CONSTRUCT MVSB HOWELL

Date Issued: 08/12/24

MICHIGAN DEPARTMENT OF MILITARY AND VETERANS AFFAIRS - 511/24024.CAK

Issued for: Bids
Bids Due: 09/04/24

Location Maps
NOT TO SCALE

LOCATION MAP
No Scale

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EX1 Floor Plan - Emergency Egress Lighting Photometry

LOCATION

727 Isbell St, Howell, MI 48843

CODES AND STANDARDS

1. CONTRACTOR TO COMPLY WITH LATEST CONSTRUCTION CODE.
2. CONSTRUCTION TO COMPLY WITH NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS INCLUDING NFPA 20, NFPA 7b, AND NFPA 70e.
3. CONSTRUCTION TO APPLY TO OSHA AND MIOSHA CODES AND STANDARDS.

GENERAL NOTES

1. CONTRACTOR EMPLOYEES SHALL HAVE USE OF THE STATE OF MICHIGAN INDOOR BATHROOM FACILITIES.
2. DIMENSIONS SHOWN WERE DETERMINED BY FIELD MEASUREMENTS. ALL BIDDERS SHALL PROVIDE THEIR OWN MEASUREMENTS AND QUANTITIES, FOR ALL REQUIRED WORK AND SHALL BE RESPONSIBLE FOR THOSE AMOUNTS FOR A COMPLETE JOB WITH NO ADDITIONAL COSTS TO THE STATE AFTER AWARD OF THE CONTRACT.
3. DAMAGE TO PAVEMENT, LAWNS, SHRUBS, TREES, FENCING, BUILDINGS, OR OTHER STRUCTURES OR SITE APPURTENANCES, THAT RESULT FROM THE EXECUTION OF THIS PROJECT, SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS/HER EXPENSE. PRE-CONSTRUCTION PHOTO/VIDEO DOCUMENTATION REQUIRED.

OWNER

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

IDENTIFICATION

FILE NO: 511/24024.CAK
Chris Kulhanek, RA
State of Michigan Project Director

PROJECT NO: 26B3523004
Brian Bushnell
DMVA Design Manager

Professional Service Contractor

B R
Beckett&Raeder
Landscape Architecture Planning & Engineering

Beckett & Raeder, Inc.
535 West William, Suite 101
Ann Arbor, MI 48103

734 **663.2622** ph
734 **663.6759** fx

Consultant

Straub Pettitt Yaste
850 N. Crooks Road, Suite 200
Clawson, Michigan 48017
248 - 658 - 7777

EXISTING CONDITIONS NOTES

1. CONTRACTOR SHALL CALL MISS DIG (811) A MINIMUM OF THREE WORKING DAYS PRIOR TO START OF CONSTRUCTION.
2. CONTRACTOR SHALL INVESTIGATE EXTENT AND LOCATION OF ALL EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR PROTECTION AND RESTORATION OF SAME IF DAMAGED AS A RESULT OF CONTRACTOR'S OPERATIONS.
3. CONTOUR INTERVAL SHOWN IS 1-FOOT.

SURVEY PREPARED BY:

STATE OF MICHIGAN - RANDON GOULD - PROJECT MANAGER
OFFICE (517) 481-7584
CELL (517) 528-8606
Randon.d.gould.nfg@army.mil

BENCHMARK NOTES

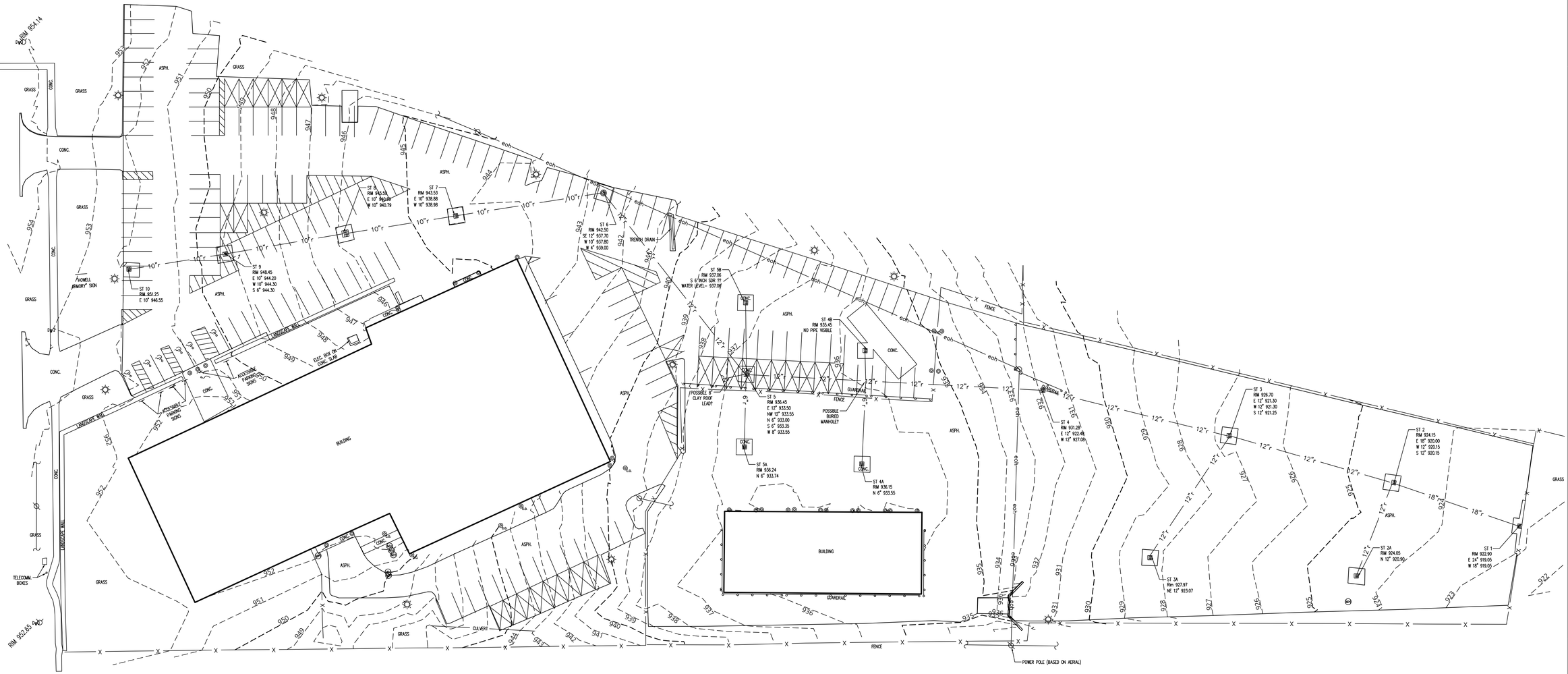
BM #1 - 954.257 UTILITY POLE ON EAST SIDE OF ISBELL ST.

SOIL TYPES

THE NATURAL RESOURCE CONSERVATION SERVICE SOIL SURVEY INDICATES THE SITE IS COMPRISED OF:
OmB - OWOSSO-MIAMI SANDY LOAMS, 2 TO 6 PERCENT SLOPES
OmC - OWOSSO-MIAMI SANDY LOAMS, 6 TO 12 PERCENT SLOPES
SvB - SPINKS-OAKVILLE LOAMY SANDS, 0 TO 6 PERCENT SLOPES

EXISTING CONDITIONS LEGEND

- FIRE HYDRANT
- GATE VALVE & BOX
- WATER SHUT OFF VALVE
- SQUARE CATCH BASIN
- SANITARY MANHOLE
- SANITARY MANHOLE
- LIGHT POLE
- UTILITY POLE
- SIGN
- POST/BOLLARD
- CHAIN LINK FENCE
- ELECTRIC LINE
- GAS MAIN
- WATER MAIN
- STORM LINE
- SANITARY LINE
- COMM LINE



Know what's **below.** **Call** before you dig.

SCALE: 1" = 30'

0 15 30 60 90 120

N

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Department of
Military and Veterans Affairs
Construct MVSB Howell
EXISTING CONDITIONS

DESIGNED: KE	
DRAWN: MK, BR	
CHECKED: KE	
APPROVED:	

ISSUED FOR	DATE
☐ PRELIMINARY	AUG 12, 2024
■ CONSTRUCTION	
☐ FINAL RECORD	

IDENTIFICATION NO.	
DMVA PROJECT NO.	268552004
DTMB PROJECT NO.	511/24024.CAK

SHEET C1.0

SESC NOTES

1. THIS PROJECT MUST BE CONSTRUCTED IN COMPLIANCE WITH PART 91 OF MICHIGAN NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT 451 OF 1994, AS AMENDED, THE SOIL EROSION AND SEDIMENT CONTROL ACT.
2. PRIOR TO ANY SITE DISTURBANCE, INCLUDING DEMOLITION, CONTRACTOR SHALL PLACE EROSION CONTROL MEASURES ON ALL EXISTING STORM SEWER STRUCTURES AFFECTED BY WORK IN THIS CONTRACT. SUCH EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT MEASURES ARE IN PLACE.
3. CONTRACTOR SHALL PLACE TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED AND SHOWN ON PLANS.
4. CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL EROSION CONTROL MEASURES AS REQUIRED BY STATE AND LOCAL GOVERNING AUTHORITIES.
5. DAILY INSPECTIONS SHALL BE MADE BY THE CONTRACTOR TO DETERMINE THE EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES. ANY NECESSARY REPAIRS SHALL BE MADE WITHOUT DELAY.
6. ALL EROSION AND SEDIMENT RESULTING FROM WORK ON SITE SHALL BE CONTAINED ON SITE AND NOT ALLOWED TO COLLECT IN ANY OFF-SITE AREAS OR WATERWAYS. WATERWAYS INCLUDE BOTH NATURAL AND MAN-MADE OPEN DITCHES, STREAMS, STORM DRAINS, RIVERS, OR PONDS.
7. CONTRACTOR SHALL PLACE TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED AND SHOWN ON PLANS.
8. CONTRACTOR SHALL PLACE INLET FILTER PROTECTION ON ALL STORM STRUCTURES AFFECTED BY THIS PROJECT.
9. ALL TEMPORARY SEDIMENT BASINS USED DURING CONSTRUCTION SHALL BE CLEANED AND ALL SEDIMENT LEGALLY DISPOSED OF PRIOR TO STABILIZATION. REMOVAL OF ALL FINES AND SEDIMENT IS CRITICAL IN AREAS WHERE INFILTRATION PRACTICES SHALL BECOME PERMANENT BEST MANAGEMENT PRACTICE.
10. CONTRACTOR SHALL CLEAN DEBRIS FROM STREETS ON A DAILY BASIS AS NEEDED. STREETS SHALL BE SWEPT WEEKLY.

