired unit, consisting of roof curb, cabinet, casing, and frame, discharge plenum section, supply fan section, variable frequency drive, cooling coil section, compressor, condensing section, refrigerant circuit, gas-

fired heating section, filter section, outdoor and return air section, exhaust and relief air section, return fan section, electrical, controls, and accessories

C Configuration

1 Air delivery As indicated on Drawings
2 Draw through type

D Roof Curb

1 Factory assembled galvanized steel mounting curb designed and manufactured by unit manufacturer, provide with seismic restraints to secure unit to roof curb RTU manufacturer shall provide stamped/signed engineering drawings showing method of seismically anchoring the RTU to the curb
2 Perimeter type with support of air handling section and rail support of condensing section
3 Furnish supply and return opening duct frames as part of curb structure allowing duct connections to be made directly to curb
4 8 inches high and include wood nailer strip
5 Furnish gaskets for field mounting

E Identification Furnish units with decals and tags to indicate caution areas and aid in unit service Fix unit nameplates to main control panel door Attach electrical wiring diagrams to control panels

F Cabinet, Casing, and Frame

1 Designed for outdoor installation with weatherproof construction
2 Frame and unit base Constructed of galvanized steel Base overhangs roof curb for water runoff and constructed with formed recess seating on roof curb gasket for positive weather tight seal Furnish lifting brackets on unit base with lifting holes to accept cable or chain hooks
3 Modular type design with factory installed blank access sections as indicated on Drawings
4 Finish Exterior surfaces finished with baked on enamel paint exceeding 500 hour salt spray test in accordance with ASTM B117
5 Insulation **R8 polyurethane foam core between double wall panels**
6 Interior panels Furnish **solid liner in airstream** 2
7 Access doors Hinged Constructed of galvanized steel insulated double wall construction Furnish access doors on both sides of each section

G Supply Fan Section

1 Fan Centrifugal backward inclined with airfoil type blade, statically and dynamically balanced, resilient mounted
2 Fan Drive V-Belt type, Cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed Furnish solid shaft construction Select Variable and adjustable pitch motor sheave to obtain required rpm with sheaves set at mid-position as recommended by manufacturer

a Drive Rating Minimum 1 5 times nameplate rating of motor
b Fan Sheave Fixed
c Motor Sheave Fixed

3 Fan motor Three phase, NEMA design B, continuously rated at 40 degrees C, high efficiency, open drip-proof NEMA T frame, with permanently lubricated bearings and integral overload protection

4 Fan Assembly Mounting Furnish spring-type vibration isolators

H Supply Fan Modulation

1 Variable Frequency Drive Refer to Section 15172

a Factory installed in blank access section
b Furnished for supply fan and return fan
c Factory installed, wired, and tested
d With bypass
e Full digital control
f Insulated Gate Bi-Polar Transistors used to produce output pulse width modulation waveform allowing quiet operation
g NEMA 1 enclosure
h Self diagnostics
i Proportional-integral-derivative setpoint control
j Communication port
k Electronic thermal overload protection

2 Controlled from duct static pressure by unit mounted controller and by static pressure sensed by duct mounted sensor located approximately 2/3 distance down supply air duct

3 Furnish field adjustable duct high limit safety control to protect duct work from excessive duct pressure

I Cooling Coil Section

1 Coil Constructed of seamless copper tubes mechanically expanded into aluminum fins Furnish with intertwined circuits with multiple rows Factory leak tested under water

2 Drain Pan Stainless steel, positively sloped extending beyond leaving side of coil and under cooling coil connections Connect to drain connection extending through unit base Furnish units which have stacked cooling coils with secondary drain pan connected to primary drain pan

3 Location Upstream of fan section

J Compressors

1 Hermetic scroll type with reversible, centrifugal or positive displacement oil pump, suction and discharge line service valves, crankcase heater, high efficiency blocked suction unloading, and internal motor overload protection
2 Furnish each compressor with independent refrigeration circuit
3 Furnish with vibration isolators
4 Furnish vibration eliminators on suction and discharge piping
5 Furnish short cycle protection

K Condensing Section

1 Condenser coils Constructed of copper tubing mechanically bonded to aluminum fins Factory leak tested under water
2 Condenser fans Direct drive, propeller type, vertical air discharge Fan blades constructed of steel Condenser fan motors high efficiency totally enclosed type with internal motor overload protection, three-phase non-reversing type with permanently lubricated ball bearing and integral rain shield
3 Furnish factory installed coil guard

L Refrigeration Circuit (with R-410a)

1 Dehydrate and factory charge each circuit with oil and refrigerant
2 Furnish the following for each circuit

a Thermal expansion device
b Filter-drier
c Replaceable core filter drier
d Suction, discharge, and liquid line service valves with gauge ports
e Sight glass
f High and low pressure safety controls
g Liquid line solenoid valve
h Sub-cooler circuit to provide 15 degrees of liquid sub-cooling

3 Capacity control

a Hot gas bypass Factory installed on each refrigerant circuit including hot gas bypass valve, solenoid valve and hot gas bypass piping

4 Furnish control to provide low ambient cooling to 0 degrees F

M Gas-fired Heating Section

1 Fuel Natural Gas
2 Heat exchanger Constructed of type 304-L stainless steel primary combustion chamber, stainless steel header, stainless steel tube bundles within stainless steel secondary tubes Furnish heat exchanger with condensate drain
3 Control Modulating with 20 to 1 turndown ratio
4 Burner Induced draft type with pre-purge timing, flame supervision, combustion air proving switch, and spark ignition

5 Gas Train Furnish with the following redundant gas valves, pressure regulator, shutoff valve, pilot gas valve, pilot pressure regulator, and pilot valve
6 Factory test and adjust burner
7 Location Upstream of fan section

N Filter Section

1 Location Upstream of fan section
2 Furnish section with integral galvanized steel filter staggered rack contained within unit
3 Disposable filters Frame mounted 2 inch thick 30 percent efficient based on ASHRAE 52 2
4 Pleated media with MERV-7 rating

O Outdoor and Return Air Section

1 Dampers Furnish with leakage rate not to exceed 1 percent of nominal airflow based on 1 5 inch water column static pressure
2 Actuators Furnish factory installed electric damper actuators for outside air, return air, and exhaust air dampers
3 Economizer Furnish fully integrated factory installed fully modulating from 0 to 100 percent outside air Operation shall be through microprocessor based primary temperature controls automatically modulate dampers to maintain space temperature conditions

a Furnish economizer with enthalpy control

b Damper Position Adjustable, minimum position, with remote control **by DDC system**

c Furnish spring return motor for outside air damper closure during unit shutdown or power interruption 2

4 100% Modulating **Exhaust** Fan with "Statitrac" control, sized for 100 percent air flow, statically and dynamically balanced with high efficiency motor Motor permanently lubricated with built-in thermal overload protection Fan operated with volume control device based on field adjustable interior space pressure set point Provide with spring type vibration isolators, and V-belt fan drive

P Electrical

1 Furnish with factory wired weatherproof control panel with deadfront cover
2 Furnish with single point power terminal block for main power connection
3 Furnish terminal board for low voltage control wiring
4 Furnish branch circuit fusing, 115 volt control circuit transformer and fuse, system switches, high temperature sensor, and 115 volt ground fault receptacle with separate electrical connection
5 Furnish separate control panel housing controls for condensing section 2
6 Fan Motor Starting
7 Power Factor Correction Furnish minimum of 0 90 for compressor, supply fan and return fan motors

8 Phase Failure and Under Voltage Protection Furnish for three-phase motors to prevent damage from single phasing, phase reversal, and low voltage conditions

a Ground Fault Protection Furnish on three-phase motors to protect against arcing ground faults

Q Controls Furnish interface to Direct Digital Control System specified in Section 15975

R Accessories

1 Convenience Outlet Factory installed, 115 volt, 15 amp, GFI type, internally mounted Factory wired from transformer internal to unit

S Capacity

1 As specified on the Drawing Schedule

2 2 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A Electrical Characteristics In accordance with Division 16

B Disconnect Switch Factory mounted Non-fused type Internal to unit or accessible through door

2 3 SOURCE QUALITY CONTROL

A Section 01400 - Quality Requirements Testing, inspection and analysis requirements

B Perform factory test of each unit Test includes

1 Dynamic trim balance of each completed fan assembly
2 Complete run check of electrical components and safety controls, including control sequencing
3 Pressure test, at manufacturer's rated pressure, of refrigerant coils and condenser coils prior to unit assembly
4 Leak check of completed refrigerant circuits
5 Compressor run check

PART 3 EXECUTION

3 1 EXAMINATION

A Section 01300 - Administrative Requirements Verification of existing conditions before starting work

B Verify roof curbs are installed and dimensions are as shown on shop drawings

3 2 INSTALLATION

A Roof Curb

1 Assemble roof curb
2 Install roof curb level
3 Coordinate curb installation and flashing with Architect
4 Install units on roof curb providing watertight enclosure to protect ductwork and utility services
5 Install gasket material between unit base and roof curb

B Connect units to supply and return ductwork with flexible connections Refer to Section 15820

C Install condensate piping with trap and route from drain pan to splash block on roof Refer to Section 15410

D Install components furnished loose for field mounting

E Install electrical devices furnished loose for field mounting

F Install control wiring between unit and field installed accessories

G Remove from roof and dispose off-site panels removed from units during installation of economizer and dampers

H Locate remote panels as indicated on Drawings

I Provide fixed sheaves required for final air balance

3 3 INSTALLATION - NATURAL GAS HEATING SECTION

A Connect natural gas piping in accordance with NFPA 54

B Connect natural gas piping to unit, full size of unit gas train inlet Arrange piping with clearances for burner service

C Install the following piping accessories on natural gas piping connections Refer to Section 15410

1 Strainer
2 Pressure gage
3 Shutoff valve
4 Pressure reducing valve

D Install natural gas piping accessories above roof

3 4 MANUFACTURER'S FIELD SERVICES

A Section 01400 - Quality Requirements Requirements for manufacturer's field services

B Furnish initial start-up and shutdown during first year of operation, including routine servicing and checkout

C Furnish services of factory trained representative for minimum of one day to leak test, refrigerant pressure test, evacuate, dehydrate, charge, start-up, calibrate controls, and instruct Owner on operation and maintenance

3 5 CLEANING

A Section 01700 - Execution Requirements Requirements for cleaning

B Vacuum clean coils and inside of unit cabinet

C Install temporary filters during construction period Replace with permanent filters at Substantial Completion

3 6 DEMONSTRATION

A Section 01700 - Execution Requirements Requirements for demonstration and training

B Demonstrate unit operation and maintenance

C Furnish services of manufacturer's technical representative for one 8 hour day to instruct Owner's personnel in operation and maintenance of units Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date

END OF SECTION 15738

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SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1 1 SUMMARY

A This Section includes the following
- 1 Commercial door hardware for the following
  - a Swinging doors
  - b Other doors to the extent indicated
- 2 Cylinders for doors specified in other Sections
- 3 Electrified door hardware

B Related Sections include the following
- 1 Division 8 Section "Steel Doors and Frames"
- 2 Division 8 Section "Flush Wood Doors"
- 3 Division 8 Section "Access Doors and Frames"
- 4 Division 8 Section "Overhead Coiling Doors"
- 5 Division 8 Section "Sectional Overhead Doors "
- 6 Division 8 Section "Aluminum-Framed Entrances and Storefronts"
- 7 Division 16 Sections for connections to electrical power system and for low-voltage wiring work

1 2 DOOR HARDWARE ALLOWANCE

A Door Hardware Selection Furnish door hardware selected by Architect, in quantities specified in this Section and in Division 1 Section "Allowances "

B Allowance Bidding After Architect selects door hardware and issues the door hardware sets, request bids for products and materials

C Allowance Award Architect will select bid from bids furnished by Contractor Award purchase order to bidder selected

D Allowance Adjustment A Change Order will be issued to adjust difference between door hardware allowance and selected bid from door hardware Installer

E Installation General types and approximate quantities of door hardware are indicated in the list of door hardware sets to provide a basis for the cost of installation and other Work that is part of the Contract Sum but not included in door hardware allowance

1 3 SUBMITTALS

A Product Data Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes

B Shop Drawings Details of electrified door hardware, indicating the following
- 1 Wiring Diagrams Power, signal, and control wiring Include the following
  - a System schematic
  - b Point-to-point wiring diagram
  - c Riser diagram
  - d Elevation of each door
- 2 Detail interface between electrified door hardware and other related building systems
- 3 Operation Narrative Describe the operation of doors controlled by electrified door hardware

C Product Certificates For electrified door hardware, signed by product manufacturer

1 Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies

D Qualification Data For installer and architectural hardware consultant

E Product Test Reports Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, panic devices and door closers

F Maintenance Data For each type of door hardware to include in maintenance manuals Include final hardware and keying schedule

G Warranty Special warranty specified in this Section

H Other Action Submittals

1 Door Hardware Sets Prepared by or under the supervision of architectural hardware consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware

a Format Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule " Double space entries, and number and date each page

b Format Use same scheduling sequence and format as in the Contract Documents

c Content Include the following information

1) Identification number, location, hand, fire rating, and material of each door and frame
2) Type, style, function, size, quantity, and finish of each door hardware item
3) Complete designations of every item required for each door or opening including name and manufacturer
4) Fastenings and other pertinent information
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule
6) Explanation of abbreviations, symbols, and codes contained in schedule
7) Mounting locations for door hardware
8) Door and frame sizes and materials
9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems
10) List of related door devices specified in other Sections for each door and frame

d Submittal Sequence Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets

2 Keying Schedule Prepared by or under the supervision of architectural hardware consultant, detailing Owner's final keying instructions for locks Include schematic keying diagram and index each key set to unique door designations

1 4 QUALITY ASSURANCE

A Installer Qualifications An employer of workers trained and approved by lock manufacturer

1 Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying

2 Installer shall have warehousing facilities in Project's vicinity

3 Scheduling Responsibility Preparation of door hardware and keying schedules

4 Engineering Responsibility Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project

B Architectural Hardware Consultant Qualifications A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project

C Source Limitations Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated

1 Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable

D Fire-Rated Door Assemblies Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2

E Electrified Door Hardware Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use

F Keying Conference Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination " In addition to Owner, Contractor, and Architect, conference participants shall also include Supplier's Architectural Hardware Consultant Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following

1 Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion
2 Preliminary key system schematic diagram
3 Requirements for key control system
4 Address for delivery of keys

G Preinstallation Conference Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination " Review methods and procedures related to electrified door hardware including, but not limited to, the following

1 Inspect and discuss electrical roughing-in and other preparatory work performed by other trades
2 Review sequence of operation for each type of electrified door hardware
3 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays
4 Review required testing, inspecting, and certifying procedures

1 5 DELIVERY, STORAGE, AND HANDLING

A Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site

B Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package

C Deliver keys to manufacturer of key control system for subsequent delivery to Owner

D Deliver keys to Owner by registered mail or overnight package service

1 6 COORDINATION

A Templates Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements

B Electrical System Roughing-in Coordinate layout and installation of electrified door hardware with connections to building systems

1 7 WARRANTY

A Special Warranty Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period
1 Failures include, but are not limited to, the following
a Structural failures including excessive deflection, cracking, or breakage
b Faulty operation of operators and door hardware
c Deterioration of metals, metal finishes, and other materials beyond normal weathering and use
2 Warranty Period One year from date of Substantial Completion, except as follows
a Exit Devices Three years from date of Substantial Completion
b Manual Closers Ten years from date of Substantial Completion
c Locksets Three years from date of Substantial Completion

1 8 MAINTENANCE SERVICE

A Maintenance Tools and Instructions Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware

PART 2 - PRODUCTS

2 1 SCHEDULED DOOR HARDWARE

A General Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article
1 Door Hardware Sets Provide quantity, item, size, finish or color indicated, and named manufacturers' products
2 Sequence of Operation Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated

B Designations Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article

2 2 HINGES, GENERAL

A Quantity Provide the following, unless otherwise indicated
1 Two Hinges For doors with heights up to 60 inches
2 Three Hinges For doors with heights 61 to 90 inches
3 Four Hinges For doors with heights 91 to 120 inches
4 For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches

B Template Requirements Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units

C Hinge Weight Unless otherwise indicated, provide the following
1 Entrance Doors Heavy-weight hinges
2 Doors with Closers Antifriction-bearing hinges
3 Interior Doors Standard-weight hinges

D Hinge Base Metal Unless otherwise indicated, provide the following
1 Provide finishes shown in hardware sets

E Fasteners Comply with the following
1 Machine Screws For metal doors and frames Install into drilled and tapped holes
2 Wood Screws For wood doors and frames
3 Threaded-to-the-Head Wood Screws For fire-rated wood doors
4 Screws Phillips flat-head Finish screw heads to match surface of hinges

2 3 HINGES

A Butts and Hinges BHMA A156 1

B Manufacturers
1 Ives (IVE)
2 Bommer Industries, Inc
3 Hager Companies
4 McKinney Products Company
5 Stanley Commercial Hardware

2 4 CONTINUOUS HINGES

A Standard BHMA A156 26

B General Minimum 0 120-inch-thick, hinge leaves with minimum overall width of 4 inches, fabricated to full height of door and frame and to template screw locations, with components finished after milling and drilling are complete

C Continuous, Gear-Type Hinges Extruded-aluminum, pinless, geared hinge leaves, joined by a continuous extruded-aluminum channel cap, with concealed, self-lubricating thrust bearings
1 Manufacturers
a Ives (IVE)
b Pemko Manufacturing Co
c Select Products Limited

2 5 LOCKS AND LATCHES, GENERAL

A Accessibility Requirements Where indicated to comply with accessibility requirements, comply with ANSI A117 1
1 Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf

B Latches and Locks for Means of Egress Doors Comply with NFPA 101 Latches shall not require more than 15 lbf to release the latch Locks shall not require use of a key, tool, or special knowledge for operation

C Lock Trim
1 Levers Schlage Neptune/Sparta design

D Lock Throw Comply with testing requirements for length of bolts required for labeled fire doors, and as follows
1 Bored Locks Minimum 1/2-inch latchbolt throw
2 Mortise Locks Minimum 3/4-inch latchbolt throw
3 Deadbolts Minimum 1-inch bolt throw

E Rabbeted Meeting Doors Provide special rabbeted front and strike on locksets for rabbeted meeting stiles

F Backset 2-3/4 inches, unless otherwise indicated

G Strikes Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows

2 6 MECHANICAL LOCKS AND LATCHES

A Lock Functions Function numbers and descriptions indicated in door hardware sets comply with the following
1 Bored Locks BHMA A156 2
2 Mortise Locks BHMA A156 13

B Bored & Mortise Locks
1 Manufacturers
a Schlage Commercial Lock Division (SCH)

2 7 DOOR BOLTS

A Automatic and Self-Latching Flush Bolts designed for mortising into door edge
1 Manufacturers
a Door Controls International
b Ives (IVE)
c Trimco

2 8 EXIT DEVICES

A Exit Devices BHMA A156 3

B Accessibility Requirements Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with ANSI A117 1
1 Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf

C Exit Devices for Means of Egress Doors Comply with NFPA 101 Exit devices shall not require more than 15 lbf to release the latch Locks shall not require use of a key, tool, or special knowledge for operation

D Panic Exit Devices Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305

E Fire Exit Devices Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252

F Removable Mullions BHMA A156 3

G Fire-Exit Removable Mullions Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252 Mullions shall be used only with exit devices for which they have been tested

H Outside Trim As shown in the hardware sets Material and finish to match locksets, unless otherwise indicated
1 Match design for locksets and latchsets, unless otherwise indicated

I Manufacturers
1 Von Duprin (VON)

2 9 LOCK CYLINDERS

A Standard Lock Cylinders BHMA A156 5

B Cylinders Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following
1 Number of Pins Six

2 Mortise Type Threaded cylinders with rings and straight- or clover-type cam
3 Rim Type Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring
4 Bored-Lock Type Cylinders with tailpieces to suit locks

C Permanent Cores Manufacturer's standard, finish face to match lockset, complying with the following
1 Core types as shown in the hardware sets

D Construction Keying Comply with the following
1 Construction Cores Provide construction cores that are replaceable by permanent cores Provide 10 construction master keys
a Replace construction cores with permanent cores as directed by Owner

E Manufacturers
1 Schlage Commercial Lock Division, an Ingersoll-Rand Company (SCH)

2 10 KEYING

A Keying System Schlage 'Everest D' key system Incorporate decisions made in keying conference, and as follows
1 Master Key System Cylinders are operated by a change key and a master key

B Keys Nickel silver
1 Stamping Permanently inscribe each key with a visual key control number and include the following notation
a Notation "DO NOT DUPLICATE "
2 Quantity Provide the following
a Cylinder Change Keys Three
b Master Keys Five
c Grand Master Keys Three

2 11 KEY CONTROL SYSTEM

A Key Control Cabinet BHMA A156 5, metal cabinet with baked-enamel finish, containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers, with key capacity of 150 percent of the number of locks
1 Wall-Mounted Cabinet Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock

B Cross-Index System Index system for recording key information Include three receipt forms for each key-holding hook
1 Manufacturers
a Key Control Systems, Inc (KCS)
b Lund Equipment Co , Inc (LUN)
c MMF Industries (MMF)

C Key Lock Boxes Quantity per locations designated by architect
1 Manufacturers
a Knox Company (KNX)
b Supra Products (SUP)

2 12 ELECTRIC STRIKES

A Standard BHMA A156 31

B General Use fail-secure electric strikes with fire-rated devices

C Manufacturers

1 Von Duprin (VON)

2 13 OPERATING TRIM

A Standard BHMA A156 6

B Materials Fabricate with materials and finishes shown in hardware sets, unless otherwise indicated

C Manufacturers
1 Ives (IVE)
2 Trimco
3 Tice Industries

2 14 CLOSERS

A Accessibility Requirements Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with ANSI A117 1
1 Comply with the following maximum opening-force requirements
a Interior, Non-Fire-Rated Hinged Doors 5 lbf applied perpendicular to door
b Fire Doors Minimum opening force allowable by authorities having jurisdiction

B Door Closers for Means of Egress Doors Comply with NFPA 101 Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width

C Power-Assist Closers As listed in the door hardware sets

D Size of Units Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force

E Surface Closers BHMA A156 4 Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated
1 Manufacturers
a LCN Closers (LCN)

2 15 PROTECTIVE TRIM UNITS

A Size 2 inches less than door width on push side and 1 inch less than door width on pull side, by height specified in door hardware sets

B Fasteners Manufacturer's standard machine or self-tapping screws

C Metal Protective Trim Units BHMA A156 6, beveled all 4 sides
1 Material 0 050-inch-thick stainless steel
2 Manufacturers
a Ives (IVE)
b Trimco
c Tice Industries

2 16 STOPS AND HOLDERS

A Stops and Bumpers BHMA A156 16
1 Provide floor stops for doors unless wall or other type stops are scheduled or indicated Do not mount floor stops where they will impede traffic Where floor or wall stops are not appropriate, provide overhead holders

B Mechanical Door Holders BHMA A156

C Combination Overhead Stops and Holders BHMA A156 8

D Electromagnetic Door Holders BHMA A156 15
1 Coordinate with fire detectors and interface with fire alarm system for labeled fire door assemblies

E Silencers for Metal Door Frames BHMA A156 16, Grade 1, neoprene or rubber, minimum diameter 1/2 inch, fabricated for drilled-in application to frame

F Manufacturers
1 Door Controls International
2 Glynn-Johnson (GLY)
3 Ives (IVE)
4 Trimco

2 17 DOOR GASKETING

A Standard BHMA A156 22

B General Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled Provide noncorrosive fasteners for exterior applications and elsewhere as indicated
1 Perimeter Gasketing Apply to head and jamb, forming seal between door and frame
2 Meeting Stile Gasketing Fasten to meeting stiles, forming seal when doors are closed
3 Door Bottoms Apply to bottom of door, forming seal with threshold when door is closed

C Smoke-Labeled Gasketing Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784
1 Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors

D Fire-Labeled Gasketing Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2

E Sound-Rated Gasketing Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408

F Replaceable Seal Strips Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer

G Gasketing Materials ASTM D 2000 and AAMA 701/702

H Manufacturers
1 National Guard Products (NGP)
2 Pemko Manufacturing Co (PEM)
3 Reese Enterprises
4 Steelcraft

2 18 THRESHOLDS

A Standard BHMA A156 21

B Generally retain first option in first paragraph below for private projects, retain third option for Federal, State, and local government projects Second option is often referenced by building codes Verify requirements with authorities having jurisdiction

C Accessibility Requirements Where thresholds are indicated to comply with accessibility requirements, comply with ANSI A117 1

1 Bevel raised thresholds with a slope of not more than 1 2 Provide thresholds not more than ½" height

D Thresholds for Means of Egress Doors Comply with NFPA 101 Maximum 1/2 inch high

E Manufacturers
1 National Guard Products (NGP)
2 Pemko Manufacturing Co (PEM)
3 Reese Enterprises (RE)

2 19 SLIDING DOOR HARDWARE

A General BHMA A156 14, consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated
1 Exterior Door Hardware Galvanized steel or anodized aluminum

B Horizontal Sliding Door Hardware Grade 1,

C Manufacturers
1 Henderson, P C Inc (HEN)
2 Johnson, L E Products, Inc
3 Lawrence Brothers, Inc
4 Stanley Commercial Hardware

2 20 FABRICATION

A Base Metals Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156 18 Do not furnish manufacturer's standard materials or forming methods if different from specified standard

B Fasteners Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated
1 Concealed Fasteners For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt
2 Steel Machine or Wood Screws For the following fire-rated applications
a Mortise hinges to doors
b Strike plates to frames
c Closers to doors and frames
3 Steel Through Bolts For the following fire-rated applications unless door blocking is provided
a Surface hinges to doors
b Closers to doors and frames
c Surface-mounted exit devices
4 Spacers or Sex Bolts For through bolting of hollow-metal doors
5 Fasteners for Wood Doors Comply with requirements in DHI WDHS 2, "Recommended Fasteners for Wood Doors "

2 21 FINISHES

A Standard BHMA A156 18, as indicated in door hardware sets

B Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping

C Appearance of Finished Work Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples Noticeable variations in the same piece are not acceptable Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast

PART 3 - EXECUTION

3 1 EXAMINATION

A Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance

B Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation

C Proceed with installation only after unsatisfactory conditions have been corrected

3 2 PREPARATION

A Steel Doors and Frames Comply with DHI A115 Series
1 Surface-Applied Door Hardware Drill and tap doors and frames according to ANSI A250 6

B Wood Doors Comply with DHI A115-W Series

3 3 INSTALLATION

A Mounting Heights Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations
1 Standard Steel Doors and Frames DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames "
2 Custom Steel Doors and Frames DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames "
3 Wood Doors DHI WDHS 3, "Recommended Locations for Architectural Hardware for Wood Flush Doors "

B Install each door hardware item to comply with manufacturer's written instructions Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections Do not install surface-mounted items until finishes have been completed on substrates involved
1 Set units level, plumb, and true to line and location Adjust and reinforce attachment substrates as necessary for proper installation and operation
2 Drill and countersink units that are not factory prepared for anchorage fasteners Space fasteners and anchors according to industry standards

C Key Control System Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule

D Boxed Power Supplies Locate power supplies as indicated or, if not indicated, verify location with Architect
1 Configuration Provide one power supply for each door opening

2 Configuration Provide the least number of power supplies required to adequately serve doors with electrified door hardware

E Thresholds Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants "

3 4 FIELD QUALITY CONTROL

A Architectural Hardware Consultant Owner will engage a qualified Architectural Hardware Consultant to perform inspections and to prepare inspection reports

1 Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted

3 5 ADJUSTING

A Initial Adjustment Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit Replace units that cannot be adjusted to operate as intended Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements

1 Door Closers Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door

3 6 CLEANING AND PROTECTION

A Clean adjacent surfaces soiled by door hardware installation

B Clean operating items as necessary to restore proper function and finish

C Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion

3 7 DEMONSTRATION

A Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes Refer to Division 1 Section "Demonstration and Training "

3 8 DOOR HARDWARE SETS

HW SET 01
DOOR NUMBER
X01

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	DEADLOCK	MS1852S	628	ADA
2	EA	FINAL CORE	23-030	626	SCH
2	EA	MORTISE CYLINDER	26-098T	626	SCH
1	EA	EXIT INDICATOR	4089	628	ADA
1	EA	PULL/PUSHBAR	9190-2-NO	630	IVE
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
1	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		

HW SET 02
DOOR NUMBER
X02

1	EA	POWER TRANSFER	EPT-2	689	VON
1	EA	CONTINUOUS HINGE	112HD X EPT	628	IVE
1	EA	PANIC HARDWARE	QEL35A-NL-OP	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	OFFSET DOOR PULL	8190-2-O	630	IVE
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
1	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		
1	EA	POWER SUPPLY	PS873-2Q	GRY	VON
1	EA	CARD READER	PROVIDED BY SECURITY SECTION		

POWER SUPPLY REQUIRES 110VAC AND CARD READER INPUT

HW SET 03
DOOR NUMBER
X03

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	630	IVE
1	EA	PANIC HARDWARE	LD98NL	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	DRIP CAP	16A	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	950V	AL	NGP

HW SET 04
DOOR NUMBER

110	112	113	113A	113B	114
114A	115	115A	115B	116	116A

X04

EACH TO HAVE

ALL HARDWARE BY DOOR MANUFACTURER

HW SET 05
DOOR NUMBER
B2

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PASSAGE SET	AL10S NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 06
DOOR NUMBER
300A 300B B2A B5A

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PRIVACY LOCK	L9496L 17A L583-363 XL12-196	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 07
DOOR NUMBER
B2B

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 08
DOOR NUMBER
B3 B4

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 09
DOOR NUMBER
BS

4	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PASSAGE SET	AL10S NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

HW SET 10
DOOR NUMBER
G2

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	630	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

HW SET 11
DOOR NUMBER
G3

2	EA	CONTINUOUS HINGE	705	630	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB1/MB2	689	IVE
1	EA	ASTRAGAL	139SS	630	NGP
2	EA	DELAYED CLOSER	4111 DEL SCUSH	689	LCN
4	EA	ARMOR PLATE	8400 36" X 1" LDW	630	IVE
1	SET	SEALS	5050B (HEAD, JAMBS & ASTRAGAL)	BRN	NGP
2	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513HD	AL	NGP