SESC PROJECT DATA

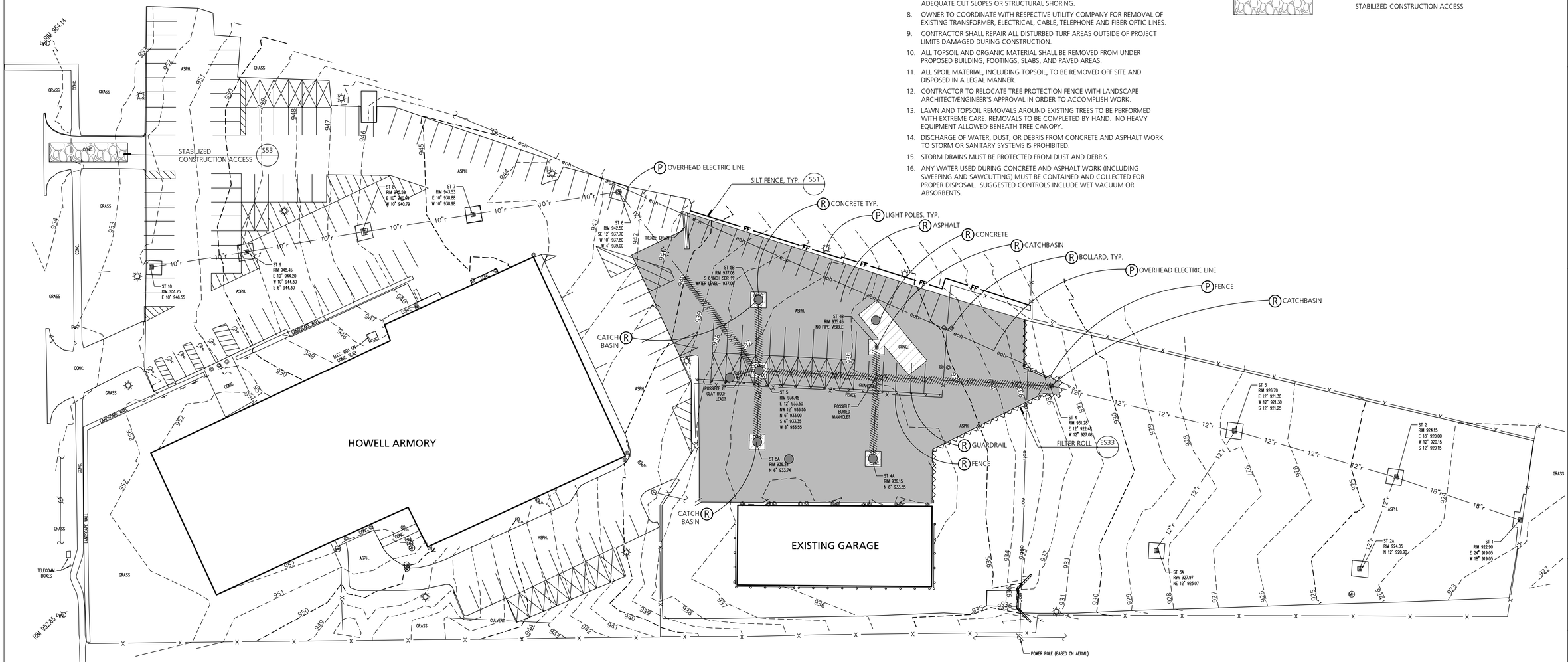
PARCEL I.D.: 4717-35-100-018
LEGAL DESCRIPTION: SEC. 35, T3N R4E CITY OF HOWELL BEG ON E LINE OF ISBELL STREET AT A POINT 1280 FT W AND 816 FT N OF SE COR OF SEC, TH E 1077 FT, N 26°55'E 85.9 FT TO SLY LINE OF RR ROW, TH NWLY ALONG RR ROW 1178 FT TO E LINE OF ISBELL STREET, TH S 443 FT ALONG E LINE OF ISBELL STREET TO POINT OF BEG. 6 AC M/L
PARCEL SIZE: 5.99 ACRES
DISTURBED AREA: 0.76 ACRES
DISTANCE TO WATER OF THE STATE: 3,500 FT TO MARION AND GENOA DRAIN

DEMOLITION NOTES

1. CONTRACTOR SHALL CALL MISS DIG (811) A MINIMUM OF THREE WORKING DAYS PRIOR TO START OF CONSTRUCTION.
2. CONTRACTOR SHALL INVESTIGATE EXTENT AND LOCATION OF EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR PROTECTION AND RESTORATION OF SAME IF DAMAGED AS A RESULT OF CONTRACTOR'S OPERATIONS.
3. ALL ITEMS NOT INDICATED FOR REMOVAL SHALL REMAIN UNDISTURBED AND PROTECTED. CONTRACTOR SHALL FULLY RESTORE ANY ITEMS/MATERIALS DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
4. ALL CONCRETE PAVEMENT AND CURB REMOVALS SHALL BE TO THE NEAREST JOINT BEYOND INDICATED EXTENT.
5. CONTRACTOR SHALL MAINTAIN CLEAN SAW CUT EDGES FOR PROPOSED WORK TO ABUT. BROKEN EDGES RESULTING FROM CONTRACTOR'S FAILURE TO PROTECT THE EDGE WILL BE SAW CUT BEYOND THE BREAKS AT THE NEAREST JOINT, AT THE CONTRACTOR'S EXPENSE.
6. ALL REMOVALS SHALL BE SAW CUT FULL DEPTH AND COORDINATED WITH LAYOUT / GRADING PLANS.
7. REMOVALS SHALL INCLUDE SUBSOIL/EXISTING BASE MATERIALS TO FULL DEPTH REQUIRED FOR INSTALLATION OF NEW WORK INCLUDING BASE COURSE. ALL EXCAVATIONS SHALL PROVIDE ADEQUATE SOIL SUPPORT THROUGH THE USE OF ADEQUATE CUT SLOPES OR STRUCTURAL SHORING.
8. OWNER TO COORDINATE WITH RESPECTIVE UTILITY COMPANY FOR REMOVAL OF EXISTING TRANSFORMER, ELECTRICAL, CABLE, TELEPHONE AND FIBER OPTIC LINES.
9. CONTRACTOR SHALL REPAIR ALL DISTURBED TURF AREAS OUTSIDE OF PROJECT LIMITS DAMAGED DURING CONSTRUCTION.
10. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE REMOVED FROM UNDER PROPOSED BUILDING, FOOTINGS, SLABS, AND PAVED AREAS.
11. ALL SPOIL MATERIAL, INCLUDING TOPSOIL, TO BE REMOVED OFF SITE AND DISPOSED IN A LEGAL MANNER.
12. CONTRACTOR TO RELOCATE TREE PROTECTION FENCE WITH LANDSCAPE ARCHITECT/ENGINEER'S APPROVAL IN ORDER TO ACCOMPLISH WORK.
13. LAWN AND TOPSOIL REMOVALS AROUND EXISTING TREES TO BE PERFORMED WITH EXTREME CARE. REMOVALS TO BE COMPLETED BY HAND. NO HEAVY EQUIPMENT ALLOWED BENEATH TREE CANOPY.
14. DISCHARGE OF WATER, DUST, OR DEBRIS FROM CONCRETE AND ASPHALT WORK TO STORM OR SANITARY SYSTEMS IS PROHIBITED.
15. STORM DRAINS MUST BE PROTECTED FROM DUST AND DEBRIS.
16. ANY WATER USED DURING CONCRETE AND ASPHALT WORK (INCLUDING SWEEPING AND SAWCUTTING) MUST BE CONTAINED AND COLLECTED FOR PROPER DISPOSAL. SUGGESTED CONTROLS INCLUDE WET VACUUM OR ABSORBENTS.

DEMOLITION & SESC LEGEND

- PARCEL LINE
- RIGHT-OF-WAY LINE
- LIMIT OF WORK LINE
- SILT FENCE
- PROPOSED FILTER ROLLS
- INLET FILTER
- SAWCUT
- (R) REMOVE ITEM
- (P) PROTECT ITEM
- (S) SALVAGE ITEM TO OWNER
- STABILIZED CONSTRUCTION ACCESS



KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
	EROSION / SEDIMENT CONTROLS		
S51	SILT FENCE		*Use adjacent to critical areas, to prevent sediment laden sheet flow from entering these areas.*
S52	CATCH BASIN SEDIMENT GUARD		*Use on stormwater inlets, especially at construction sites to prevent sediment from entering sewer.*
S53	*STABILIZED CONSTRUCTION ACCESS*		*Used at every point where construction traffic leaves a construction site to minimize sediment tracking*
S58	*INLET PROTECTION FABRIC DROP*		*Use at stormwater inlets, especially at construction sites.*
ES33	*FILTER ROLLS*		*In areas requiring immediate protection of slopes against surface erosion and gully formation and for perimeter sediment control.*

Know what's **below.** **Call** before you dig.

SCALE: 1" = 30'
0 15 30 60 90 120

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Department of Military and Veterans Affairs
Construct MVSB Howell
DEMOLITION + SESC

DESIGNED: KE	
DRAWN: MK, BR	
CHECKED: KE	
APPROVED:	
DATE	AUG 12, 2024
ISSUED FOR	☐ PRELIMINARY ■ CONSTRUCTION ☐ FINAL RECORD
IDENTIFICATION NO.	DMVA PROJECT NO. 268523004 DTMB PROJECT NO. 511/24024.CAK
SHEET	C2.0

SOIL EROSION MAINTENANCE NOTES

1. PERMIT COMPLIANCE REQUIRES WEEKLY INSPECTIONS BY A CERTIFIED STORM WATER MANAGEMENT OPERATOR AS WELL AS PERIODICAL INSPECTIONS WITHIN 24 HOURS OF ANY RAINFALL. THESE INSPECTIONS MAY RESULT IN RECOMMENDATIONS FOR ROUTINE MAINTENANCE OF THE SOIL EROSION CONTROL DEVICES, AS WELL AS FURTHER MAINTENANCE AS OUTLINED BELOW. INSPECTIONS TO BE PERFORMED BY CONTRACTOR.
2. THROUGHOUT THE CONSTRUCTION PERIOD, ALL MUD/ SILT TRACKED ONTO EXISTING ROADS FROM THE SITE DUE TO CONSTRUCTION SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR.
3. CATCH BASIN INLET FILTERS SHALL BE MAINTAINED CLEAN AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD. WEEKLY INSPECTIONS WILL BE PERFORMED. IF A FILTER HAS HOLES OR IS INUNDATED WITH SEDIMENT, THE FILTER WILL REQUIRE REPLACEMENT.
4. SILT FENCE IS TO BE INSPECTED DAILY BY CONTRACTOR AND WEEKLY BY CERTIFIED STORM WATER OPERATOR. IF REPAIRS OR REPLACEMENT IS NECESSARY, IT SHALL BE PERFORMED IMMEDIATELY. THE SILT FENCE SHOULD BE TRENCHED IN, BACK FILLED, AND STAPLED OR STAKED ACCORDING TO THE MANUFACTURERS SPECIFICATIONS. MAINTENANCE INCLUDES THE REMOVING OF BUILT-UP SEDIMENT ACCUMULATES TO 1/2 THE HEIGHT OF THE FENCE. CONTRACTOR MAY HAVE TO REMOVE, REPLACE, RETRENCH, OR RE-BACKFILL THE FENCE IF IT FAILS. IT WOULD ALSO BE NECESSARY TO REINSTALL IF ANY PORTION OF THE FENCING WAS DAMAGED BY CONSTRUCTION MACHINERY.
5. SEEDING OR RESEEDING MAY BE REQUIRED IMMEDIATELY TO AREAS WHICH HAVE BEEN DAMAGED BY RUNOFF.
6. THE CONTRACTOR SHALL MAINTAIN DUST CONTROL ON THE SITE THROUGHOUT THE DURATION OF THE CONSTRUCTION PROCESS.

SOIL EROSION CONTROL NOTES

1. THIS PROJECT MUST BE CONSTRUCTED IN COMPLIANCE WITH PARTS 31 AND 91 OF ACT 451 OF 1994, AS AMENDED, THE SOIL EROSION AND SEDIMENT CONTROL ACT.
2. PRIOR TO CONSTRUCTION A SOIL EROSION PERMIT SHALL BE OBTAINED FROM THE STATE OF MICHIGAN.
3. A COPY OF THE SOIL EROSION AND SEDIMENTATION CONTROL PLANS AND PERMIT AS WELL AS ALL INSPECTION LOGS SHALL BE KEPT ON-SITE AT ALL TIMES.
4. DAILY INSPECTIONS SHALL BE MADE BY THE CONTRACTOR TO DETERMINE THE EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES. ANY NECESSARY REPAIRS SHALL BE MADE WITHOUT DELAY.
5. THE CONTRACTOR SHALL CONDUCT ALL EXCAVATION, FILLING, GRADING, AND CLEANUP OPERATIONS IN A MANNER SUCH THAT SEDIMENT, GENERATED BY WIND OR WATER IS NOT DISCHARGED INTO ANY DRAINAGE DITCH, RIVER, LAKE, AIR, OR UNDERGROUND UTILITY SYSTEM. CONTRACTOR SHALL STAGE WORK TO MINIMIZE THE AREA OF EXPOSED SOIL, THEREBY REDUCING THE OPPORTUNITY FOR SOIL EROSION.
6. CONSTRUCTION WILL BE PERFORMED IN PHASES. SOIL EROSION CONTROL MEASURES SHALL BE INSTALLED IN LOCATIONS TO PROTECT EACH PHASE OF CONSTRUCTION. RELOCATION AND ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED TO PROTECT EACH PHASE OF CONSTRUCTION. IN PARTICULAR, THE CONTRACTOR SHALL REPOSITION THE MUD TRACKING PAD FOR EACH PHASE OF CONSTRUCTION.
7. A TRUCK WASHOUT AREA SHALL BE INSTALLED NEAR THE CONSTRUCTION ENTRANCE. ALL TRUCKS LEAVING THE SITE SHALL BE WASHED DOWN. THE WASHOUT AREA SHALL BE SURROUNDED BY SILT FENCE.
8. CONTRACTOR SHALL PLACE EROSION CONTROL MEASURES ON ALL EXISTING STORM SEWER STRUCTURES AFFECTED BY WORK IN THIS CONTRACT. SUCH EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT MEASURES ARE IN PLACE.
9. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PLACED PRIOR TO COMMENCING CONSTRUCTION.
10. ALL SOIL STOCKPILE AREAS SHALL BE SURROUNDED WITH SILT FENCE TO PREVENT EROSION AND SEDIMENTATION.
11. ALL CONSTRUCTION TRAFFIC SHALL ENTER AND EXIT THE SITE VIA THE MUD TRACKING SURFACE LOCATED AT THE CONSTRUCTION EXIT. ALL DIRT AND DEBRIS TRACKED ONTO PUBLIC ROADWAYS SHALL BE CLEANED UP BY THE CONTRACTOR.
12. IF SEDIMENT EXTENDS BEYOND THE PROJECT LIMITS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP AND RESTORATION OF ALL SURFACES TO THE CONDITION THAT EXISTED PRIOR TO THE CONTRACT AWARD.
13. CONTRACTOR SHALL PLACE TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED AND SHOWN ON PLANS. AS SOON AS PERMANENT STABILIZATION OF SLOPES, DITCHES AND OTHER EARTH CHANGES ARE ACCOMPLISHED, ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE REMOVED.
14. ALL DISTURBED AREAS THAT WILL BE INACTIVE FOR MORE THAN 14 DAYS SHALL BE TEMPORARILY STABILIZED.
15. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 5 CALENDAR DAYS AFTER FINAL GRADING AND/OR FINAL EARTH CHANGES HAVE BEEN COMPLETED. WHEN IT IS NOT POSSIBLE TO PERMANENTLY STABILIZE A DISTURBED AREA AFTER AN EARTH CHANGE HAS BEEN COMPLETED OR WHERE SIGNIFICANT EARTH CHANGE ACTIVITY CEASES, TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED WITHIN FIVE DAYS. ALL TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED. ALL PERMANENT MEASURES MUST BE IMPLEMENTED AND ESTABLISHED BEFORE A CERTIFICATE OF COMPLIANCE IS ISSUED. ALL EROSION CONTROL MEASURES AS INDICATED ON THESE DRAWINGS ARE MINIMAL REQUIRED CONTROL MEASURES. ALL ADDITIONAL EROSION CONTROL MEASURES, REQUIRED TO TERMINATE ALL EROSION, SHALL BE DONE AT THE CONTRACTOR'S EXPENSE.

SEQUENCE OF EROSION AND SEDIMENTATION CONTROL OPERATIONS (FOR EACH PHASE OF CONSTRUCTION)

1. INSTALL ALL PERIMETER EROSION AND SEDIMENTATION CONTROL MEASURES AND INLET FILTERS ON ALL EXISTING STORM INLETS PERTINENT TO THE CURRENT LIMITS OF CONSTRUCTION PRIOR TO BEGINNING CONSTRUCTION.
2. DEMOLISH EXISTING FEATURES TO BE REMOVED, CLEAR AND GRUB SITE. ALL REMOVED MATERIALS SHALL BE LEGALLY DISPOSED OF OFF-SITE.
3. INSTALL PROPOSED STORM SEWER. INSTALL FILTERS AT ALL INLETS AS THEY ARE BROUGHT ON-LINE.
4. MASS GRADE SITE, CONSTRUCT BUILDING FOOTINGS, AND LAY PAVEMENT BASE.
5. DURING CONSTRUCTION THE CONTRACTOR SHALL STRICTLY MAINTAIN ALL SOIL EROSION CONTROL MEASURES IN ORDER TO ELIMINATE ANY CONTAMINATION OF ADJACENT STORM WATER SYSTEMS.
6. PAVE THE PARKING AND DRIVE AREAS.
7. ALL DISTURBED AREAS SHALL BE SEEDED WITHIN 5 DAYS OF FINAL GRADE.
8. PERMANENT STABILIZATION OF ALL LAWN AREAS SHALL BE COMPLETED PRIOR TO THE REMOVAL OF ALL TEMPORARY SOIL EROSION CONTROL MEASURES.

CONSTRUCTION SEQUENCE

CONSTRUCTION SEQUENCE	OPERATION TIME SCHEDULE (2024-2025)								
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
TEMPORARY CONTROL MEASURES									
SEDIMENT CONTROL									
SITE UTILITIES									
TEMPORARY ACCESS									
PERMANENT CONTROL MEASURES									
FOUNDATION / BUILDING CONSTRUCTION									
SITE CONSTRUCTION									
FINISH GRADING									
TOPSOIL AND SEEDING									

MAINTENANCE SCHEDULE (DURING CONSTRUCTION BY GC)

TASK	COMPONENT: STORM SEWER SYSTEM	CATCH BASIN SUMPS	CATCH BASIN INLET CASINGS	FILTER FABRIC FENCE	EROSION EELS	SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION	X	X	X	X	X	**WEEKLY**
REMOVAL OF SEDIMENT ACCUMULATION	X	X	X	X	X	**AS NEEDED AND PRIOR TO TURNOVER**
INSPECT FOR FLOATABLES AND DEBRIS	X	X	X	X	X	**QUARTERLY**
REMOVAL OF FLOATABLES AND DEBRIS	X	X	X	X	X	**QUARTERLY AND AT TURNOVER**
INSPECT FOR EROSION						**WEEKLY**
RE-ESTABLISH VEGITATION ON ERODED SLOPES						**AS NEEDED AND PRIOR TO TURNOVER**
REPLACEMENT OF STONE						**AS NEEDED***
MOWING						**0 TO 2 TIMES PER YEAR**
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY PROFESSIONAL ENGINEER)	X	X	X			**ANNUALLY AND PRIOR TO TURNOVER**
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED BY PRE-TURNOVER INSPECTION	X	X	X	X	X	**AS NEEDED**

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C2.1	DMVA PROJECT NO. 285523004	PRELIMINARY ☐	AUG 12, 2024	DRAWN: MK, BR
	DTMB PROJECT NO. 511/24024.CAK	CONSTRUCTION ■		CHECKED: KE
		FINAL RECORD ☐		APPROVED:

LAYOUT & MATERIALS NOTES

1. ALL WORK SHALL BE COMPLETED IN CONFORMANCE WITH CURRENT ADA STANDARDS.
2. ALL DIMENSIONS ARE TO BACK OF CURB, FACE OF BUILDING OR EDGE OF MATERIAL UNLESS OTHERWISE NOTED.
3. ALL LINES ARE PARALLEL OR PERPENDICULAR TO THE CURB/ PAVEMENT/ BUILDING LINE FROM WHICH THEY ARE DIMENSIONED UNLESS OTHERWISE NOTED.
4. FOLLOWING LAYOUT OF ALL MATERIALS, CONTRACTOR SHALL REVIEW WITH OWNER'S REPRESENTATIVE.
5. ANY DISCREPANCIES IN THE LAYOUT PLAN SHOULD BE IMMEDIATELY REPORTED TO OWNER'S REPRESENTATIVE.

GRADING NOTES

1. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION ALL WORK COMPLETED IN CONFORMANCE WITH CURRENT ADA STANDARDS.
2. PROPOSED CONTOUR LINES AND SPOT ELEVATIONS REFLECT FINISH GRADES. HOLD DOWN SUBGRADE ELEVATIONS ACCORDINGLY. ADJUST RIM ELEVATIONS OF ALL UTILITIES AFFECTED BY WORK IN THIS CONTRACT. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE ON THE SITE. ANY AREA THAT APPEARS TO NOT PROPERLY DRAIN SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE LANDSCAPE ARCHITECT/ ENGINEER FOR RESOLUTION.

EXISTING GAS METER
EXISTING LOAD: 4920 CFH
(PER EXISTING PLANS - V.I.F.)
ADDED LOAD
NEW GARAGE + 400 CFH
NEW TOTAL: 5320 CFH
PROVIDE NEW 4" HEADER (BLACK STEEL) AT METER WITH 3" TAP FOR EX. BLDG & 2" TAP FOR NEW GARAGE. FIELD VERIFY AND COORDINATE ALL REQUIRED WORK.

UTILITIES NOTES

1. ALL UTILITIES SHOWN FOR CONCEPTUAL DESIGN DEVELOPMENT ONLY. FINAL ROUTING, SIZING AND CONNECTIONS WILL VARY.
2. PROPOSED CONTOUR LINES AND SPOT ELEVATIONS REFLECT FINISH GRADES. HOLD DOWN SUBGRADE ELEVATIONS ACCORDINGLY. ADJUST RIM ELEVATIONS OF ALL UTILITIES AFFECTED BY WORK IN THIS CONTRACT. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE ON THE SITE. ANY AREA THAT APPEARS TO NOT PROPERLY DRAIN SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE LANDSCAPE ARCHITECT/ ENGINEER FOR RESOLUTION.
3. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITY LOCATIONS, DEPTHS AND ELEVATIONS PRIOR TO CONSTRUCTION. NO CHANGES IN CONTRACT PRICE WILL BE AWARDED FOR ACTUAL DISCREPANCIES IN UTILITY LOCATIONS DUE TO THE FAILURE TO VERIFY ACTUAL FIELD LOCATIONS.
4. THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY HIS CONSTRUCTION OPERATIONS TO A CONDITION EQUAL TO OR BETTER THAN THAT EXISTING PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CLEAN UP AND HAUL AWAY ALL CONSTRUCTION DEBRIS AND LITTER CAUSED BY HIS OPERATIONS.
5. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION. ANY DAMAGE INCURRED SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
6. ALL UTILITY CROSSINGS SHALL HAVE A MINIMUM OF 18" VERTICAL CLEARANCE.
7. SEE ARCHITECTURAL AND MECHANICAL SHEETS FOR CONTINUATION OF UTILITIES WITHIN STRUCTURES.