HW SET 12
DOOR NUMBER
G4

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	LD98NL	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	WALL STOP	WS407CVX	630	IVE
1	EA	THRESHOLD	513	AL	NGP
4	EA	SILENCER	SR64	GRY	IVE

HW SET 13
DOOR NUMBER
G5

8	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB1/MB2	689	IVE
1	EA	ASTRAGAL	139SS	630	NGP
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	EA	WALL STOP	WS407CVX	630	IVE
1	EA	THRESHOLD	513	AL	NGP
4	EA	SILENCER	SR64	GRY	IVE

HW SET 14
DOOR NUMBER
G7

8	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
1	EA	ASTRAGAL	139SS	630	NGP
2	EA	SURFACE CLOSER	1461	689	LCN
4	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SEALS	5050B (HEAD, JAMBS & ASTRAGAL)	BRN	NGP
2	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

HW SET 15
DOOR NUMBER
G8 G9

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

HW SET 16
DOOR NUMBER
BN

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	DOOR SWEEP	600A	AL	NGP
1	EA	THRESHOLD	513	AL	NGP
1	EA	CARD READER	PROVIDED BY SECURITY SECTION		

THIS IS NOT A REQUIRED EXIT FROM THE GARAGE

HW SET 17
DOOR NUMBER
X10

2	EA	POWER TRANSFER	EPT-2	689	VON
2	EA	CONTINUOUS HINGE	112HD X EPT	628	IVE
1	EA	PANIC HARDWARE	QEL3547A-EO	626	VON
1	EA	PANIC HARDWARE	QEL3547A-TL-LESS PULL	626	VON
1	EA	MORTISE CYLINDER	20-061T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
2	EA	OFFSET DOOR PULL	8190-2-O	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	AUTO OPERATOR	4642 REG	689	LCN
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
2	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		
1	EA	POWER SUPPLY	PS873-2Q	GRY	VON
2	EA	ACTUATOR, JAMB	8310-818T		LCN

		MOUNT			
1	EA	CARD READER	PROVIDED BY SECURITY SECTION		

POWER SUPPLY AND AUTO OPERATOR REQUIRE 110VAC AND CARD READER INPUT

HW SET 18
DOOR NUMBER
X11

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	35A-NL-OP	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	OFFSET DOOR PULL	8190-2-O	630	IVE
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
1	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		

HW SET 19
DOOR NUMBER
X12

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	LD35A-EO	626	VON
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
1	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		

HW SET 20
DOOR NUMBER
X13

1	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	35A-NL-OP	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	OFFSET DOOR PULL	8190-2-O	630	IVE
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	FLOOR STOP	FS441	626	IVE
1	SET	WEATHERSTRIP	PROVIDED BY DOOR MANUFACTURER		
1	EA	BOTTOM SEAL	PROVIDED BY DOOR MANUFACTURER		
1	EA	THRESHOLD	PROVIDED BY DOOR MANUFACTURER		

HW SET 21
DOOR NUMBER
100A

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 22
DOOR NUMBER
100B

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	98L 996L-17	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 23
DOOR NUMBER
100E 200E 300E 400E

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	THRESHOLD	513	AL	NGP

HW SET 24
DOOR NUMBER
100J

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

HW SET 25
DOOR NUMBER
100M 100W 200M 200W 300M 300W
400M 400W

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302-6 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 26
DOOR NUMBER
101

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	OVERHEAD STOP	450S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 27
DOOR NUMBER
101A

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

HW SET 28
DOOR NUMBER
102A 102C

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	98L 996L-17	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 29
DOOR NUMBER
102B

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 30
DOOR NUMBER
102D

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	LD98EO	626	VON
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 31
DOOR NUMBER
1N

4	EA	HINGE	5BB1HW 5 X 4 5	652	IVE
1	EA	FIRE EXIT HARDWARE	9475L-F-BE-17	626	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	MAGNETIC HOLD-OPEN	SEM 7850	AL	LCN
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	THRESHOLD	410	AL	NGP

HW SET 32
DOOR NUMBER
1S 2S 3S 4S

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	POWER TRANSFER	EPT-2	689	VON
1	EA	FIRE EXIT HARDWARE	98L-F E996L-FS-17	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1		MORTISE CYLINDER	20-061T (FOR KEYSWITCH)	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1		FINAL CORE	23-030 (FOR KEYSWITCH)	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE

1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	THRESHOLD	410	AL	NGP
1	EA	PS873 OPTION BOARD	873-FA		VON
1	EA	POWER SUPPLY	PS873	GRY	VON
1		KEYSWITCH	653-04	630	SCE

POWER SUPPLY REQUIRES 110VAC AND N C FIRE ALARM CONNECTION LEVER ON STAIR SIDE TO UNLOCK ON FIRE ALARM INSTALL (1) KEYSWITCH ADJACENT TO FIRE ALARM CONTROL PANEL THAT CONTROLS ALL STAIR DOORS

HW SET 33
DOOR NUMBER
116C

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	WALL STOP & HOLDER	WS45	626	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	FINGER GUARD	2248A X 76"	AL	NGP
1	EA	FINGERGARD- HINGE	2252B X 79 3/4"	BRN	NGP

HW SET 34
DOOR NUMBER
116B

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE
1	EA	FINGERGARD- HINGE	2252B X 79 3/4"	BRN	NGP

HW SET 35
DOOR NUMBER
117

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	DELAYED CLOSER	1461 DEL	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	FINGER GUARD	2248A X 76"	AL	NGP

HW SET 36
DOOR NUMBER
118 119

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PRIVACY LOCK	L9496L 17A L583-363 XL12-196	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	FINGER GUARD	2248A X 76"	AL	NGP
1	EA	FINGERGARD- HINGE	2252B X 79 3/4"	BRN	NGP

HW SET 37
DOOR NUMBER
120

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	OVERHEAD STOP	450S	630	GLY
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	FINGER GUARD	2248A X 76"	AL	NGP
1	EA	FINGERGARD- HINGE	2252B X 79 3/4"	BRN	NGP

HW SET 38
DOOR NUMBER

121	323	324	325	327	328
329	406	407	409	410	411
412	413	414	415	416	417

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 39
DOOR NUMBER
142

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN NGP

HW SET 40
DOOR NUMBER
142A

3	EA	HINGE	5BB1 4 5 X 4 5	652 IVE
1	EA	OFFICE LOCK	AL50PD NEP	626 SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689 LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630 IVE
1	EA	WALL STOP	WS407CCV	630 IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN NGP
1	EA	DOOR SWEEP	600A	AL NGP
1	EA	THRESHOLD	513	AL NGP

HW SET 41
DOOR NUMBER
143 143A

EACH TO HAVE

1	SET	PIVOT SET	7253	626 IVE
2	EA	PUSH PLATE	8200 4" X 16"	630 IVE
1	EA	CONCEALED CLOSER	6031 BUMPER	689 LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630 IVE

HW SET 42
DOOR NUMBER
144

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652 IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626 SCH
1	EA	DELAYED CLOSER	1461 DEL EDA	689 LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630 IVE
1	EA	WALL STOP	WS407CVX	630 IVE
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN NGP

HW SET 43
DOOR NUMBER
200A 200B

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652 IVE
1	EA	PANIC HARDWARE	98L 996L-17	626 VON
1	EA	RIM CYLINDER	20-057T	626 SCH
1	EA	FINAL CORE	23-030	626 SCH
1	EA	SURFACE CLOSER	1461 EDA	689 LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630 IVE

1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 44
DOOR NUMBER
200J 300J 400J

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET 45
DOOR NUMBER
2N 3N 4N

EACH TO HAVE

8	EA	HINGE	5BB1HW 5 X 4 5	652	IVE
1	EA	FIRE EXIT HARDWARE	9847EO-F-LBR	626	VON
1	EA	FIRE EXIT HARDWARE	9847L-F-BE-LBR 996L-BE-17	626	VON
1	SET	MEETING ASTRAGAL	600A	AL	NGP
2	EA	SURFACE CLOSER	1461	689	LCN
4	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	MAGNETIC HOLD-OPEN	SEM 7850	AL	LCN
1	SET	SEALS	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 46
DOOR NUMBER
300C 300D

EACH TO HAVE

2	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4 5 X 4 5 TW4	652	IVE
1	EA	EU STOREROOM LOCK	ND80PDEU SPA	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	POWER SUPPLY	PS861	GRY	VON
1	EA	PUSHBUTTON	621GR	630	SCE

POWER SUPPLY REQUIRES 110VAC LOCATE PUSHBUTTON AT RECEPTION FOR REMOTE RELEASE OF DOOR

HW SET 47
DOOR NUMBER

301	302	303	304	305	306
307	308	309	310	311	312
314	315	316			

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 48
DOOR NUMBER

301A	316A	317A

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

INSTALL WITH KEY CYLINDER ON CONFERENCE ROOM SIDE

HW SET 49
DOOR NUMBER
313

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302-6 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	FINGER GUARD	2248A X 76"	AL	NGP
1	EA	FINGERGARD- HINGE	2252B X 79 3/4"	BRN	NGP

HW SET 50
DOOR NUMBER
315A

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PASSAGE SET	AL10S NEP	626	SCH
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 51
DOOR NUMBER
317

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 52
DOOR NUMBER
400A

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4 5 X 4 5 TW4	652	IVE
1	EA	EU STOREROOM LOCK	ND80PDEU SPA	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP
1	EA	POWER SUPPLY	PS861	GRY	VON
1	EA	PUSHBUTTON	621GR	630	SCE

POWER SUPPLY REQUIRES 110VAC LOCATE PUSHBUTTON AT RECEPTION FOR REMOTE RELEASE OF DOOR

HW SET 53
DOOR NUMBER
401A 401B 403

EACH TO HAVE

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	98L 996L-17	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 54
DOOR NUMBER
408

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	PANIC HARDWARE	98L-BE 996L-BE-17	626	VON
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

CONFIRM IF THIS IS A REQUIRED EXIT TOWARD SOUTH STAIRS

HW SET 55
DOOR NUMBER
401C

1	SET	TRACK ASSEMBLY	301 SERIES		HEN
2	EA	FLUSH PULL	1115	630	TRI

HW SET 56
DOOR NUMBER
402

8	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	PANIC HARDWARE	9827EO-LBR	626	VON
1	EA	PANIC HARDWARE	9827L-LBR 996L-17	626	VON
1	EA	RIM CYLINDER	20-057T	626	SCH
1	EA	FINAL CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	1461 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	WALL STOP & HOLDER	WS45	626	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 57
DOOR NUMBER
404

4	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 58
DOOR NUMBER
405A

4	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
4	EA	SILENCER	SR64	GRY	IVE

HW SET 59
DOOR NUMBER
405B

4	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 60
DOOR NUMBER
405C

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 61
DOOR NUMBER
418A 418B

EACH TO HAVE

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE 24VDC	630	VON
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	CARD READER	PROVIDED BY SECURITY SECTION		

HW SET 62
DOOR NUMBER
419

3	EA	HINGE	5BB1 4 5 X 4 5	652	IVE
1	EA	OFFICE LOCK	AL50PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

HW SET 63
DOOR NUMBER
420

3	EA	HINGE	5BB1 4 5 X 4 5 NRP	652	IVE
1	EA	STOREROOM LOCK	AL80PD NEP	626	SCH
1	EA	SURFACE CLOSER	1461 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SOUND SEAL	5050B (HEAD & JAMBS)	BRN	NGP

END OF SECTION 08710

Form 2a Project Name | Page

SUMMARY

Project

1 Project Name	Clark Family Center		
2 Project Address	2740 SE Powell Blvd		
3 City/Town	Portland	5 County	Multnomah
4 Building, Gross Area (ft2)	60,000	6 No of Floors	5
7 Construction Site Elevation Above 2,000 ft?		☐ YES	☑ NO

Attached Forms and Worksheets

Check boxes to indicate attached forms and worksheets

Chapter	Type	ID	Description	Attach
Building Envelope	Form	3a	Building Envelope - General	☑
		3b	Prescriptive Path - All Climate Zones	☐
		*	CodeComp Report for Simplified Trade-off	☐
* *In lieu of 3b*		*	Floppy disc with **occ** CodeComp file	☐
	Worksheet	3a	Wall U-factor	☐
		3b	Roof U-factor	☐
		3c	Floor U-factor	☐
		3d	Window/Skylight Schedule	☐
Systems	Form	4a	Systems - General	☑
		4b	Complex Systems	☐
	Worksheet	4a	Unitary Air Conditioners - Air Cooled	☑
		4b	Unitary Air Cond - Water & Evap Cooled	☐
		4c	Unitary Heat Pump - Air Cooled	☐
		4d	Unitary Heat Pump - Water Cooled	☐
		4e	Packaged Terminal A C - Air Cooled	☐
		4f	Packaged Terminal Heat Pump - Air Cooled	☐
		4g	Water Chilling Pkgs - Water & Air Cooled	☐
		4h	Heat Rejection Equipment	☐
		4i	Boiler - Gas-Fired and Oil-Fired	☐
		4j	Furnace & Unit Heaters - Gas and Oil-Fired	☐
		4k	Simultaneous Heating and Cooling	☐
		4l	Air Transport Energy	☐
		4m	Natural Ventilation	☐
Lighting	Form	5a	Lighting - General	☐
		5b	Interior Lighting Power - Tenant Method	☐
		5c	Int Ltng Power - Space-by-Space Method	☐
	Worksheet	5a	Lighting Schedule	☐
		5b	Interior Lighting Power	☐

Applicant

7 Name	Brandon Schneider	10 Telephone	503 892 1188
8 Company	MKE and Associates	11 Date	10/30/08
9 Signature			

Attached Documentation

No of Pages	Description of Documentation
7	Cut Sheets

08-177308-00

Form 3a | Project Name Clark Family Center | Page

BUILDING ENVELOPE - GENERAL

Check all boxes that apply

Exceptions
Discussion of qualifying exceptions in instructions section

Plans/Specs
Show compliance by including a drawing sheet detail number specification section and/or subparagraph

1 Exceptions (Section 1312)

☐ **No Envelope Components** The building plans do not call for new or altered building envelope components, e g , walls, floors or roof/ceilings

☐ **A Non-conditioned Building** The proposed structure has no spaces heated or cooled by an HVAC system

☐ **Exception** All new or altered building envelope components do not comply with the requirements, Section 1312, but qualify for Exception ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Portions of the building that qualify

The plans/specs show compliance in the following locations

2 Air Leakage (Section 1312 1 1)

☑ **Complies** Plans require penetrations in building envelope are sealed and windows and doors are caulked, gasketed or weatherstripped
The plans/specs show compliance in the following locations

Spec

3 Suspended Ceiling (Section 1312 1 2 1)

☑ **Complies** Building plans do not show suspended ceilings used to separate conditioned space from unconditioned space No exceptions permitted

4 Recessed Light Fixtures (Section 1312 1 2 2)

☑ **Complies** The building plans do not show recessed light fixtures installed in ceilings separating conditioned spaces from unconditioned spaces

☐ **Exception** The building plans require that fixtures installed in direct contact with insulation be insulation coverage (IC) rated The plans/specs show compliance in the following locations

5 Moisture Control (Section 1312 1 4)

☑ **Complies** A one-perm vapor retarder is installed on the warm side (in winter) of all exterior floors, walls and ceilings, and a ground cover installed in the crawl space of both new and existing buildings where insulation is installed
The plans/specs show compliance in the following locations