CONTRACTOR SHALL COORDINATE NEW NATURAL GAS REQUIREMENT WITH LOCAL GAS UTILITY COMPANY & PROVIDE ALL NECESSARY ITEMS / ACCESSORIES TO SUPPORT NEW WORK. GAS PIPE SIZING IS BASED INLET PRESS. LESS THAN 2 P.S.I. WITH 0.5 IN. W.C. and 0.60 SPECIFIC GRAVITY AS LISTED IN TABLE 402.4 (2) OF THE INTERNATIONAL FUEL GAS CODE FOR SCHEDULE 40 METALLIC PIPE (BLACK STEEL) AND POLYETHYLENE PLASTIC PIPE. (400 EQUIVALENT FEET OF PIPE LENGTH WITH FITTINGS FOR BLACK STEEL PIPING INCLUDED)

LAYOUT & MATERIALS LEGEND

- PARCEL LINE
- RIGHT-OF-WAY LINE
- LIMIT OF WORK LINE
- EXISTING BUILDING / STRUCTURE
- H.D. CONCRETE PAVEMENT (CONTROL JOINT, EXPANSION JOINT)
- SECURITY FENCE
- POST/BOLLARD

GRADING & DRAINAGE LEGEND

- + 931.63 — EXISTING SPOT GRADE
- 880 — EXISTING MAJOR CONTOUR
- 878 — EXISTING MINOR CONTOUR
- 885 — PROPOSED MAJOR CONTOUR
- 888 — PROPOSED MINOR CONTOUR
- + ME — MATCH EXISTING GRADE
- + 80.84 — PROPOSED SPOT GRADE
- RIM 89.00 — PROPOSED RIM ELEVATION
- INV 73.25 — PROPOSED INVERT ELEVATION

UTILITY PLAN LEGEND

- PROPOSED STORM WATER STRUCTURE
- STR — PROPOSED STORM LINE
- G — PROPOSED GAS LINE
- UGE — PROPOSED UNDERGROUND ELECTRIC LINE

Know what's **below.**
Call before you dig.

SCALE: 1" = 30'
0 15 30 60 90 120
N

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

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Landscape Architecture
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Beckett & Raeder, Inc.
535 West William, Suite 101
Ann Arbor, MI 48103
734 663.2622 ph
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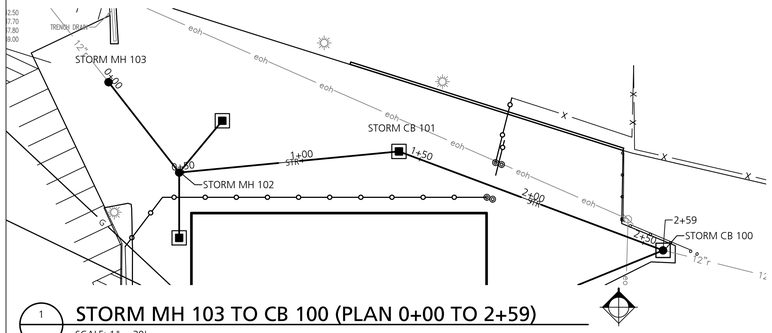
Department of Military and Veterans Affairs
Construct MVSB Howell
GRADING + UTILITIES PLAN

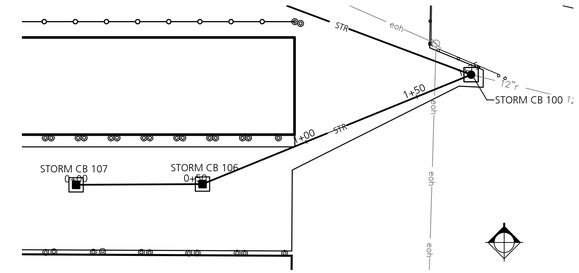
DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

DATE	ISSUED FOR	IDENTIFICATION NO.
AUG 12, 2024	PRELIMINARY ☐	DMVA PROJECT NO. 26B352304
	CONSTRUCTION ■	DTMB PROJECT NO. 511/24024.CAK
	FINAL RECORD ☐	

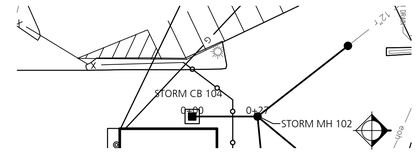
SHEET C3.0



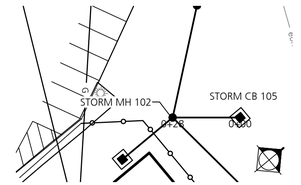
1 STORM MH 103 TO CB 100 (PLAN 0+00 TO 2+59)
SCALE: 1" = 30'



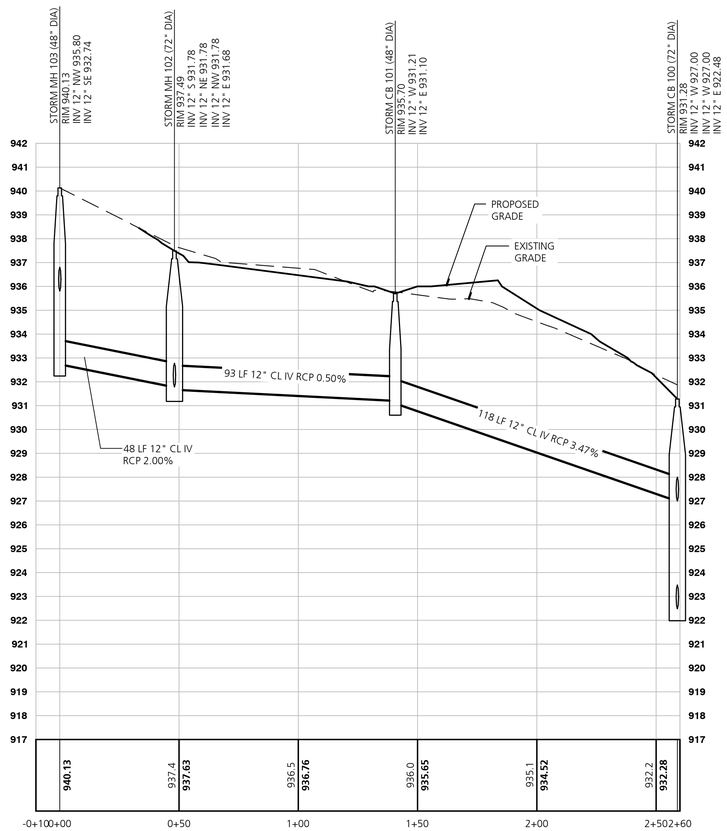
2 STORM CB 107 TO CB100 (PLAN 0+00 TO 1+75)
SCALE: 1" = 30'



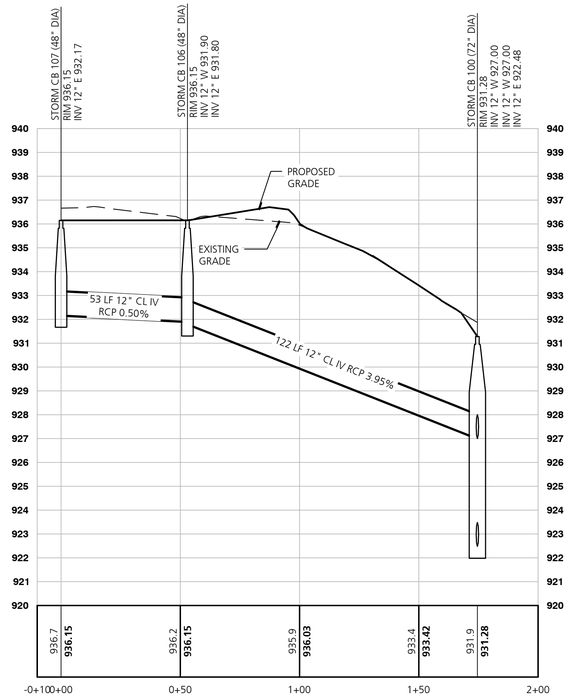
3 STORM CB 104 TO MH 102 (PLAN 0+00 TO 0+27)
SCALE: 1" = 30'



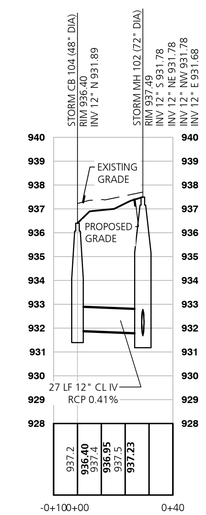
4 STORM CB 105 TO MH 102 (PLAN 0+28 TO 0+00)
SCALE: 1" = 30'



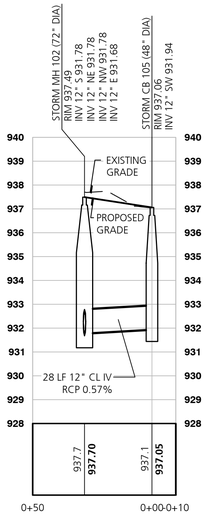
1 STORM MH 103 TO CB 100 (PROFILE 0+00 TO 2+59)
SCALE: HORIZONTAL - 1" = 30' VERTICAL - 1" = 3'



2 STORM CB 107 TO CB 100 (PROFILE 0+00 TO 1+75)
SCALE: 1" = 30'



3 STORM CB 104 TO MH 102 (PROFILE 0+00 TO 0+27)
SCALE: 1" = 30'



3 STORM CB 105 TO MH 102 (PROFILE 0+28 TO 0+00)
SCALE: 1" = 30'

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

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Department of
Military and Veterans Affairs
Construct MVSB Howell
STORM SEWER PROFILE

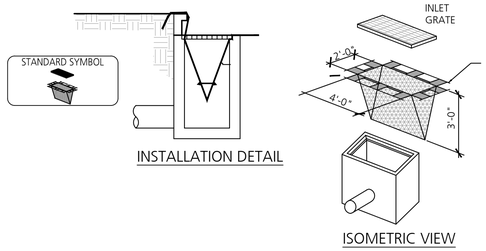
DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

DATE
AUG 12, 2024

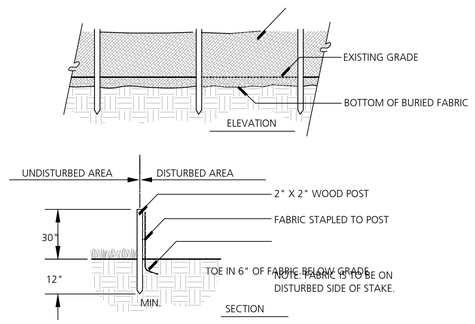
ISSUED FOR
☐ PRELIMINARY
■ CONSTRUCTION
☐ FINAL RECORD