Spec

☐ **Exception** All new or altered building envelope components do not comply with the vapor retarder requirements of the code, but qualify for an exception Note applicable exception Section 1312 1 4, Exception ☐ 1 ☐ 2
Portions of the building that comply

Climate Zones

6 Climate Zones

☑ **Zone 1** - A building site is in Climate Zone 1 if its elevation is less than 3000 feet above sea level and it is in one of the following counties Benton, Columbia, Clackamas, Clatsop, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Yamhill, or Washington

☐ **Zone 2** - Building sites not in Zone 1, or where construction site elevation is 3000 feet or higher in Zone 1, are in Zone 2

PRESCRIPTIVE PATH

CLIMATE ZONE 1

Glazing Percent Calculation

See instruction section for a discussion of glazing percent calculation

	Window Area (total rough frame ft2)		Exterior Wall Area (gross ft2)		Glazing %	Maximum Glazing Fraction Complies
Conditioned Space	8,002	÷	20,727	X 100 =	38 6%	Yes
Semi Conditioned Space		÷		X 100 =		Yes
Conditioned Mechanical Penthouse		÷		X 100 =		Yes

Windows

From Work sheet 3d place the highest Overall Window U factor and highest Center of-Glass SC Or check minimum assembly and identify window

Window (from Worksheet 3d)	Max U Factor[1]	Minimum Assembly
N/A	N/A	☑
U Value Complies	N/A	
Required Minimum Assembly (Fixed Windows)	Double-glazed w/0 5 inch argon-filled space low-e coating < 0 05 thermally broken frame	
Required Mini-mum Assembly (Operable Windows and Curtainwall)	Only use Max U-Factor	

Window (from Worksheet 3d)	Shading Coefficient[2]	Minimum Assembly
#N/A	-	☐
SC Complies	Yes	
Required Minimum Assembly	N/A	

The plans/specs show window compliance in the following locations

Spec

Notes

[1] From Worksheet 3d place the highest Overall Window U factor or check (Minimum Assembly) See 'Window Requirements in table on the following page for specific MA requirements Excel version will automatically insert minimum assembly requirements or greatest U value from Worksheet 3d

[2] From Worksheet 3d place the highest center of glass shading coefficient (SC) for glass or check MA (Minimum Assembly) See 'Window Require ments in following table for specific MA requirements Excel version will automatically insert minimum assembly requirements or greatest SC from Worksheet 3d Shading Coefficient (SC) can be calculated from Solar Heat Gain Coefficient using the equation SC = SHGC ÷ 0 87 Manufacturers data may also be used to document SC

Walls

See instructions for a discussion of wall require-ments

Wall / Insulation Type	R-Value Insulation Only		U-Factor[3]
Frame (wood or metal framing)	13	or	
		or	
		or	
		or	
		or	
		or	

Below-Grade Walls

See instructions for a discussion of requirements

Below-Grade Walls	R-Value Insulation Only (Min R 7 5)		U-Factor[3] (Max 0 11)
N/A		or	

Notes

[3] Submit Worksheet 3a for each calculated assembly U-factor

Form 3b | Project Name: Clark Family Center | Page

PRESCRIPTIVE PATH

Part 2 of 4

Code Requirements - Zone 1

Discussion of these requirements in the instruction section

ZONE 1						
		Wall Requirements			Window Requirements	
Max Glazing Fraction[4]	Wall / Insulation Type	R-Value Insulation Only		U-Factor	Max U-Factor	Max Shading Coefficient
Up to 15%	CMU 'Masonry[5] w/integral loose fill[6] insulation	N/A	or	0 300	0 540[7]	0 57[7]
	Masonry or concrete[5] w/cont exterior insulation	1 4	or	0 300		
Up to 30%	CMU Masonry[5] w/integral rigid[8] fill insulation	N/A	or	0 210	0 540[7]	0 57[7]
	Masonry or concrete[5], w/interior insulation	11	or	0 130		
	Masonry or concrete[5] w/cont exterior insulation	2 8	or	0 210		
	Frame[9] (wood or metal framing)	13	or	0 130		
	Other *(provide short description)*	13	or	0 130		
Up to 40%	CMU Masonry[5] w/integral rigid[8] fill insulation	N/A	or	0 210	0 370[10]	0 35[10]
	Masonry or concrete[5] w/interior insulation	11	or	0 130		
	Masonry or concrete[5] w/cont exterior insulation	2 8	or	0 210		
	Frame[9] (wood or metal framing)	13	or	0 130		
	Other *(provide short description)*	13	or	0 130		

Code Requirements - Zone 2

Discussion of these requirements in the instruction section

ZONE 2						
		Wall Requirements			Window Requirements	
Max Glazing Fraction[4]	Wall / Insulation Type	R-Value Insulation Only		U-Factor	Max U-Factor	Max Shading Coefficient
Up to 15%	CMU 'Masonry[5] w/integral loose fill[6] insulation	N/A	or	0 300	0 500[11]	0 57[11]
	Masonry or concrete[5] w/cont exterior insulation	1 8	or	0 270		
Up to 25%	CMU Masonry[5] w/integral rigid[8] fill insulation	N/A	or	0 160	0 500[11]	0 57[11]
	Masonry or concrete[5] w/interior insulation	13	or	0 090		
	Masonry or concrete[5] w/cont exterior insulation	4 3	or	0 160		
	Frame[9] (wood or metal framing)	19	or	0 090		
	Other *(provide short description)*	19	or	0 090		
Up to 33%	CMU Masonry[5] w/integral rigid[8] fill insulation	N/A	or	0 160	0 370[12]	0 43[12]
	Masonry or concrete[5] w/interior insulation	13	or	0 090		
	Masonry or concrete[5] w/cont exterior insulation	4 3	or	0 160		
	Frame[9] (wood or metal framing)	19	or	0 090		
	Other *(provide short description)*	19	or	0 090		

Notes

[4] The Simplified Trade off Approach must be used if glazing fraction exceeds allowable percentages

[5] Minimum weight of masonry and concrete walls = 45 lb/ft2 of wall face area

[6] All cores to be filled At least 50% of cores must be filled with vermiculite or equivalent fill insulation

[7] Prescriptive MA (Minimum Assembly) - For **Fixed Windows** double-glazed window with a 0 5 inch air space low e coating and aluminum frame MA shading coefficient description is a tinted outboard pane of glass For **Operable Windows or Curtainwall** double glazed window with a 0 5 inch air space low-e coating and thermally broken frame MA shading coefficient description is a tinted outboard pane of glass

[8] All cores except bond beams must contain rigid insulation inserts approved for use in reinforced masonry walls

[9] Batt insulation installed in metal or wood frame walls shall be insulated to the full depth of the cavity up to 6 inches in depth

[10] Prescriptive MA (Minimum Assembly) For **Fixed Windows** double-glazed window with a 0 5 inch argon filled space low-e coating (e<= 0 05) and thermal break frame For **Operable Windows or Curtainwall** only use Max U Factor MA shading coefficient description is a 0 25 inch thick glass with low e coating (e<= 0 05) with a tinted outboard pane

[11] Prescriptive MA (Minimum Assembly) For **Fixed Windows** double glazed window with a 0 5 inch air space low e coating and aluminum frame For **Operable Windows or Curtainwall** double-glazed window with a 0 5 inch air space low-e coating (e <= 0 1) and thermally broken frame MA maximum shading coefficient description is a tinted outboard pane of glass

[12] Prescriptive MA (Minimum Assembly) For **Fixed Windows** a double glazed window with a 0 5 inch argon filled space low e coating (e<= 0 05) and thermal break frame For **Operable Windows or Curtainwall** only use Max U Factor MA shading coefficient description is a 0 25-inch thick glass with low-e coating (e<= 0 05)

PRESCRIPTIVE PATH

Roofs/ Ceilings

See instructions for a dicussion of roofs/ceilings

Roof / Ceiling[11]	R-Value Insulation Only (Min R 19)		U-Factor[12] (Max 0 050)
Roof	19	or	

Notes

[11] Write in a short description for assembly with the lowest insulation R value or the highest assembly U factor

[12] Submit Worksheet 3b for each calculated roof/ceiling assembly U factor

Skylights

Includes glazed smoke vents

See instructions for a dicussion of skylights

	Skylight Area (total rough frame ft2)		Roof Area (gross ft2)		Skylight % [13]	Maximum Skylight Fraction Complies
Conditioned Space	75	÷	12,103	X 100 =	0 6%	Yes
Semi-Conditioned Space		÷		X 100 =		N/A
Conditioned Mechanical Penthouse		÷		X 100 =		N/A
	Skylight Area (total rough frame ft2)		Roof/Ceiling Area (gross ft2)		Skylight Percent[13]	

Skylights

From Worksheet 3d place highest Overall Vertical Window U-factor and highest Center of Glass SC

Skylights (from Worksheet 3d)	Max U-Factor[14]	Minimum Assembly
N/A	N/A	☑
U Value Complies	N/A	
Required Minimum Assembly	Double-glazed with 0 5 inch airspace	

Skylights (from Worksheet 3d)	Shading Coefficient[15]	Minimum Assembly
#N/A	-	N/A
SC Complies	Yes	
Required Minimum Assembly	N/A (must use SC)	

The plans/specs show window compliance in the following locations

Specs

Code Requirements

Compliance Option	Thermal Performance Overall Vertical U Factor	Shading Coefficient Center of Glass SC
Performance	U-1 230 for overall assembly in overhead plane	SC-0 47 center of glass
Min Assembly (MA)	Double glazed 0 5-inch airspace	N/A

Notes

[13] Skylight percentage area is based on total skylight and smoke vent rough frame area divided by total conditioned roof area Percentage must not exceed 6 percent of total roof/ceiling area in conditioned building space The Simplified Trade-off Approach must be used if glazing fraction exceeds allowable percentages

[14] From Worksheet 3d place the highest Overall Vertical U factor or write in MA (Minimum Assembly) See Skylight Requirements in table above for specific MA requirements

[15] From Worksheet 3e place the highest center-of-glass shading coefficient (SC) for glass See Skylight Requirements in table above for specific MA requirements Shading Coefficient (SC) can be calculated from the Solar Heat Gain Coefficient using the equation SC = SHGC ÷ 0 87 Manufacturers data may also be used to document SC

Floors

See instructions for a dicussion of floors

Floors over Unconditioned Spaces[16]	R-Value Insulation Only		U-Factor
Over Parking Garage	11	or	

Heated Concrete Slab Edge	R-Value Insulation Only

Heated Slab-on-Grade (Section 1312 1 2 4)

☐ **Complies** Building plans show insulation extending downward from the top of the slab a minimum distance of 24 inches or downward and under the slab for a combined minimum distance of 24 inches or to the bottom of the thickened edge of the of slabs used as a foundation

The plans/specs show compliance in the following locations

Spec

Notes

[16] Write in a short description for assembly with the lowest insulation R value or the highest assembly U factor

[17] Submit Worksheet 3c for each calculated floor assembly U factor

[18] Write in a short description for Heated Slab which has heat integrated into slab such as hydronic heat If more than one floor type enter the lowest insulation R-value or the highest component U factor of any floor

Code Requirements

Component	Compliance Options: Min R-Value Insulation Only		Max U-Factor
Floor over Unconditioned Spaces	11	or	0 070

Component	Climate Zone 1		Climate Zone 2
Heated Concrete Slab Edge, Min R Value	7 5	or	10 0

Doors

See instructions for a dicussion of doors

Doors[19] opaque with leaf width greater than 4	R-Value Insulation Only (Min R 5)		U-Factor Center-of Panel (Max 0 20)
Doors	5	or	

Notes

[19] Write in a short description for Doors If more than one door type enter the lowest insulation R value or the highest center-of-panel U factor of any door The following doors are exempt from door and window U factor and shading coefficient requirement

Form 4a | Project Name: Clark Family Center | Page

SYSTEMS - GENERAL

Applicability
Discussion of qualifying exceptions on page 4-25

Plans/Specs
Show compliance by including a drawing sheet detail number specification section and subparagraph

1. Applicablity (Section 1317)

Is this form required?

☑ **Form Required** Complete form if a new HVAC system is being installed, or components of an existing HVAC system are being replaced (I e , equipment, controls, ductwork, and insulation)

☐ **Exception** The building or part of the building qualifies for an exception from HVAC code requirements Applicable code exception is Section 1317 1 Portions of the building that qualify

Area _____ Exception ☐-1 ☐-2 ☐-3

Area _____ Exception ☐-1 ☐-2 ☐ 3

Area _____ Exception ☐-1 ☐-2 ☐ 3

☐ **Form Not Required** This project does not contain work required to comply with code

2. Simple or Complex Systems (Section 1317.9 or 1317 10)

☑ **Simple System** Building contains only Simple HVAC System(s) Complete this form (4a) and equipment efficiency worksheets as required Form 4b is not required

☐ **Complex System** Project includes a Complex System Complete this form (4a), form 4b and equipment efficiency worksheets as required

3. Equipment Performance (Section 1317.5)

☐ **No New HVAC Equipment** The building plans do not call for new electrical HVAC equipment, combustion heating equipment, or heat-operated cooling equipment

☑ **Complies** All new HVAC equipment have efficiencies not less than those required by code

The following equipment efficiency worksheets are attached

☑ -4a ☐ -4b ☐ -4c ☐ -4d ☐ -4e ☐ -4f ☐ -4g ☐ -4h ☐ -4i ☑ -4j

4. Duct Insulation and Sealing (Sections 1317.7 & 1317.8)

☐ **No Ducts** The building plans and specifications do not call for new HVAC ducts or plenums

☑ **Complies** The plans and specifications call for all air-handling ducts and plenums to be insulated and sealed as required by Sections 1317 7 &1317 8

5. Distribution Transformers (Section 1316.1)

☑ **No Distribution Transformers** The plans/specs do not call for new distribution transformers

☐ **Complies** All new distribution transformers comply with efficiency, testing, and labeling requirements of Section 1316 1 1

☐ **Exception** The project qualifies for an exception per Section 1316 1 1, Exceptiion

☐-1 ☐-2 ☐ 3 ☐-4 ☐-5 ☐-6 ☐-7 ☐-8 ☐-9 ☐-10 ☐-11 ☐-12 ☐-13 ☐-14

Attach relevant documentation for appropriate exception The plans/specs show compliance in the following locations

SYSTEMS - GENERAL

6. HVAC Controls (Section 1317.4)

6.1 System Thermostat/Zone Controls (Section 1317.4.1)

☑ **Complies** All new HVAC systems include at least one temperature control device responding to temperatures within the zones

☐ **Exception** HVAC system qualifies for an exception from zone control requirements
The applicable code exception is Section 1317 4 2, Exception ☐-1 ☐-2

Portions of the building that qualify

The plans/specs show compliance in the following locations

6.2 Off-hour Controls - Auto Setback or Shutdown (Section 1317.4.3)

☑ **Complies** Systems must have **at least one** of the following features

☐ **Control Setback Complies** Each system is equipped with automatic control capable of reducing energy through control setback during periods of non-use or alternate use of spaces served

☐ **Equipment Shutdown Complies** Each system is equipped with controls capable of reducing energy use through automatic shutdown during periods of non-use or alternate use of spaces