IDENTIFICATION NO.
DMVA PROJECT NO.
288522004
DTMB PROJECT NO.
511/24024.CAK

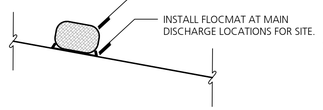
SHEET
C4.0



1 Inlet Protection Filter
NO SCALE

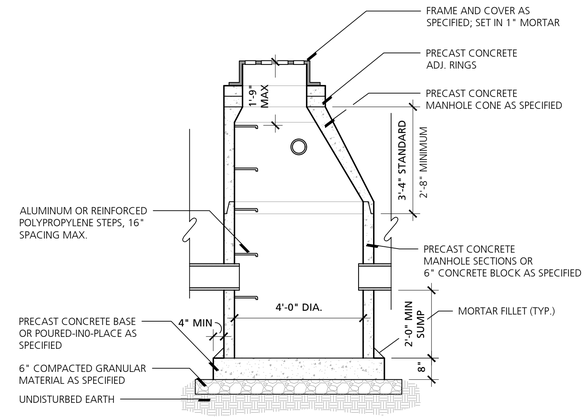


2 Filter Fabric Fence
NO SCALE

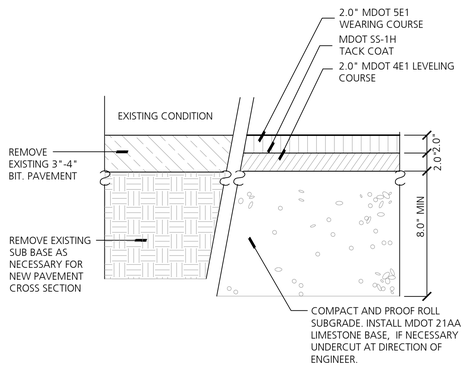


NOTES:
1. INSTALL PER MANUFACTURER'S RECOMMENDATIONS
2. FOR AREAS WITH HIGH CONSTRUCTION TRAFFIC/ACTIVITY, DRIVE METAL POSTS THROUGH EEL HANDLES BEHIND EELS EVERY 6 FOOT TO PREVENT VEHICLES FROM DRIVING OVER EELS.
3. PLACE EEL ON GROUND SURFACE THAT HAS BEEN PREPARED BY REMOVING LARGE DEBRIS, RAKING (OR DRAG HARROWING) SURFACE, AND COMPACTING LOOSE SOIL PRIOR TO EEL PLACEMENT.

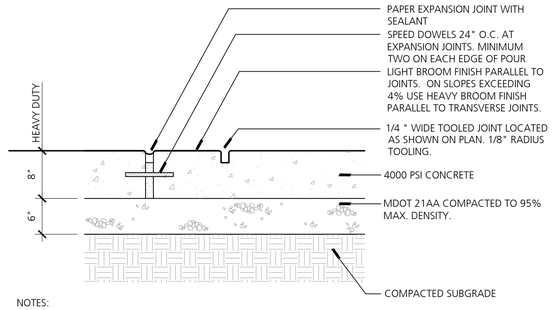
3 Filter Rolls
NO SCALE



4 4' Diameter Catch Basin
NO SCALE

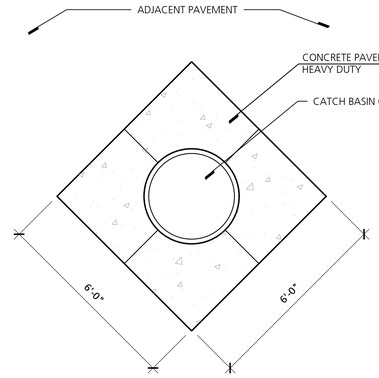


5 Standard Duty Asphalt
Not to Scale

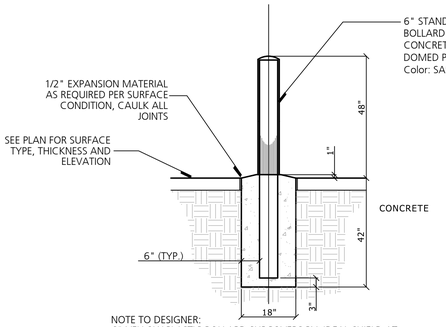


NOTES:
1. 1/2" EXPANSION JOINTS SHALL BE SPACED SUCH THAT NO SINGLE DIMENSION EXCEEDS 40 LINEAL FT. AND THE AREA ISOLATED BY THE EXPANSION JOINTS SHALL NOT EXCEED 500 SQ. FT. SEAL ALL EXPANSION JOINTS.
2. 1/2 " EXPANSION PAPER SHALL BE PLACED AT ALL LOCATIONS THAT NEW SIDEWALK ABUTS CONCRETE CURB OR EXISTING SIDEWALK.
3. CONSTRUCTION MANAGER SHALL INSPECT ALL FORMS AND REVIEW JOINT PLACEMENT PRIOR TO POUR.
4. HAND TOOL JOINTS TO 1/4 SLAB THICKNESS. IF NECESSARY TO ACHIEVE JOINT DEPTH, SAWCUT WITHIN HAND TOOLED JOINT TO ACHIEVE FULL DEPTH.

6 Concrete Pavement
Not to Scale

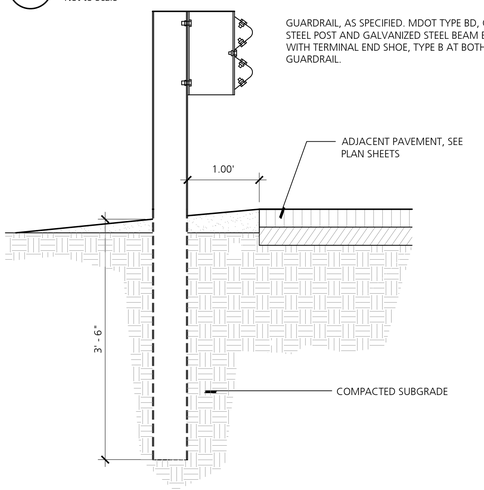


7 Catch Basin Boxout
NOT TO SCALE

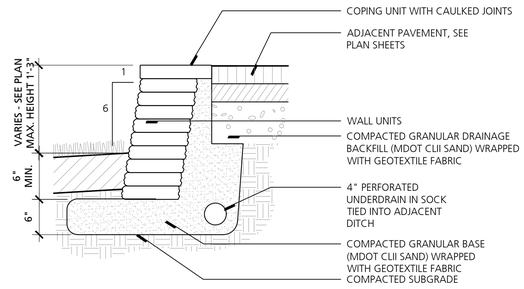


NOTE TO DESIGNER:
6" YELLOW PLASTIC BOLLARD SLIPCOVERS BY: IDEAL SHIELD AT WWW.IDEALSHIELD.COM OR POSTGUARD (YELLOW WITH BLUE STRIPING) AT WWW.POSTGUARD.COM/BOLLARDCOVERS.PH OR APPROVED EQUAL

8 Bollard
NO SCALE



9 Guard Rail
NO SCALE



10 Unit Retaining Wall
SCALE: 1" = 1'-0"

STATE OF MICHIGAN
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Department of Military and Veterans Affairs
Construct MVSB Howell
DETAILS

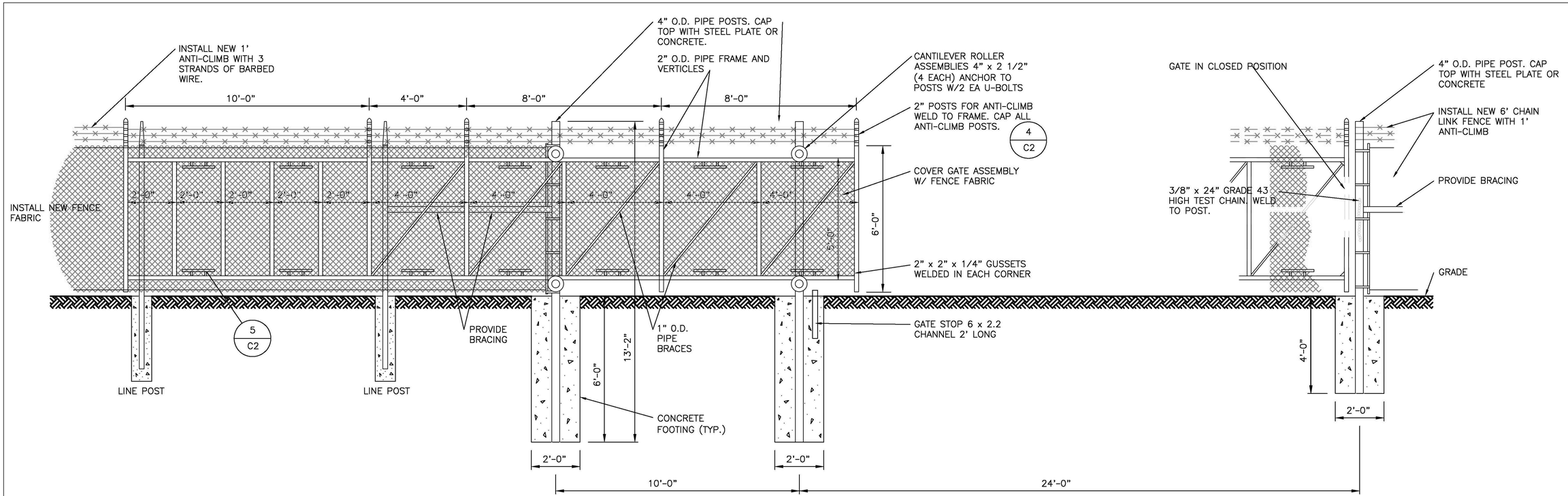
DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