HVAC systems with equipment shutdown are equipped with at least one of the following

- ☐ Programmable controls (1317 4 3 1 (1))
- ☐ Occupant sensor (1317 4 3 1 (2))
- ☐ Interlocked to a security system (1317 4 3 1 (3))
- ☐ Manually activated timers with 2-hour operation max (1317 4 3 1 (4))

☐ **Exception** The building qualifies for an exception to the requirement for automatic setback or shutdown controls
The applicable code exception is Section 1317 4 3

Exception ☐-1 ☐-2

The plans/specs show compliance in the following locations

6.3 Control Capabilities (Sec. 1317.4.2.1)

☑ **Complies** Zone thermostats are capable of being set to the temperatures described in Sec 1317 4 2 1 Where used to control both heating and cooling, zone controls shall be capable of providing a temperature range or deadband of at least 5 degrees F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum

☐ **Exception** The building qualifies for an exception to the deadband requirements
The applicable code exception is Section 1317 4 2 1 Exception ☐-1 ☐-2

Portions of the building that qualify

The plans/specs show compliance in the following locations

6.4 Optimum Start Controls (Section 1317.4 3.2)

☑ **Complies** Separate HVAC systems have controls capable of varying start-up time of system to just meet temperature set point at time of occupancy

☐ **Exception** HVAC systems have a design supply air capacity not exceeding 10,000 cfm
The plans/specs show compliance in the following locations

6.5 Heat Pump Controls (Section 1317.4.4)

☑ **No Heat Pump** The plans/specs do not call for a new heat pump

☐ **Complies** All new heat pumps equipped with supplementary heaters are controlled to minimize the use of supplemental heat as defined in Section 1317 4 4

The plans/specs show compliance in the following locations

SYSTEMS - GENERAL

7. Economizer Cooling (Section 1317.3)

☐ **No Cooling** The building plans do not call for a new fan system with mechanical cooling

☑ **Complies** Each new fan system has an air economizer capable of modulating outside-air and return-air dampers to provide up to 100 percent of the design supply air as outside air

☐ **Exception** At least one new fan system qualifies for an exception The applicable code exception is Section 1317 3, Exception ☐-1 ☐-2 ☐-3 ☐-4 ☐-5 ☐-6 ☐-7

If Exception 3 is selected complete the following

(a) Total cooling capacity of exempt units (Btu/hr)

(b) Total installed building cooling capacity (Btu/hr)

☐ **Complies** Sum of exempt units rated at less than 54,000 Btu/hr is <240,000 Btu/hr or a/b < 0 10 (10% of total building cooling capacity)

Unit Identifier of exempt units

The plans/specs show compliance in the following locations

8. Economizer Pressure Relief & Integration (Section 1317 3.1 and 1317.3.2)

☐ **No Economizers Required** Project does not contain a new fan system requiring economizers

☑ **Overpressurization Complies** The drawings specifically identify a pressure relief mechanism for each fan system that will relieve the extra air introduced by the economizer

☐ **Integration Complies** Economizer is capable of providing partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load

☐ **Exception** The applicable exception is Section 1317 3 2, Exception ☐-1 ☐-2

The plans/specs show compliance in the following locations

9. Hot Gas Bypass (Section 1317.5)

☑ **No Hot Gas Bypass**

☐ **Complies** See allowable amount of hot gas bypass as a percentage of total cooling capacity in table below

Unit ID	Rated Cooling Capacity	Hot Gas Bypass Capacity

Allowable Hot Gas Bypass	
Rated Cooling Capacity	Max Hot Gas Bypass Capacity
≤240,000 Btu/hr	50%
>240,000 Btu/hr	25%

☐ **Exception** Unitary packaged system with cooling capacity no greater than 90,000 Btu/h

SYSTEMS - GENERAL

10. Shutoff Dampers (1317.4.3.3)

☐ **Not Required** Shutoff dampers are not required on this project

☑ **Complies** Each outdoor air supply & exhaust system shall be equipped with motorized dampers

☐ **Exception** The building qualifies for an exception to the motorized damper requirement The applicable code exception is Section 1317 4 3 3 Exception ☐-1 ☐ 2 ☐-3 ☐ 4 ☐ 5 ☐-6

The plans/specs show compliance in the following locations

10.1. Shutoff Damper Controls (Section 1317.4.3.3.1)

☑ **Complies** Outdoor air supply and exhaust systems shall be provided dampers that automatically shut when systems or spaces served are not in use or during building warm-up, cooldown, or setback

☐ **Complies** Stair and shaft vents are capable of being automatically closed during normal building operation and interlocked to open as required by fire and smoke detection systems

The plans/specs show compliance in the following locations

10.2. Motorized Damper Leakage (1317.4.3 3.2)

☑ **Complies** Motorized outdoor air supply and exhaust air dampers have a maximum leakage rate of 4 cfm/ft2 at 1 0 in w g when tested in accordance with AMCA Standard 500-1998

☐ **Exception** Packaged HVAC equipment may have maximum leakage rate of 20 cfm/ft^2 at 1 0 in w g when tested in accordance with AMCA Standard 500–1998

The plans/specs show compliance in the following locations

11. Piping Insulation (Section 1314)

☑ **No New Piping** The building plans and specifications do not call for new piping serving a heating or cooling system or part of a circulating service water heating system

☐ **Complies** All new piping serving a heating or cooling system or part of a circulating service water heating system complies with the requirements of the Code, Section 1314 1

☐ **Exception** New piping qualifies for exception Section 1314 1, Exception ☐-1 ☐ 2

12. Occupancy Ventilation

☑ **Complies** Mechanical ventilation systems provide the required amount of ventilation is indicated in plans/specifications as specified in Chapter 4 of the Oregon Mechanical Specialty Code

☐ **Complies** Natural ventilation systems provide required amount of ventilation as certified by a reg-istered architect or engineer as specified by Section1203 4 1, Exception Attach worksheet 4m

The plans/specs show compliance in the following locations

The plans/specs show compliance on the following pages

SYSTEMS - GENERAL

13. High Occupancy Ventilation (Section 1317.2.2)

☑ **Complies** HVAC systems with ventilation air capacities of 1,500 CFM or greater that serve areas having an average occupant load of 20 square feet per person or less from Table 1004 1 2 have a means to automatically reduce outside air intake

Identify applicable systems

Plans/specs indicate where equipment (i e carbon dioxide sensor) and sequence is specified

☐ **Exception** HVAC systems are equipped with an energy recovery device with at least 50% recovery effectiveness

☐ **No High Occupancy Systems** Project does not contain an HVAC system as described above

14. Exhaust Air Heat Recovery (Section 1318.3)

☑ **Not Regulated** HVAC system does not have 1) design supply air cap of ≥10,000 cfm, **and** 2) min outside air supply ≥70%, **and** 3) at least 1 exhaust fan rated at 75% of min outside air supply

☐ **Complies** Heat recovery system increases outside air temperature by 20°F (Climte Zone 1) or 30°F (Zone 2) and has provision to provide bypass during air economizer mode

☐ **Exception** An HVAC system qualifies for an exception to this requirement Applicable exception from Section 1318 3 Exception ☐-1 ☐ 2 ☐-3 ☐-4 ☐-5 ☐ 6 ☐-7

The plans/specs show compliance in the following locations

15. Large Volume Fan Systems (Section 1318.4.2.4)

☐ **Not Regulated** The building plans or specifications do not call for fan systems over 15,000 CFM that serve a single zone and function for the purpose of temperature control

☑ **Complies** Fan systems are equipped with variable frequency drive or two speed motor to reduce airflow as required by Section 1318 4 2 3

The plans/specs show compliance in the following locations

16. Variable Speed Drives (Section 1317.10 3 1)

☐ **Not Regulated** The building plans or specifications do not call for fan and pump motors 10 horsepower and greater that serve variable-flow air or liquid systems

☑ **Complies** All fan and pump motors 10 hp and greater which serve variable-flow air or liquid systems are controlled by a variable-speed drive

☐ **Exception** The building qualifies for an exception to the variable-speed drive requirement

Portions of the building that qualify

Applicable code exception is Section 1317 10 3 1, Exception

The plans/specs show compliance in the following locations

17. Service Water Heating (Sec. 1315)

☐ **No New Water Heating** The building plans and specifications do not call for new water heaters, hot water storage tanks or service hot water distribution systems

☑ **Complies** All new water heaters, hot water storage tanks or service hot water distribution systems comply with the requirements of the Section 1315

☐ **Exception** The applicable code exception is Section Exception

Portions of the building that qualify

The plans/specs show compliance in the following locations

SYSTEMS - GENERAL

18. Swimming Pools, Spas and Hot Tubs (Section 1315.5)

☑ **No New Pools** The building plans and specifications do not call for new, swimming pools, spas or hot tubs

☐ **On/Off Controls Complies** Spa and hot tub heaters are equipped with a readily accessible ON/OFF switch as required by Section 1315 5 1

☐ **Ventilation Controls Complies** Pool ventilation system is controlled based on humidity

☐ **Cover Complies** All heated pools, hot tubs and spas are equipped with a cover

☐ **Heat Recovery Complies** Pools, Spas, and hot tubs, over 200 ft^2 utilize recovered heat as required by Section 1315 5 3

- ☐ **Exception** Heat recovery is not necessary as pool is heated by renewable energy or waste heat recovery sources capable of providing at least 70 percent of the heating energy required over an operating season

19. Fume Hoods (Section 1317.2.1.)

☐ **No Fume Hoods** The building plans do not call for fume hood systems that have a total exhaust rate greater than 15,000 cfm

☑ **Complies** Fume hood systems have **at least one** of the following features

- ☐ Variable air volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50% or less of design values
- ☑ Direct makeup (auxiliary) air supply equal to at least 75% of the exhaust rate, heated no warmer than 2° F below room set point, cooled no cooler than 3° F above room set point, no humidification added, and no simultaneous heating and cooling used for dehumidification control
- ☐ Heat recovery systems to precondition makeup air from fume hood exhaust in accordance with 1318 3 - Exhaust Air Energy Recovery, without using any exception

The plans/specs show compliance in the following locations

20. Parking Garage Ventilation (Section 1317.2.3)

☐ **No Enclosed Garages** The building plans and specifications do not call for enclosed Group S-2 parking garages with a ventilation exhaust rate greater than 30,000 CFM

☑ **Complies** The plans and specifications call for carbon monoxide sensing devices as required by Section 1317 2 3

☐ **Exception** Open parking garages

21. Kitchen Hoods (Section 1317.11)

☐ **Not Regulated** The plans/specs do not call for any new kitchen hoods with exhaust capacity greater than 5,000 cfm each

☑ **Complies** All new kitchen hoods with a total exhaust capacity greater than 5,000 cfm have at least 50 percent of the required makeup air, (a) unheated or heated to no more than 60°F, and (b) uncooled or evaporatively cooled

The plans/specs show compliance in the following locations

22. Outside Heating Systems (Section 1317.12)

☑ **No Outside Heating Systems** The plans/specs do not call for new permanently installed heating systems outside the building

☐ **Complies** All new permanently installed outside heating systems are radiant gas fired systems controlled by an occupancy sensor or timer switch as required by Section 1317 12

Worksheet 4a | Project Name **Clark Family Center** | Page

UNITARY AIR CONDITIONER - AIR COOLED

Equipment

Discussion of equipment ratings and equipment definitions on page 4-19

(a) Equip ID	(b) Model Designation	(c) Cooling Capacity (Btu/h)	(d) Proposed Performance: Steady State	(d) Proposed Performance: Seasonal or Part Load	(e) Compliance Schedule (A-E)	(f) New or Replacemnt? *
RTU-1	Trane Intellapak II	1560000	9 7	11 2	c	n
CU-1	Mitsubishi PUY	36000	13		a	n
CU-2	Mitsubishi PUY	18000	13		a	n
CU-3	Mitsubishi MU	8000	13		a	n
CU-4	Mitsubishi MU	8000	13		a	n
CU-5	Mitsubishi MU	8000	13		a	n
CU-6	Mitsubishi PUY	24000	13		a	n
CU-7	Carrier HDR	48000	13		c	n

Required Document-ation

Indicate source of information

- ☐ ARI Unitary Directory Section AC page
- ☐ ARI Applied Products directory Section ULE page
- ☑ Product data (Attach data furnished by the equipment supplier I e cut sheets)

Code Required Efficiencies

This schedule of equip ment efficiencies was reformatted from code Table 13 L

Compliance Schedule	Equipment Type		Cooling Capacity (btu/hr): Over	Cooling Capacity (btu/hr): But not over -	Minimum Rating: Steady State	Minimum Rating: Seasonal or Part Load
A	Single Package Without a Heating Section or With Electric Resistance Heat	New *	0	65 000	na	13 SEER
		Replacement *	0	65,000	na	9 7 SEER
		All	65 000	135 000	10 3 EER	n/a
			135 000	240 000	9 7 EER	n/a
			240 000	760 000	9 5 EER	9 7 IPLV
			760 000	-	9 2 EER	9 4 IPLV
B	Split System Without a Heating Section or With Electric Resistance Heat	New *	0	65 000	na	13 SEER
		Replacement *	0	65 000	na	10 SEER
		All	65 000	135 000	10 3 EER	n/a
			135 000	240 000	9 7 EER	n/a
			240 000	760 000	9 5 EER	9 5 IPLV
			760 000	-	9 2 EER	9 2 IPLV
C	Single Package With a Heating Section Other Than Electric Resistance	New *	0	65 000	na	13 SEER
		Replacement *	0	65 000	na	9 7 SEER
		All	65 000	135 000	10 1 EER	n/a
			135 000	240 000	9 5 EER	n/a
			240 000	760 000	9 3 EER	9 5 IPLV
			760 000	-	9 0 EER	9 2 IPLV
D	Split System With a Heating Section Other Than Electric Resistance	New *	0	65 000	na	13 SEER
		Replacement *	0	65 000	na	10 SEER
		All	65 000	135 000	10 1 EER	n/a
			135 000	240 000	9 5 EER	n/a
			240 000	760 000	9 3 EER	9 7 IPLV
			760 000	-	9 0 EER	9 4 IPLV
E	Condensing Unit Only	All	135 000	-	10 1 EER	11 2 IPLV

* Equipment is a new installation or replaces existing equipment

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FURNACE & UNIT HEATERS - GAS & OIL-FIRED

Equipment

Discussion of equip-ment ratings and equipment definitions on page 4-19

(a) Equip ID	(b) Model Designation	(c) Heating Capacity (Btu/hr)	(d) Proposed Minimum E_C (%)	(d) Proposed Minimum E_T (%)	(d) Proposed Minimum AFUE (%)	(e) Compliance Schedule (A-E)
RTU-1	Trane Intellapak II	1,880,000		80		a
MUA-1	Trane GRAA	350,000		80		a
F-1	Carrier MVB	80,000			92	a

Required Document-ation

Indicate source of information

☐ GAMA Consumer Directory page(s)

☑ Product data (Attach data furnished by the equipment supplier, I e "cut sheets')

Code Required Efficiencies

This schedule of equip-ment efficiencies was reformatted from code Table 13-P

Compliance Schedule	Equipment Type	Capacity (Btu/hr) Over	But not over	Minimum Efficiency
A	Gas Fired Warm-Air Furnaces & Combustion Furnace/AC	0	225 000	78% AFUE or 80% E_t
		225,000	-	80% E_c
B	Oil-Fired Warm-Air Furnaces & Combustion Furnace/AC	0	225 000	78% AFUE or 80% E_t
		225 000	-	81% E_t
C	Gas Fired Duct Furnaces	ALL		80% E_c
D	Gas Fired Unit Heaters	ALL		80% E_c
E	Oil-Fired Unit Heaters	ALL		80% E_c

COMBINATION RATINGS (CONT.)

38HDR

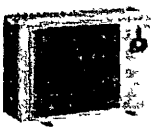
UNIT SIZE – SERIES	INDOOR MODEL	TOTAL CAP BTUH	FACTORY SUPPLIED ENHANCEMENT	SEER		EER	FURNACE MODEL
				STANDARD RATING	TDR†		
036	CNPH*4221A**	33,400	TDR&TXV	14 00		11 50	58MVB040–14
	CNPH*4221A**	33,400	TDR&TXV	14 00		11 50	58MVB060–14
	CNPH*4221A**	33 400	TDR&TXV	14 00		11 50	58MVB080–14
	CNPH*4221A**	33 400	TDR&TXV	14 00		11 50	58MVB080–20
	CNPH*4221A**	33 400	TDR&TXV	14 00		11 50	58MVB100–20
	CNPH*4221A**	33 400	TDR&TXV	14 50		11 50	58MVB120–20
	CNPH*4221A**	33 400	TXV		13 00	11 00	
	CNPV*3617A**	33 000	TDR&TXV	14 00		11 50	58CV(A X)070–12
	CNPV*3617A**	33 000	TDR&TXV	13 50		11 50	58CV(A X)090–16
	CNPV*3617A**	33 000	TDR&TXV	13 50		11 50	58MVB060–14
	CNPV*3617A**	33 000	TXV		13 00	11 00	
	CNPV*3621A**	33 000	TDR&TXV	14 50		11 50	58CV(A X)090–16
	CNPV*3621A**	33 000	TDR&TXV	13 50		11 50	58CV(A X)110–20
	CNPV*3621A**	33 000	TDR&TXV	14 50		11 50	58MVB060–14
	CNPV*3621A**	33 000	TDR&TXV	13 50		11 50	58MVB080–14
	CNPV*3621A**	33 000	TDR&TXV	13 50		11 50	58MVB080–20
	CNPV*3621A**	33 000	TDR&TXV	13 50		11 50	58MVB100–20
	CNPV*3621A**	33 000	TXV		13 00	11 00	
	CNPV*4221A**	33 400	TDR&TXV	14 50		11 50	58CV(A X)090–16
	CNPV*4221A**	33,400	TDR&TXV	14 50		11 50	58CV(A X)110–20
	CNPV*4221A**	33 400	TDR&TXV	14 50		11 50	58MVB060–14
	CNPV*4221A**	33,400	TDR&TXV	14 00		11 50	58MVB080–14
	CNPV*4221A**	33 400	TDR&TXV	14 00		11 50	58MVB080–20
	CNPV*4221A**	33 400	TDR&TXV	14 00		11 50	58MVB100–20
	CSPH*3612A**	33 000	TDR&TXV	14 00		11 50	58CV(A,X)070–12
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58CV(A X)090–16
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58CV(A X)110–20
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58CV(A X)135–22
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58CV(A X)155–22
	CSPH*3612A**	33 000	TDR&TXV	14 00		11 50	58MVB040–14
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58MVB060–14
	CSPH*3612A**	33 000	TDR&TXV	14 00		11 50	58MVB080–14
	CSPH*3612A**	33 000	TDR&TXV	14 00		11 50	58MVB080–20
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58MVB100–20
	CSPH*3612A**	33 000	TDR&TXV	14 50		11 50	58MVB120–20
	CSPH*3612A**	33 000	TXV		13 00	11 00	
	CSPH*4212A**	33,400	TDR&TXV	14 00		11 50	58CV(A X)070–12
	CSPH*4212A**	33 400	TDR&TXV	14 50		11 50	58CV(A X)090–16
	CSPH*4212A**	33 400	TDR&TXV	14 50		11 50	58CV(A X)110–20
	CSPH*4212A**	33 400	TDR&TXV	14 50		11 50	58CV(A X)135–22
	CSPH*4212A**	33 400	TDR&TXV	14 50		11 50	58CV(A X)155–22
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB040–14
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB060–14
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB080–14
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB080–20
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB100–20
	CSPH*4212A**	33 400	TDR&TXV	14 00		11 50	58MVB120–20
	CSPH*4212A**	33 400	TXV		13 00	11 00	
	FE4AN(B F)003	33 000	TDR&TXV	14 00		11 50	
	FE4AN(B F)005	33 400	TDR&TXV	15 00		12 50	
	FE4ANB006	33 400	TDR&TXV	15 00		12 50	
	FE4ANF002	33 000	TDR&TXV	13 50		11 50	
	FF1ENP036	33 000	TDR&TXV	13 00		11 00	
	FV4BN(B F)003	33 000	TDR&TXV	14 00		11 50	
	FV4BN(B,F)005	33 400	TDR&TXV	15 00		12 50	
	FV4BNB006	33,400	TDR&TXV	15 00		12 50	
	FV4BNF002	33 000	TDR&TXV	13 50		11 50	
	FX4CN(B F)036	33 000	TDR&TXV	14 00		11 50	
	FX4CN(B F)042	33 400	TDR&TXV	14 00		11 50	
	FY4ANF036	33 000	TDR&TXV	13 00		11 00	
	FY4ANF042	33,400	TDR&TXV	13 00		11 00	
	40QAC036	33 000	TXV		13 00	11 40	
048	*CNPV*4821A**	47 000	TXV		13 00	11 00	
	CAP**4817A**	46 000	TDR&TXV	13 50		11 50	58CV(A X)090–16
	CAP**4817A**	46 000	TXV		13 00	11 00	
	CAP**4821A**	47 000	TDR&TXV	13 50		11 50	58CV(A X)090–16
	CAP**4821A**	47 000	TDR&TXV	13 50		11 50	58CV(A X)110–20
	CAP**4821A**	47 000	TDR&TXV	13 50		11 50	58MVB080–20
	CAP**4821A**	47,000	TDR&TXV	13 50		11 50	58MVB100–20
	CAP**4821A**	47 000	TXV		13 00	11 00	

See notes on pg 14

SPECIFICATIONS FOR MS/MSY COOLING-ONLY

M-SERIES (R410A)

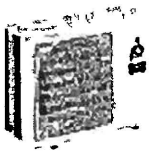
INVERTER



Model Name	Indoor Unit / Outdoor Unit		MS-A09WA / MU-A09WA	MS-A12WA / MU-A12WA	MSY-A15NA / MUY-A15NA	MSY-A17NA / MUY-A17NA	MSY-A24NA / MUY-A24NA
Cooling *1	Rated Capacity	Btu/h	9 500	12 000	15 000	16 200	22 000
	Capacity Range	Btu/h			3 100 15 000	3 100 16 200	4 400 22 000
	Total Input	W	870	1 070	1 690 (210 1 690)	2 070 (210 2,070)	2,850 (290 2,850)
	Energy Efficiency	SEER	13		16		
	Moisture Removal	Pints/h	2 7	3 2	4 7	5 1	7 3
	Sensible Heat Factor		0 68	0 70	0 65	0 65	0 63
Power supply	Phase, Cycle, Voltage		1 Phase 60Hz 115V		1 Phase, 60Hz 208/230V		
Voltage	Indoor Outdoor S1 S2		AC 115V		AC 208/230V		
	Indoor Outdoor S2 S3		DC12 24V				
	Indoor Remote Controller		Wireless Type		Wireless Type (Optional Wired Controller DC12V)		
Indoor Unit	MCA	A	1 2		1 0		
	Max Fuse Size	(Time Delay) A	15				
	Fan Motor	F L A	0 95		0 76		
	Airflow (Lo Med Hi)	DRY (CFM)	183 261 335	222 286 406	268 328 381		296 431 568
		WET (CFM)	162 233 300	198 254 363	240 293-342		265 385 508
	Sound Level (Lo Med Hi)	dB(A)	26 32 42	33 38 46	34 40 45	34 40 46	34 40 49
	External Finish Color		Munsell 1 0Y 9 2/0 2				
	Dimension Unit	W inch	30 11/16				43 5/16
		D inch	8 1/4				10 1/4
		H inch	11 3/4				12 13/16
	Weight Unit	lbs	23				37
	Field Drain Pipe Size O D	inch	5/8				5/8
Outdoor Unit	MCA	A	14	16	14		17
	Max Fuse Size	(Time Delay) A	15	20	15		20
	Fan Motor	F L A	0 63	0 93	0 52		0 93
	Compressor	Model (Type)	RN092WHDHT	RN110WHDHT	SNB130FPDH		
		R L.A	9 3	10 82	10 1		
		L.R.A	47	56'	12		16
	Airflow	CFM	1 083	1 327	1 249		1 729
	Refrigerant Control		Capillary Tube		Linear Expansion Valve		
	Sound Level at Cooling *1	dB(A)	47	52	50	52	55
	External Finish Color		Munsell 3Y 7 8/1 1				
	Dimensions	W inch	31 1/2	33 7/16	31 1/2		33 1/16
		D inch	11 1/4	11 7/16	11 1/4		13
		H inch	21 5/8	23 13/16	21 5/8		33 7/16
	Weight	lbs	78	96	88		128
Remote Controller	Type		Wireless Remote		Wireless Remote (Optional Wired Controller)		
Refrigerant	Type		R410A				
	Charge	lbs , oz	2 5	3 1	2 7	2, 7	4
	Oil	Type (fl oz)	NE022 (10 8)		NE022 (15 2)		
Refrigerant Pipe	Gas Side O D	inch	3/8	1/2	1/2		5/8
	Liquid Side O D		1/4		1/4		1/4
	Height (Max)	feet	35		40		50
	Length (Max)		65		65		100
Connection Method	Indoor/Outdoor		Flared/Flared				

NOTES Test conditions are based on ARI 210/240
*1 Rating conditions (cooling) - Indoor 80° FDB, 67° FWB, Outdoor 95° FDB, (75° FWB)
Specifications are subject to change without notice

LIMITED WARRANTY | Six-year warranty on compressor One-year warranty on parts



SPECIFICATIONS FOR PKA COOLING-ONLY
P-SERIES (R410A)

INVERTER

R410A

GA/FA = Wired controller
GAL/FAL = Wireless controller
BS = Seacoast Protection

Model Name	Indoor Unit		PKA-A12GA PKA-A12GAL	PKA-A18GA PKA-A18GAL	PKA-A24FA PKA-A24FAL	PKA-A30FA PKA-A30FAL	PKA-A36FA PKA-A36FAL
	Outdoor Unit		PUY-A12NHA PUY-A12NHA-BS	PUY-A18NHA PUY-A18NHA-BS	PUY-A24NHA PUY-A24NHA-BS	PUY-A30NHA PUY-A30NHA-BS	PUY-A36NHA PUY-A36NHA-BS
Cooling *1	Rated Capacity	Btu/h	12,000	18,000	24,000	30,000	34,200
	Capacity Range	Btu/h	6,000-12,000	8,000-18,000	12,000-24,000	12,000-30,000	12,000-34,200
	Total Input	W	1,210	2 240	2,650	4,400	5,030
	Energy Efficiency	SEER	13 8	14 1	13 5	13	13 1
	Moisture Removal	Pints/h	1 5	4 8	4 7	8 1	7 1
	Sensible Heat Factor		0 86	0 7	0 78	0 7	0 77
Power supply	Phase, Cycle, Voltage		1 Phase, 60Hz, 208/230V				
	Breaker Size	A	15		25	30	
Voltage	Indoor - Outdoor S1-S2		AC 208/230V				
	Indoor - Outdoor S2-S3		DC24V				
	Indoor - Remote Controller		DC12V Wired Type (GA/FA)				
	Indoor - Remote Controller		Wireless Type (GAL/FAL)				
Indoor Unit	MCA	A	1				
	MOCP	A	15				
	Fan Motor	F L A	0 33		0 43		0 52
	Fan Motor Output	W	30		45		70
	Airflow (Lo-M1-M2-Hi)	DRY (CFM)	320-350-390-425		530-705 (Lo-Hi)		780-990 (Lo-Hi)
		WET (CFM)	290-315-350-380		480-635 (Lo-Hi)		700-890 (Lo-Hi)
	Sound Level (Lo-M1-M2-Hi)	dB(A)	36-38-41-43		39-45 (Lo-Hi)		46-49 (Lo-Hi)
	External Finish Color		Munsell 0 70Y 8 59/0 97		Munsell 3 4Y 7 7/0 8		
	Dimension Unit	W inch	39		55-1/8		66-1/8
		D inch	9-1/4				
		H inch	13-3/8				
	Weight Unit	lbs	35		53		62
	Field Drain Pipe Size I D	inch	13/16				
Outdoor Unit	MCA	A	13		18	25	
	MOCP	A	15	20	30	40	
	Fan Motor	F L A	0 35		0 75		
	Fan Motor Output	W	40		75		
	Compressor		SNB130FPBM1		TNB220FLDM		
		R L A	12				
		L R A	14			17 5	
	Airflow	CFM	1 200		1,940		
	Refrigerant Control		Linear Expansion Valve				
	Sound Level at Cooling *1	dB(A)	46		48		
	External Finish Color		Munsell 3Y 7 8/1 1				
	Dimensions	W inch	31-1/2		37-3/8		
		D inch	13 + 7/8		13 + 1-3/16		
		H inch	23-5/8		37-1/8		
	Weight	lbs	90	97	163		
Remote Controller			Located with Indoor Unit (GA/FA = Wired, GAL/FAL = Wireless)				
Refrigerant	Type		R410A				
	Charge	lbs , oz	2 lbs 14 oz	3 lbs 12 oz	6 lbs		
	Oil	Type (fl oz)	MEL56 (20)		MEL56 (28)		
Refrigerant Pipe	Gas Side O D	inch	1/2		5/8		
	Liquid Side O D	inch	1/4		3/8		
Refrigerant Pipe Length	Height Difference		Max 100 ft				
	Length		Max 100 ft		Max 165 ft		
Connection Method			Flared				

NOTES
*1 Rating conditions (cooling)-Indoor D B 26 7° C (80° F), W B 19 4° C (67° F) Outdoor D B 35° C (95° F), W B 23 9° C (75° F)
Specifications are subject to change without notice

LIMITED WARRANTY | Six-year warranty on compressor One-year warranty on parts

Performance Adjustment Factors

Table PAF 1 — Correction Factors for Altitude

	Altitude (Feet)												
	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
Temp	Barometric Pressure (In Hg)												
F	39 92	29 38	28 86	28 33	27 82	27 31	26 82	26 32	25 84	25 36	24 9	24 43	29 98
40	0 79	0 81	0 82	0 84	0 85	0 87	0 88	0 90	0 92	0 93	0 95	0 97	0 99
0	0 87	0 88	0 90	0 92	0 93	0 95	0 97	0 99	1 00	1 02	1 04	1 06	1 08
40	0 94	0 96	0 98	1 00	1 01	1 03	1 05	1 07	1 09	1 11	1 13	1 16	1 18
70	1 00	1 02	1 04	1 06	1 08	1 10	1 12	1 14	1 16	1 18	1 20	1 22	1 25
80	1 02	1 04	1 06	1 08	1 10	1 12	1 14	1 16	1 18	1 20	1 22	1 25	1 27
100	1 06	1 08	1 10	1 12	1 14	1 16	1 18	1 20	1 22	1 25	1 27	1 29	1 32
120	1 90	1 11	1 13	1 16	1 18	1 20	1 22	1 24	1 27	1 29	1 31	1 34	1 37