DATE: AUG 12, 2024

ISSUED FOR
☐ PRELIMINARY
■ CONSTRUCTION
☐ FINAL RECORD

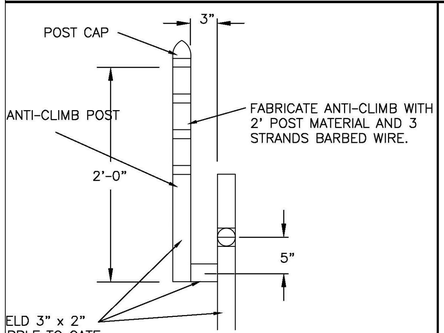
IDENTIFICATION NO.
DMVA PROJECT NO. 268822004
DTMB PROJECT NO. 511/24024CAK

SHEET C5.0



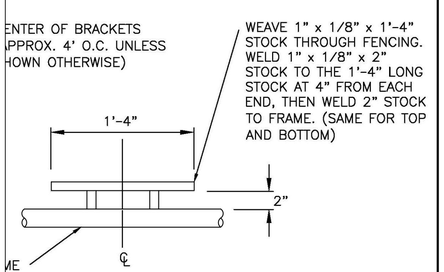
3 15' SLIDING GATE DETAILS

SCALE: N/A



4 ANTI-CLIMB DETAIL

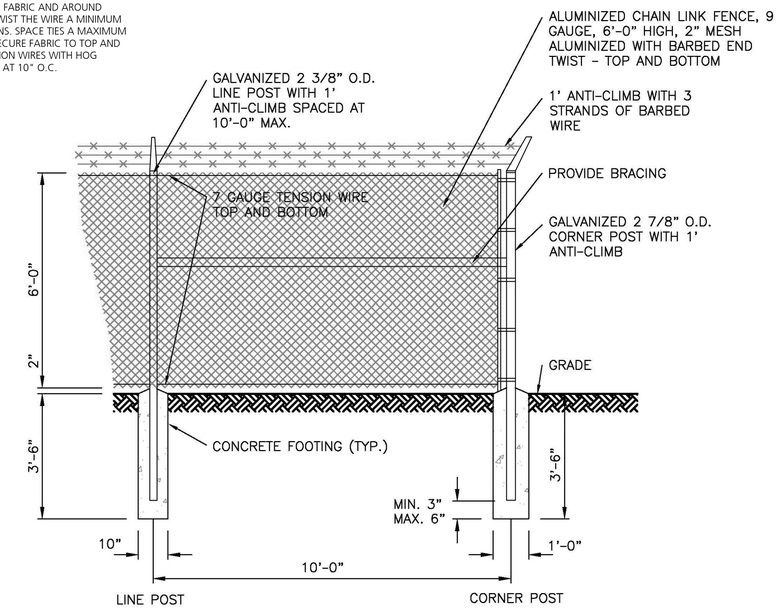
SCALE: NONE



5 BRACING DETAIL

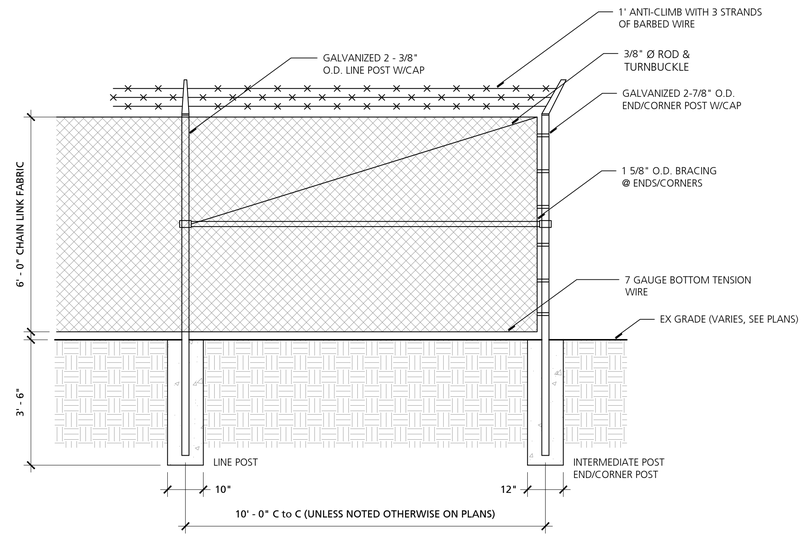
SCALE: NONE

NOTE: USE STEEL WIRE OF PROPER LENGTH TO FIRMLY SECURE FENCE FABRIC TO THE LINE POSTS BY EXTENDING THE WIRE THROUGH THE FABRIC AND AROUND POSTS, AND TWIST THE WIRE A MINIMUM OF THREE TURNS. SPACE TIES A MAXIMUM OF 12" O.C. SECURE FABRIC TO TOP AND BOTTOM TENSION WIRES WITH HOG RINGS SPACED AT 10" O.C.



2 TYPICAL NEW FENCING

SCALE: NONE



1 POST DETAIL

SCALE: NONE

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Ann Arbor, MI 48103
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Department of Military and Veterans Affairs
Construct MVSB Howell
DETAILS

DESIGNED KE	DRAWN MK, BR	CHECKED KE	APPROVED
DATE	AUG 12, 2024		
ISSUED FOR	☐ PRELIMINARY	■ CONSTRUCTION	☐ FINAL RECORD
IDENTIFICATION NO.	DMVA PROJECT NO. 265352004 DTMB PROJECT NO. 511/24024CAK		
SHEET	C5.1		

DESIGN NOTES:

MICHIGAN BUILDING CODE 2015
MICHIGAN MECHANICAL CODE 2021
NATIONAL ELECTRICAL CODE 2023

USAGE GROUP: S2
AREA - 5084 GSF
HEIGHT - 16'-5¼"
STORIES - 1
CONSTRUCTION TYPE - II B
NOT SPRINKLERED

DESIGN LOADS:
ROOF LIVE LOAD - 20 psf
COLLATERAL LOADS - 38 lbs + 10 plf FOR RADIANT HEATERS
25 lbs LOAD AT LIGHT FIXTURE
10 psf LOAD FOR OVERHEAD DOOR
SNOW LOAD - GROUND SNOW LOAD = 25 psf
SNOW EXPOSURE COEFFICIENT = C PARTIALLY EXPOSED
THERMAL COEFFICIENT = 1.1
ROOF SNOW LOAD = 19.25 psf
WIND LOAD - BASIC WIND SPEED = 90 mph
ULTIMATE WIND SPEED = 115 mph
WIND EXPOSURE = C
SEISMIC DESIGN - SPECTRAL RESPONSE ACCELERATION FOR 0.2 SECONDS = BETWEEN 5 AND 10
SPECTRAL RESPONSE ACCELERATION FOR 1 SECOND = BETWEEN 4 AND 6
SITE CLASS = D
FLOOR LOAD - 100 psf

SOIL BEARING CAPACITY: 2000 PSF

GENERAL NOTES:

CONTRACTOR'S SHALL INCLUDE IN THEIR BID ALL WORK AND COMPONENTS ASSOCIATED WITH CONSTRUCTING THEIR PORTION OF THE PROJECT.

METAL STRUCTURE, CLADDING ACCESSORIES ARE PRE-ENGINEERED METAL BUILDING COMPONENTS.

INSTALL A HARDENER/SEALER ON THE INTERIOR CONCRETE SLAB.

FINISH EXTERIOR CONCRETE WITH A BROOM FINISH PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW.

SEAL ALL EXPANSION JOINTS IN CONCRETE SLABS AND WALLS.

PAINT MAN-DOORS AND FRAMES.

PAINT MOUNTING BACKBOARD, ELECTRICAL CONDUITS AND GAS PIPING LOCATED WITHIN THE BUILDING.

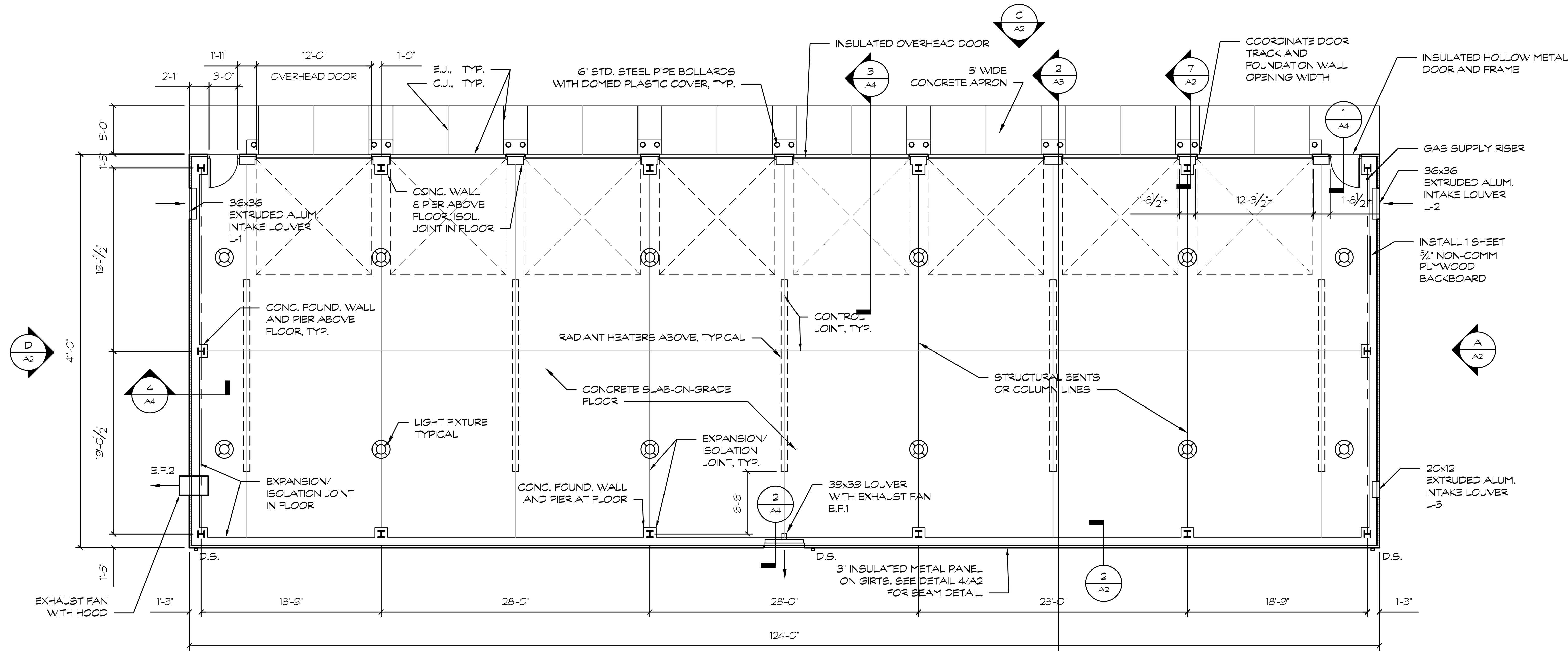
PAINT ALL NON-GALVANIZED STEEL OR MANUFACTURER PRIMED COMPONENTS WITHIN THE BUILDING.

SPECIAL INSPECTIONS:

SOILS -
SUBGRADE, BEARING, COMPACTION MATERIALS, DENSITY, LIFT THICKNESS, AND COMPACTION OF LIFTS
CONCRETE -
DESIGN MIX, REINFORCEMENT, ANCHORS, FORM WORK, CYLINDERS, SLUMP, AIR CONTENT, TEMPERATURE, INSTALLATION, AND CURING
BOLTED AND WELDED CONNECTIONS

ARCHITECTURAL SHEET INDEX:

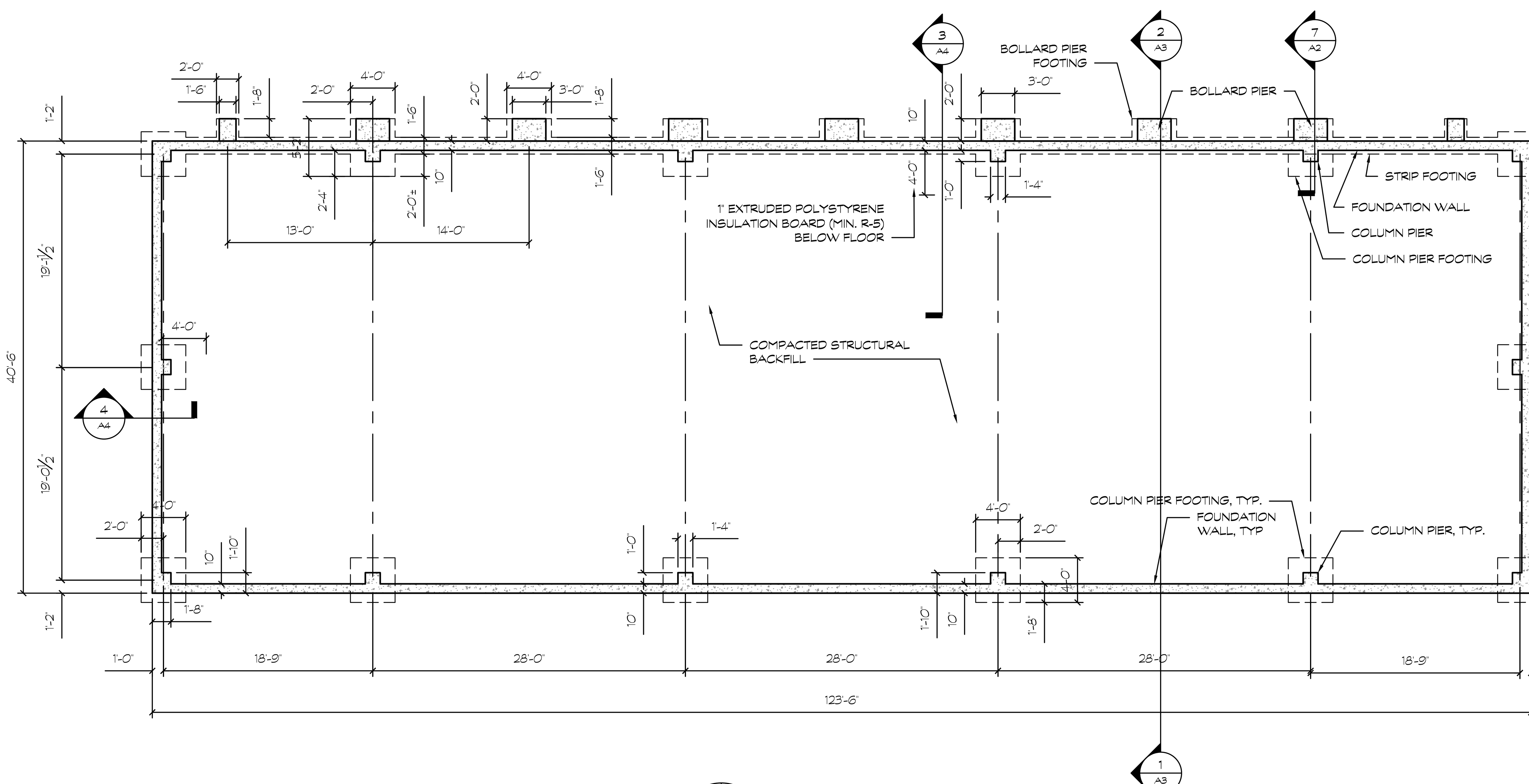
A1.0 FLOOR PLAN AND FOUNDATION PLAN
A2.0 ELEVATIONS AND DETAILS
A3.0 BUILDING SECTION
A4.0 SECTIONS AND DETAILS



NOTE:
DOWNSPOUTS: MIN. 3"x4" FABRICATED ALUMINUM TUBE, MIN. 0.032" ALUMINUM SHEETS, COLOR MATCH BUILDING SIDING.
LOCATE DOWNPOUTS MAX. 50'-0" APART AND SYMMETRICAL ON THE BUILDING FACADE.
DOWNSPOUTS ARE TO CONNECT TO UNDERGROUND STORM PIPING SHOWN ON CIVIL PLANS.

N

FLOOR PLAN
SCALE: 1/8" = 1'-0"



N

FOUNDATION PLAN
SCALE: 1/8" = 1'-0"

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT + BUDGET
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

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Straub Pettitt Yaste

Department of
Military and Veterans Affairs
Construct MSVB Howell
FLOOR AND FOUNDATION PLANS

DESIGNED: KE	DRAWN: MK, BR	CHECKED: KE	APPROVED:

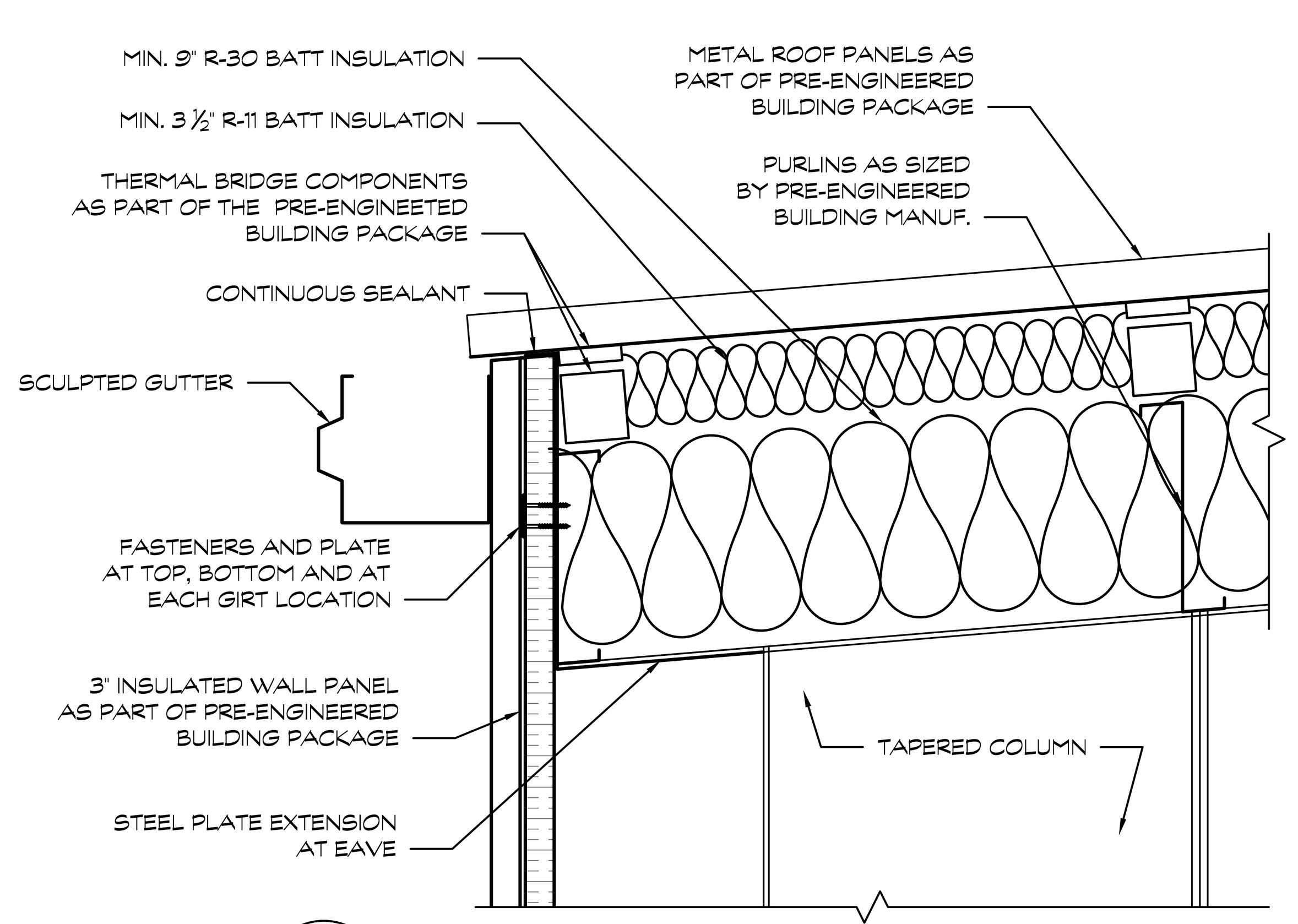
ISSUED FOR		DATE
PRELIMINARY	■	JUL 25, 2024
CONSTRUCTION	■	AUG 9, 2024
FINAL RECORD	☐	