1 Actual ESP = Duct ESP x Factor – Accs SP
2 Actual BHP = Cat BHP – Factor
3 Correct BTUH Input = Catalog BTUH Input – Factor
4 Corrected BTUH Output = Corrected BTUH Input x Efficiency

Performance Data

Table PD-1 — Rooftop Gas Duct Furnace Performance Data — Arrangement A

Capacity 10 12 Furnace Type A B/C D Rooftop Arrangement "A	Input Rating BTU/Hr (kW)	Output Rating BTU/Hr (kW)	Eff %	Temp Rise Deg F (Deg C) Min	Temp Rise Deg F (Deg C) Max	CFM (cu m/s) Min	CFM (cu m/s) Max	Pressure Drop in of Water (kPa) Min	Pressure Drop in of Water (kPa) Max	Nat Gas Inlet in	L P Gas Inlet in
10 A/B	100 000	80 000	80	20	60	1 235	3 704	0 15	1 10	1/2	1/2
	(29 3)	(23 4)		(11)	(33)	(0 583)	(1 748)	(0 04)	(0 27)		
15 A/B	150 000	120 000	80	20	60	1 852	5 556	0 15	1 00	1/2	1/2
	(43 9)	(35 1)		(11)	(33)	(0 874)	(2 622)	(0 04)	(0 25)		
20 A/B	200 000	160 000	80	20	60	2 469	7 407	0 15	1 05	1/2	1/2
	(58 6)	(46 9)		(11)	(33)	(1 165)	(3 496)	(0 04)	(0 26)		
25 A/B	250 000	200 000	80	20	60	3 086	9 259	0 15	1 08	3/4	1/2 OR 3/4
	(73 2)	(58 6)		(11)	(33)	(1 457)	(4 370)	(0 04)	(0 27)		
30 A/B	300 000	240 000	80	20	60	3 704	11 111	0 15	1 10	3/4	1/2 OR 3/4
	(87 8)	(70 3)		(11)	(33)	(1 748)	(5 244)	(0 04)	(0 27)		
35 A/B	350 000	280 000	80	20	60	4 321	12 963	0 15	1 11	3/4	1/2 OR 3/4
	(102 5)	(82 0)		(11)	(33)	(2 040)	(6 119)	(0 04)	(0 28)		
40 A/B	400 000	320 000	80	20	60	4 938	14 815	0 15	1 12	3/4	1/2 OR 3/4
	(117 1)	(93 7)		(11)	(33)	(2 331)	(6 993)	(0 04)	(0 28)		
50 A/B	500 000	400 000	80	40	120	3 086	9 269	0 30	2 16	3/4	1/2 OR 3/4
	(146 4)	(117 1)		(22)	(67)	(1 457)	(4 375)	(0 07)	(0 54)		
60 A/B	600 000	480 000	80	40	120	3 704	11 111	0 30	2 20	3/4	1/2 OR 3/4
	(175 7)	(140 6)		(22)	(67)	(1 748)	(5 244)	(0 07)	(0 55)		
70 A/B	700 000	560 000	80	40	120	4 321	12 963	0 30	2 22	3/4	1/2 OR 3/4
	(205 0)	(164 0)		(22)	(67)	(2 040)	(6 119)	(0 07)	(0 55)		
80 A/B	800 000	640 000	80	40	120	4 938	14 815	0 30	2 24	3/4	1/2 OR 3/4
	(234 3)	(187 4)		(22)	(67)	(2 331)	(6 993)	(0 07)	(0 56)		
12 A/B	1 200 000	960 000	80	60	180	4 938	14 815	0 45	3 36	3/4	1/2 OR 3/4
	(351 4)	(281 1)		(33)	(100)	(2 331)	(6 993)	(0 11)	(0 84)		
10 C/D	100 000	79 000	79	30	90	823	2 469	0 10	0 88	1/2	1/2
	(29 3)	(23 1)		(17)	(50)	(0 388)	(1 165)	(0 02)	(0 22)		
15 C/D	150 000	118 500	79	30	90	1 219	3 657	0 10	0 78	1/2	1/2
	(43 9)	(34 7)		(17)	(50)	(0 575)	(1 726)	(0 02)	(0 19)		
20 C/D	200 000	158 000	79	30	90	1 626	4 876	0 10	0 81	1/2	1/2
	(58 6)	(46 3)		(17)	(50)	(0 767)	(2 301)	(0 02)	(0 20)		
25 C/D	250 000	197 500	79	30	90	2 032	6 096	0 10	0 85	3/4	1/2 OR 3/4
	(73 2)	(57 8)		(17)	(50)	(0 959)	(2 877)	(0 02)	(0 21)		
30 C/D	300 000	237 000	79	30	90	2 438	7 315	0 10	0 86	3/4	1/2 OR 3/4
	(87 8)	(69 4)		(17)	(50)	(1 151)	(3 453)	(0 02)	(0 21)		
35 C/D	350 000	276 500	79	30	90	2 845	8 534	0 10	0 87	3/4	1/2 OR 3/4
	(102 5)	(81 0)		(17)	(50)	(1 343)	(4 028)	(0 02)	(0 22)		
40 C/D	400 000	316 000	79	30	90	3 251	9 753	0 10	0 88	3/4	1/2 OR 3/4
	(117 1)	(92 5)		(17)	(50)	(1 534)	(4 603)	(0 02)	(0 22)		

Ratings shown are for elevations up to 2000 feet (610 m) above sea level Above 2000 feet (610 m) input must be derated four percent for each 1000 feet (305 m) above sea level

Tag Data - Commercial Rooftop Air Conditioning Units (Large) (Qty 1)

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-1	1	90-150 Ton Packaged Industrial Rooftop	SF--1504

Product Data - Commercial Rooftop Air Conditioning Units (Large)

Item A1 Qty 1 Tag(s) RTU-1

Rooftop
DX cooling/natural gas heat
150 Ton air cooled
460/60/3 XL
Medium gas heat-Modulating
1 piece unit - w/o blank section
Downflow supply/ upflow return
Standard CFM supply fan - high eff motor(s)
100 HP
Standard CFM Return with VFD with Statitrac
50 HP
VFD Supply w/ bypass (Disch Air Ctrl)
Economizer with standard dampers and dry bulb control
Non fused disconnect w/ pwrd conv outlet
Suction service valves and replacable core liquid filter driers
Hot gas bypass
LCI
UL/CSA
Dual side access doors
Standard curb (Fld)

Performance Data - Commercial Rooftop Air Conditioning Units (Large)

Tags	RTU-1
Supply fan airflow (cfm)	57500
Actual Supply fan RPM (rpm)	1247
Evaporator face velocity (ft/min)	541
Exhaust / Return Fan CFM (cfm)	54000
Cooling EDB (F)	80 00
Cooling EWB (F)	67 00
Entering air relative humidity (%)	51 08
Ambient Dry Bulb temp (F)	95 00
Ambient wet bulb temp (F)	68 00
Leaving coil dry bulb (F)	57 22
Leaving coil wet bulb (F)	57 22
Leaving unit dry bulb (F)	61 38
Leaving unit wet bulb (F)	59 08
Gross total capacity (MBh)	1868 72
Gross sensible capacity (MBh)	1585 21
Gross latent capacity (MBh)	283 23
Net total capacity (MBh)	1595 90
Net sensible capacity (MBh)	1312 40
Net sensible heat ratio (%)	82 24
Input heating capacity (MBh)	1800 00
Output heating capacity (MBh)	1440 00
Output heating cap w/supply fan heat (MBh)	1699 80
Heating entering air temperature (F)	55 00
Heating leaving air temperature (F)	78 08
Heating delta T (F)	23 08
Supply duct static pressure (in H2O)	2 50
Return duct static pressure (in H2O)	1 00
Component static pressure drop (in H2O)	3 83
Total static pressure (in H2O)	6 33
Actual supply motor power (bhp)	97 55

Tags	RTU-1
Actual Exhaust / Return motor power (bhp)	42 42
System power (kW)	231 39
Operating EER (EER)	6 9
EER @ ARI (EER)	9 7
IPLV @ ARI (IPLV)	11 2
Minimum circuit ampacity (A)	443 25
Maximum overcurrent protection (A)	500 00
Recommended dual element (A)	500 00
Compressor 1 count (Each)	4 00
Compressor 1 RLA (A)	52 10
Compressor 2 count (Each)	0 00
Compressor 2 RLA (A)	0 00
Supply fan motor FLA (A)	119 00
Condenser fan FLA (A)	21 60
Exhaust / Return fan motor FLA (A)	60 50
Electric heater FLA (A)	0 00
Crankcase heater FLA (A)	1 00
Other FLA (A)	4 00
Evaporator face area (sq ft)	106 25
Evaporator rows (Each)	6 00
Evaporator fin spacing (Per Foot)	168
Fan motor heat (MBh)	272 82
Minimum disconnect switch size (A)	475 00
Actual Exhaust / Return fan speed (rpm)	1132
Installed point loading 1 (lb)	1891 1
Installed point loading 2 (lb)	1487 0
Installed point loading 3 (lb)	2035 5
Installed point loading 4 (lb)	1631 4
Installed point loading 5 (lb)	2179 8
Installed point loading 6 (lb)	1775 8
Installed point loading 7 (lb)	2324 2
Installed point loading 8 (lb)	1920 1
Installed point loading 9 (lb)	2468 6
Installed point loading 10 (lb)	2064 5
Installed point loading 11 (lb)	2651 9
Installed point loading 12 (lb)	2247 8
First x dimension - installed (in)	4 000
Second x dimension - installed (in)	97 800
Third x dimension - installed (in)	191 600
Fourth x dimension - installed (in)	285 400
Fifth x dimension - installed (in)	379 200
Sixth x dimension - installed (in)	498 300
First y dimension - installed (in)	2 875
Second y dimension - installed (in)	140 925
Installed center of gravity - y (in)	63 136
Installed center of gravity - x (in)	263 469
Piece 1-Lifting point loading 1 (lb)	4632 2
Piece 1-Lifting point loading 2 (lb)	3824 0
Piece 1-Lifting point loading 3 (lb)	4515 8
Piece 1-Lifting point loading 4 (lb)	3707 6
Piece 1-Lifting point loading 5 (lb)	4403 1
Piece 1-Lifting point loading 6 (lb)	3595 0
Piece 1- First x dimension - loading (in)	65 990
Piece 1- Second x dimension - loading (in)	269 380
Piece 1-Third x dimension - loading (in)	466 180
Piece 1 - COG Y (in)	63 136
Piece 1 - COG X (in)	263 469

PHYSICAL DATA

DESCRIPTION	UNIT SIZE					
	040–14	060–14	080–14	080–20	100–20	120–20
Direct–Drive Motor Hp (ECM)	1/2	1/2	1/2	1	1	1
Motor Full Load Amps	7 7	7 7	7 7	12 8	12 8	12 8
RPM (Nominal)—Speeds	Variable 250 — 1300					
Blower Wheel Diameter X Width (in)	11 X 10	10 X 7	11 X 10	11 X 10	11 X 10	11 X 10
Filter Size (in /mm) Nominal A (Washable)	(1) 24 X 25 X 1 / 610 X 635 X 25	(1) 16 X 25 X 1 / 406 X 635 X 25	(1) 20 X 25 X 1 / 508 X 635 X 25	(1) 20 X 25 X 1 / 508 X 635 X 25	(1) 20 X 25 X 1 / 508 X 635 X 25	(1) 24 X 25 X 1 / 610 X 635 X 25
Shipping Weight (lb)	205	170	182	204	203	234
Limit Control	SPST					
Heating Blower Control (Off Delay)	Selectable 90, 120, 150, or 180 SEC Intervals					
Burners (Monoport)	2	3	4	4	5	6
Gas Connection Size	1/2–in NPT					
Gas Valve (Redundant) Manufacturer Minimum Inlet Pressure (in wc) Maximum Inlet Pressure (in wc)	White–Rodgers 4 5 (Natural Gas) 13 6 (Natural Gas)					
Ignition Device	Hot Surface –SIN					

58MVB

PERFORMANCE DATA

UNIT SIZE			040–14	060–14	080–14	080–20	100–20	120–20
CERTIFIED TEMP RISE RANGE (°F/°C)		Low	25–55 / –4–13	50–80 / 10–27	50–80/ 10–27	50–80/ 10–27	50–80/ 10–27	50–80/ 10–27
		High	30 – 60/ –1–16	35 – 65/ 2–18	35–65/ 2–18	35–65/ 2–18	45–75/ 7–24	45–75/ 7–24
CERTIFIED EXT STATIC PRESSURE (ESP)		Heating	0 10	0 12	0 15	0 15	0 20	0 20
		Cooling	0 50	0 50	0 50	0 50	0 50	0 50
AIRFLOW CFM‡		Heating Low	525 (620**)	500 (590**)	705 (830**)	685 (810**)	875 (1030**)	1180 (1390**)
		Heating High	785	1070	1490	1530	1530	1900
		Cooling (Max)	1390	1400	1375	1975	1950	2060
OUTPUT CAPACITY BTUH* (96)	Low	Upflow	25000	37000	49000	49000	61000	73000
		Downflow	25000	36000	49000	49000	61000	73000
		Horizontal	25000	36000	49000	49000	61000	73000
	High	Upflow	38000	57000	75000	75000	94000	113000
		Downflow	37000	56000	75000	75000	94000	113000
		Horizontal	37000	56000	75000	75000	93000	112000
AFUE%* Nonweatherized 96		Upflow	96 6	94 1	94 1	94 1	94 1	94 1
		Downflow	95	92 7	92 7	92 7	92 7	92 7
		Horizontal	96 1	93 7	93 7	93 7	93 7	93 7
INPUT BTUH†		Low	26000	39000	52000	52000	65000	78000
		High	40000	60000	80000	80000	100000	120000

* Capacity in accordance with U S Government DOE test procedures
† Gas input ratings are certified for elevations to 2000 ft For elevations above 2000 ft reduce ratings 2% for each 1000 ft above sea level In Canada derate the unit 5% for elevations from 2000 to 4500 ft above sea level
‡ Airflow shown is for bottom only return–air supply with factory–supplied 1–in washable filter(s) For air delivery above 1800 CFM see Air Delivery Table for other options
** Low– and Medium–heat CFM when low/medium heat rise adjustment switch (SW1–3) on furnace control is used

Form 5a Project Name Clark Family Center Page 1

LIGHTING - GENERAL

Exceptions
Discussion of qualifying exceptions in instructions section

Plans/Specs
Show compliance by including a drawing sheet detail number and/or specification section and subparagraph

1 Interior Exceptions (Section 1313 1)

☐ **No Interior Lighting** The building plans and specifications do not call for new or altered interior lighting Skip to item 5 Exterior building Lighting - General below

☐ **Exceptions** 1 The building or part of the building qualifies for an exception from code lighting requirements Applicable code exception is number

2 Lighting equipment that qualifies for an exception - in addition to general lighting and is separately controlled Applicable code exception is number

Areas of the building and equipment that qualify for any exceptions

2 Local Shut-off controls (Section 1313 3 1 1)

☑ **Complies** At least one local shut-off lighting control for every 2 000 square feet of lighted floor area and for all spaces enclosed by walls or ceiling height partitions This control is detailed in the building plans on drawing number

☐ **Exception** The building or part of the building qualifies for an exception Applicable code exception is Section 1313 3 1 1 Exception

Portions of the building that qualify

3 Automatic Shutoff Controls (Section 1313 3 1 2)

☐ **Not Applicable** Office floor area is not over 2 000 square feet of contiguous office floor area or permitted space is not over 5 000 square feet No offices less than 300 square feet meeting or conference rooms or school classrooms

☑ **Complies** All interior lighting systems are equipped with a separate automatic control to shut off lighting during unoccupied periods Offices less than 300 square feet meeting and conference rooms and school classrooms are equipped with occupancy sensors that comply with Section 1313 3 1 2 1 Compliance details in plans/specs

☐ **Exception** The building or part of the building qualifies for an exception Applicable code exception is Section 1313 3 1 2 Exception

Portions of the building that qualify

4 Daylighting Controls (1313 3 1 3)

☑ **No classrooms or atriums with skylights or window to wall ratio greater than 50%**

☐ **Complies** All classrooms and atriums with window to wall ratio greater than 50% and/or skylights are equipped with automatic daylight sensing controls as required by Section 1313 3 1 3 1 and Section 1313 3 1 3 2 The daylight sensors specified comply with Section 1313 3 1 3 3 Compliance details in plans/specs

Exterior Build-ing Lighting
is lighting directed to illuminate the exterior of the building and adjacent walkways and loading areas with or without canopies

Clock Switches shall be astronomic (seasonal correcting) type with separate programs for each day of the week and shall store energy to maintain timekeeping during power outages

5 Exterior Lighting (Section 1313 5)

☑ **Complies** The plans do not call for use of incandescent or mercury vapor lamps for use on building exterior

☐ **Exception** The building plans indicate luminaires with incandescent or mercury vapor lamps but are specified for use in or around swimming pools water features or other locations subject to requirements of Article 680 of the 2002 National Electrical Code

6 Exterior and Canopy Lighting Controls (Section 1313 3 2)

☑ **Complies** The building plans and specifications include photoelectric and/or clock switches on all exterior lighting systems which are designed and programmed to extinguish lights when daylight is present as required by Section 1313 3 2

7 Connected Lighting Power (Section 1313 4)

YES **Complies** The lighting power does not exceed the power allowance established in either the Tenant Space Method (Form 5b) or the Space-by-Space Method (Form 5c)

○ Tenant Space Method (Form 5b) ○ Space-by-Space Method (Form 5c)

08-17308-CO

Form 5b | Project Name: Clark Family Center | Page

INTERIOR LIGHTING POWER - Tenant Space Method

Lighting Budget

Occupancy/ Use Types
See instructions for description of occupancy types

	(a) Tenant or Building Type (Table-13G)	(b) Floor Area (sq ft)	(c) Max Power Density (W/ft²)	(d) Lighting Power Budget (W)
	Office	51 115	1 0	51 115
1	**Total Interior Lighting Power Budget (Watts) for Building**			**51,115**

Lighting Power Budget

Track Lighting Power

2	Total length of track lighting (ft)	24
3	Line 2 multiplied by 50 Watts/ft	1 200
4	Total amperage of circuit breaker(s) serving track lighting (amps)	
5	Voltage of circuit breaker serving track lighting (volts)	
6	Maximum wattage of track lighting (multiply line 4 by line 5)	
7	VA rating of the inline current limiter or the low voltage transformers	
8	Track Lighting Power (the lesser value of line 3 6 or 7)	1 200

Building s Interior Lighting Power

9	Total Interior Lighting Power from Worksheet 5b 1 (Sum of Column (m))	+	38 191
10	**Total Adjusted Interior Lighting Power** (line 8 + line 9)	=	**39,391**
11	**Does Interior Lighting Design Meet Budget?** Line 10 must be no greater than line 1		*YES*

Exterior Canopy Parking Garage Lighting Power

12	**Do Exterior Canopies Meet Budget** (Worksheets 5c)?	*YES*
13	**Does Parking Garage Meet Budget** (Worksheets 5c)?	*YES*

Workst | Project Name: Clark Family Center | Page

LIGHTING FIXTURE SCHEDULE (see Table 5c in instructions for default luminaire power)

(a) Lum ID	(b) Luminaire Type	(b) Luminaire Description	(c) Lamp No	(c) Lamp Description	(d) Ballasts No	(d) Ballasts Description	(e) Luminaire Power (watts)	(f) Is Luminaire From Table 5c
A1	Fluorescent T8 4 foot	1 F32T8 ELECT NO 32W	1	F32T8	1	Electronic Normal Output RS	32	YES
A4	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
A8	Fluorescent T8 4 foot	4 F32T8-ELECT NO 114W	4	F32T8	1	Electronic Normal Output RS	114	YES
A12	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
C1	Compact Fluorescent Quad	2 CFQ26W/G24q 3 ELECT 52W	2	CFQ26W/G24q 3	2	Electronic	52	YES
C2	Compact Fluorescent Triple	2-CFTR26W/GX24q 3-ELECT 55W	2	CFTR26W/GX24q 3	1	Electronic	55	YES
C2W	Compact Fluorescent Triple	2 CFTR26W/GX24q 3-ELECT 55W	2	CFTR26W/GX24q-3	1	Electronic	55	YES
C3	Long Compact Fluorescent Twin T5 (40W)	1-FT40W/2G11 ELECT NO-41W	1	FT40W/2G11	1	Electronic	41	YES
L1	Fluorescent T8 4 foot	2 F32T8-ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L2	Fluorescent T8 4 foot	2 F32T8-ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L3	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L3W	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L4	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L5	Fluorescent T8 4 foot	2 F32T8 ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L6	Fluorescent T8 4 foot	2 F32T8 ELECT NO 62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L7	Fluorescent T8 4 foot	2 F32T8-ELECT NO-62W	2	F32T8	1	Electronic Normal Output RS	62	YES
L8	Fluo escent L near Lamps T5	1 F28T5 ELECT 30W	1	F28T5	1	Elect Program Start	30	YES
L9	Fluorescent Linear Lamps T5	1 F54T5 ELECT-62W	1	F54T5	1	Elect Program Start	62	YES
L10	Fluo escent T8 4 foot	1 F32T8-ELECT NO-32W	1	F32T8	1	Electronic Normal Output RS	32	YES
S1	High Intensity Discharge Metal Halide	1 M35/39 ELECT-44W	1	M35/39	1	Electronic	44	YES
S2	Compact Fluorescent Quad	2-CFQ26W/G24q 3-ELECT 52W	2	CFQ26W/G24q 3	2	Electronic	52	YES
S3	Compact Fluorescent Quad	2 CFQ26W/G24q 3-ELECT 52W	2	CFQ26W/G24q 3	2	Electronic	52	YES
S4	H gh Intensity Discharge Metal Halide	1 M100-ELECT 110W	1	M100	1	Electronic	110	YES
T1	Track Lighting	Track Lighting	–	–	–	–	50	YES

Worksheet 5b 1 Project Name Clark Family Center Page

INTERIOR LIGHTING POWER

Each room must be identified
Describe luminaires for each individual room in plans

For track lighting enter lineal feet in column column (g)

Column (k) enter sum of column (j) for each room only once at first entry for the room See example in instructions

(a) Room ID (do not leave any blanks)	(b) Area (ft^2)	(c) Space Type (Table 13-H) (enter space type only once per room)	(d) Space Type LPD	(e) Lighting Power Budget (b) x (d)	(f) Lum ID from Worksheet 5a Column (a)	(g) Quantity of Luminaires (or lineal ft for track lighting)	(h) Luminaire Power (Watts)	(i) Exempt Fixtures	(j) Lighting Power (g) x (h)	(k) Room Total Ltg Power
	Space by Space Method Only Skip to column (f) if using the Tenant Space Method									
Basement			--	--	A4	3	62	☐	186	4 784
Basement			--	--	A8	2	114	☐	228	--
Basement			--		A12	18	62	☐	1 116	--
Basement			--		C1	2	52	☐	104	--
Basement			--		L1	30	62	☐	1 860	--
Basement			--	--	L2	12	62	☐	744	--
Basement			--	--	L3W	2	62	☐	124	--
Basement			--	--	L4	3	62	☐	186	--
Basement			--	--	L5	2	62	☐	124	--
Basement			--		L8	2	30	☐	60	--
Basement			--	--	S3	1	52	☐	52	--
1st Floor			--		A1	1	32	☐	32	12 568
1st Floor			--	--	A4	7	62	☐	434	--
1st Floor			--	--	A8	4	114	☐	456	--
1st Floor			--	--	A12	84	62	☐	5 208	--
1st Floor			--		C1	22	52	☐	1 144	--
1st Floor			--		C2	14	55	☐	770	
1st Floor			--	--	C2W	4	55	☐	220	--
1st Floor			--		C3	4	41	☐	164	--
1st Floor			--	--	L3	7	62	☐	434	--
1st Floor			--	--	L4	2	62	☐	124	--
1st Floor			--	--	L5	2	62	☐	124	
1st Floor			--	--	L6	13	62	☐	806	--
1st Floor			--		L7	8	62	☐	496	--
1st Floor			--	--	L8	2	30	☐	60	--
1st Floor			--	--	S1	18	44	☐	792	--
1st Floor			--	--	S2	2	52	☐	104	--
1st Floor			--		T1	24	50	☐	1,200	--
2nd Floor			--	--	A1	2	32	☐	64	1 955
2nd Floor			--	--	C2	10	55	☐	550	--
2nd Floor			--	--	C3	1	41	☐	41	--
2nd Floor			--	--	L3	12	62	☐	744	--
2nd Floor			--	--	L4	2	62	☐	124	--
2nd Floor			--		L7	6	62	☐	372	--
2nd Floor			--	--	L8	2	30	☐	60	--
3rd Floor			--	--	A1	2	32	☐	64	8 532
3rd Floor			--	--	A4	1	62	☐	62	--
3rd Floor			--	--	A8	61	114	☐	6 954	--
3rd Floor			--	--	A12	3	62	☐	186	--
3rd Floor			--		C1	8	52	☐	416	--
3rd Floor			--		C2	8	55	☐	440	--
3rd Floor			--	--	C3	10	41	☐	410	--
		Worksheet 5b-1 Total Budget						Wksht 5b 1 Total Lighting Power (excluding exempt/track fixtures)		26 639

Other Pages
List the additional worksheets nece ssary to catalog all luminaires in building

Total Number of Additional Worksheet 5b 1

Worksheet Number	(l) Lighting Power Budget Space by-Space only (Total of column (e))	(m) Proposed Buding Lighting Power (Total of column (k) excluding exempt/track)	(n) Area Sqft (not required for Tenant Method)
5b-1		26 639	
5b-2		11 552	
5b-3			
Sum of additional 5b worksheets			
Total Budget (of all worksheets		38 191	

Worksheet 5b 2 Project Name Clark Family Center Page

INTERIOR LIGHTING POWER

Each room must be identified

Describe luminaires for each individual room in plans

For track lighting enter lineal feet in column column (g)

Column (k) enter sum of column (j) for each room only once at first entry for the room See example in instructions

	Space by-Space Method Only Skip to column (f) if using the Tenant Space Method									
(a) Room ID (do not leave any blanks)	(b) Area (ft²)	(c) Space Type (Table 13 H) (enter space type only once per room)	(d) Space Type LPD	(e) Lighting Power Budget (b) x (d)	(f) Lum ID from Worksheet 5a Column (a)	(g) Quantity of Luminaires (or lineal ft for track lighting)	(h) Luminaire Power (Watts)	(i) Exempt Fixtures	(j) Lighting Power (g) x (h)	(k) Room Total Ltg Power
3rd Floor			–	–	L3	2	62	☐	124	928
3rd Floor			–	–	L4	2	62	☐	124	–
3rd Floor			–	–	L5	4	62	☐	248	–
3rd Floor			–	–	L7	6	62	☐	372	–
3rd Floor			–	–	L8	2	30	☐	60	–
4th Floor			–	–	A1	2	32	☐	64	10 624
4th Floor			–	–	A4	1	62	☐	62	–
4th Floor			–	–	A8	49	114	☐	5 586	–
4th Floor			–	–	A12	15	62	☐	930	–
4th Floor			–	–	C1	13	52	☐	676	–
4th Floor			–	–	C2	21	55	☐	1 155	–
4th Floor			–	–	C3	1	41	☐	41	–
4th Floor			–	–	L3	9	62	☐	558	–
4th Floor			–	–	L4	2	62	☐	124	–
4th Floor			–	–	L7	6	62	☐	372	–
4th Floor				–	L8	2	30	☐	60	–
4th Floor				–	L9	14	62	☐	868	–
4th Floor			–	–	L10	4	32	☐	128	–
			–	–				☐		
			–	–				☐		–
			–	–				☐		–
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			–	–				☐		–
			–	–				☐		–
	–		Worksheet 5b-2 Total Budget	–	Worksheet 5b-2 Total Lighting Power (excluding exempt/track fixt)					11 552

Worksheet 5c Project Name Clark Family Center Page

EXTERIOR CANOPY AND PARKING GARAGE LIGHTING POWER

Exterior Canopy Lighting

Each room must be identified

Describe luminaires for each individual room in plans

For track lighting enter lineal feet in column column (g)

Column (k) enter sum of column (j) for each room only once at first entry for the room See example in instructions

(a) Room ID (do not leave any blanks)	(b) Area (ft^2)	(c) Canopy	(d) Space Type LPD	(e) Lighting Power Budget (b) x (d)	(f) Lum ID from Worksheet 5a Column (a)	(g) Quantity of Luminaires (or lineal ft for track lighting)	(h) Luminaire Power (Watts)	(i) Exempt Fixtures	(j) Lighting Power (g) x (h)	(k) Room Total Ltg Power
1st floor	175	Canopies Under 15 feet in height	1 5	263	S2	5	52	☐	260	260
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
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			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
	175	Total Exterior Canopy Budget		263		Total Exterior Canopy Lighting Power (excluding exempt fixtures)				260

Parking Garage Lighting

(a) Room ID (do not leave any blanks)	(b) Area (ft^2)	(c) Parking Garage	(d) Space Type LPD	(e) Lighting Power Budget (b) x (d)	(f) Lum ID from Worksheet 5a Column (a)	(g) Quantity of Luminaires (or lineal ft for track lighting)	(h) Luminaire Power (Watts)	(i) Exempt Fixtures	(j) Lighting Power (g) x (h)	(k) Room Total Ltg Power
basement	9400	Parking Garage – Garage Area	0 2	1 880	L1	30	62	☐	1 860	1 860
			–	–				☐		
			–	–				☐		
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
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			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
			–	–				☐		–
	9 400	Total Parking Garage Budget		1 880		Total Parking Garage Lighting Power (excluding exempt fixtures)				1 860

Does Canopy Lighting Power Comply?	YES
Does Parking Garage Lighting Power Comply?	YES