IDENTIFICATION NO.
DMVA PROJECT NO. 26B352004
DTMB PROJECT NO. 511/24024.CAK

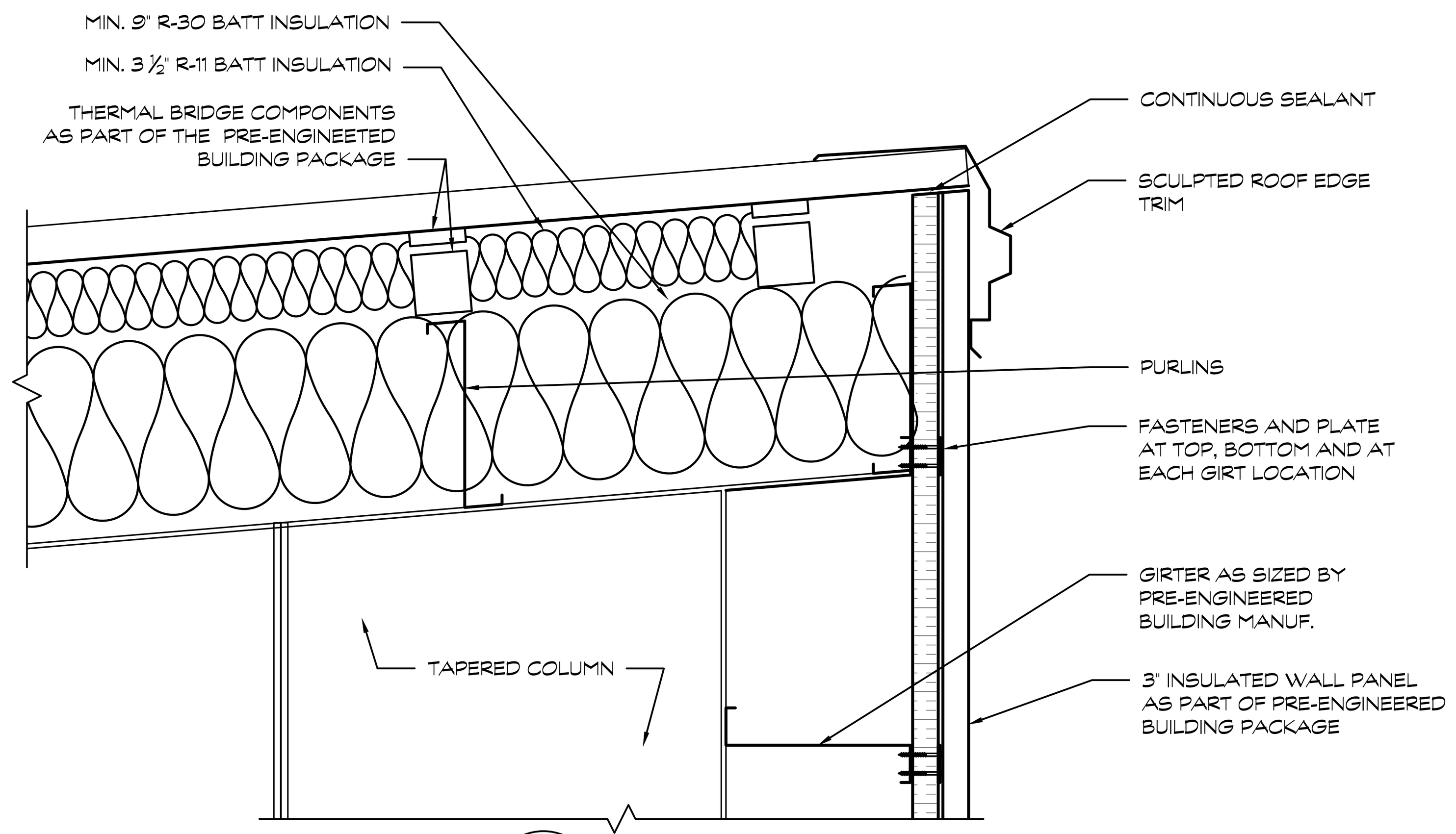
STATE OF MICHIGAN
RICHARD A. MANN
ARCHITECT
No. 1301038626
LICENSED ARCHITECT

SHEET
A1.0

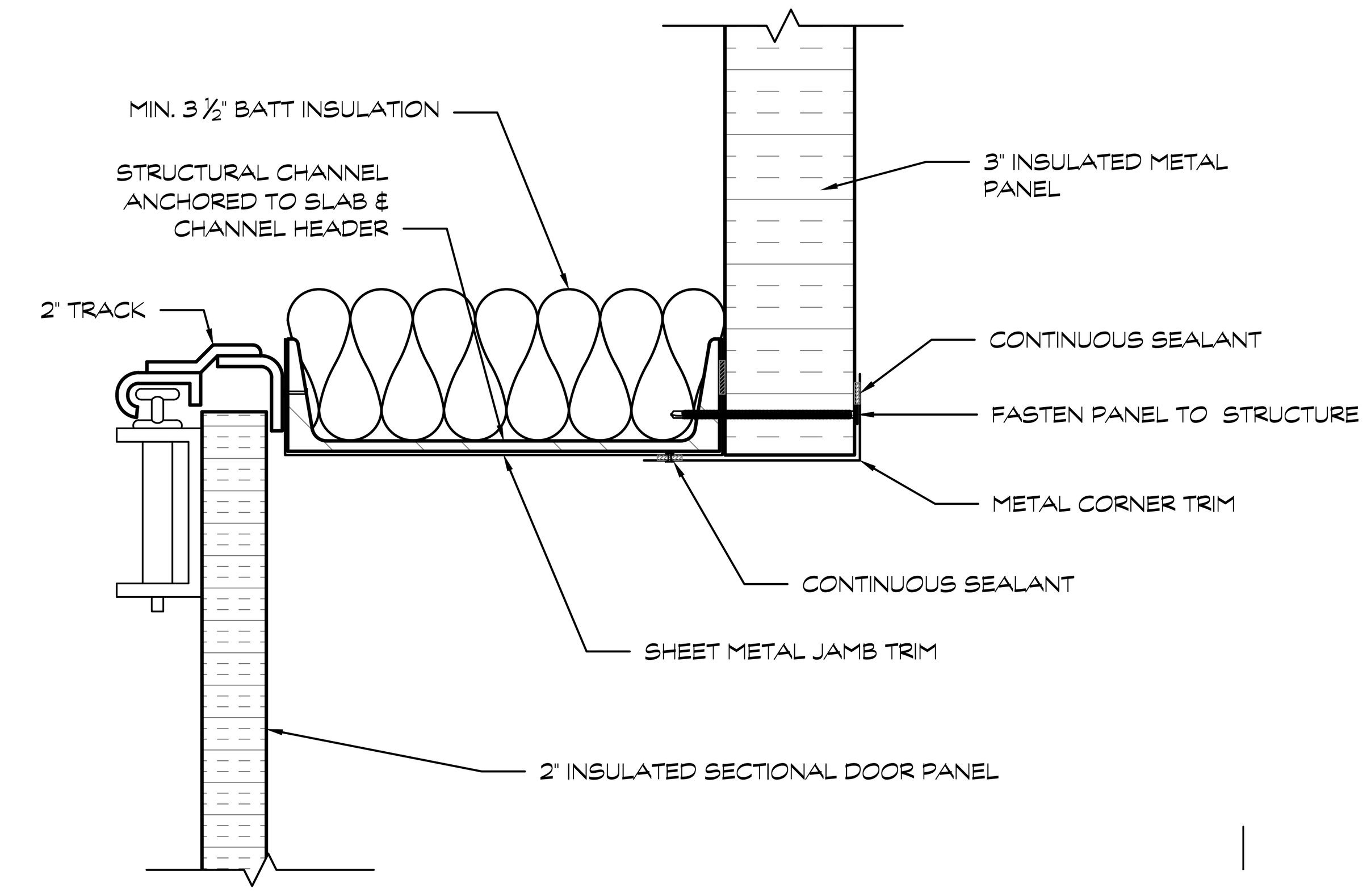
P:\2024\2423 - Howell Armory\ Floor Plan.dwg [8-08-2024]
Plotted Fri, 8-9-2024 at 5:37pm by RichardMann



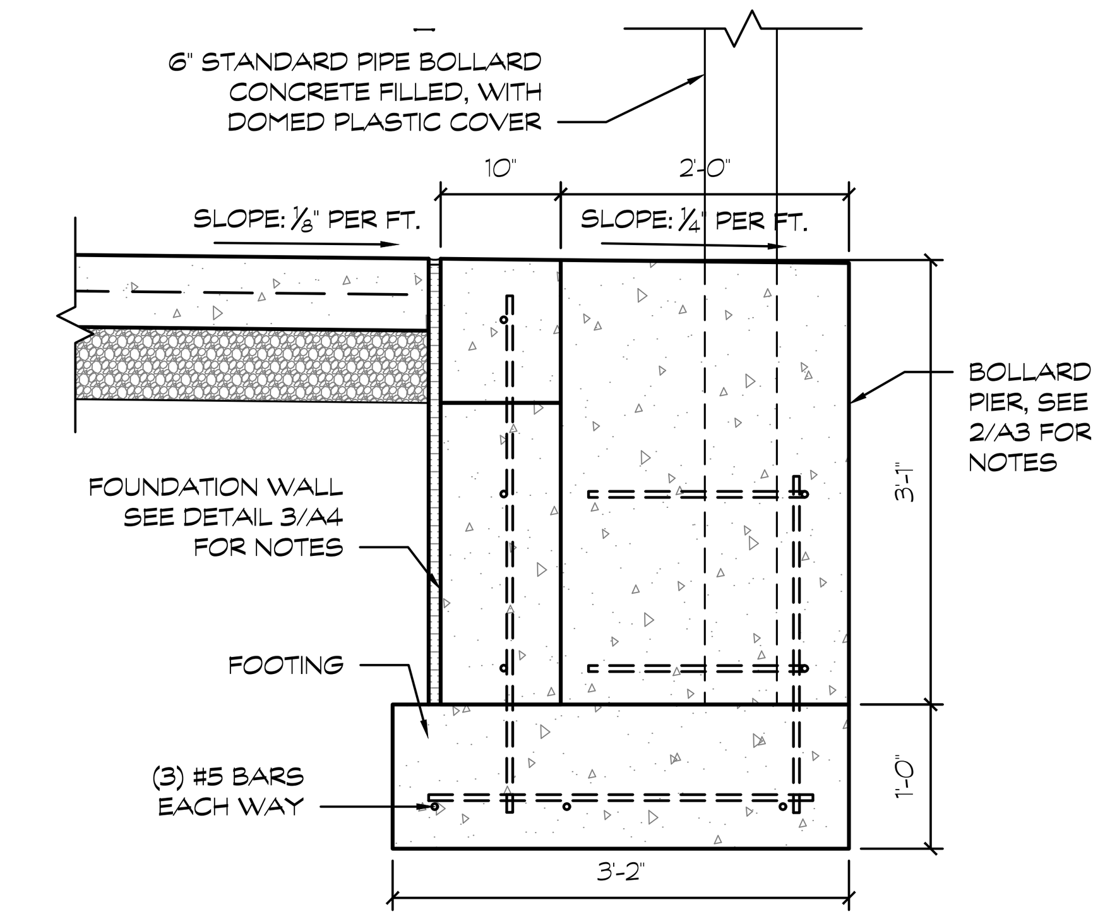
1 A3 ROOF/WALL DETAIL (LOW)
SCALE: 1-1/2" = 1'-0"



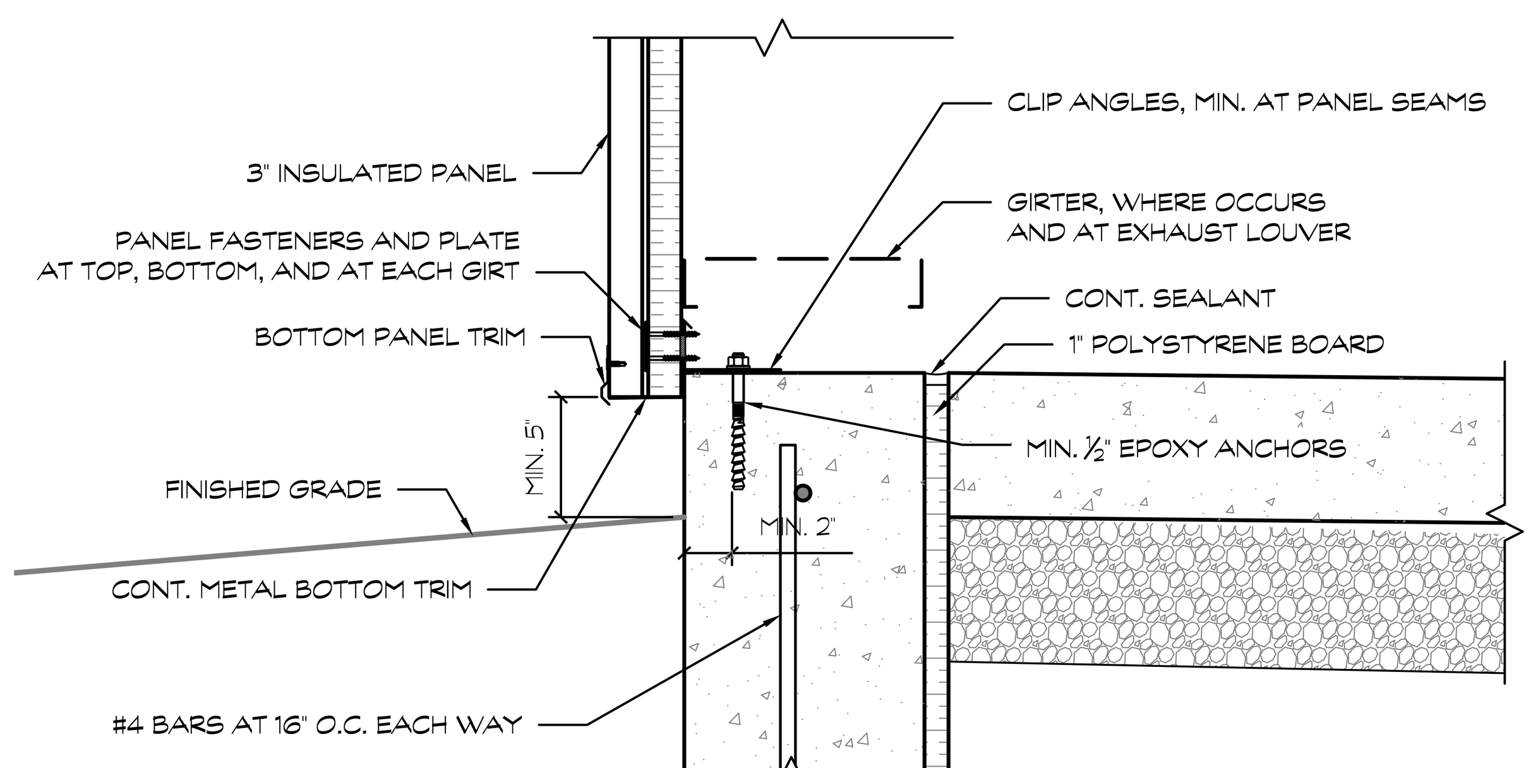
3 A3 ROOF/WALL DETAIL (HIGH)
SCALE: 1-1/2" = 1'-0"



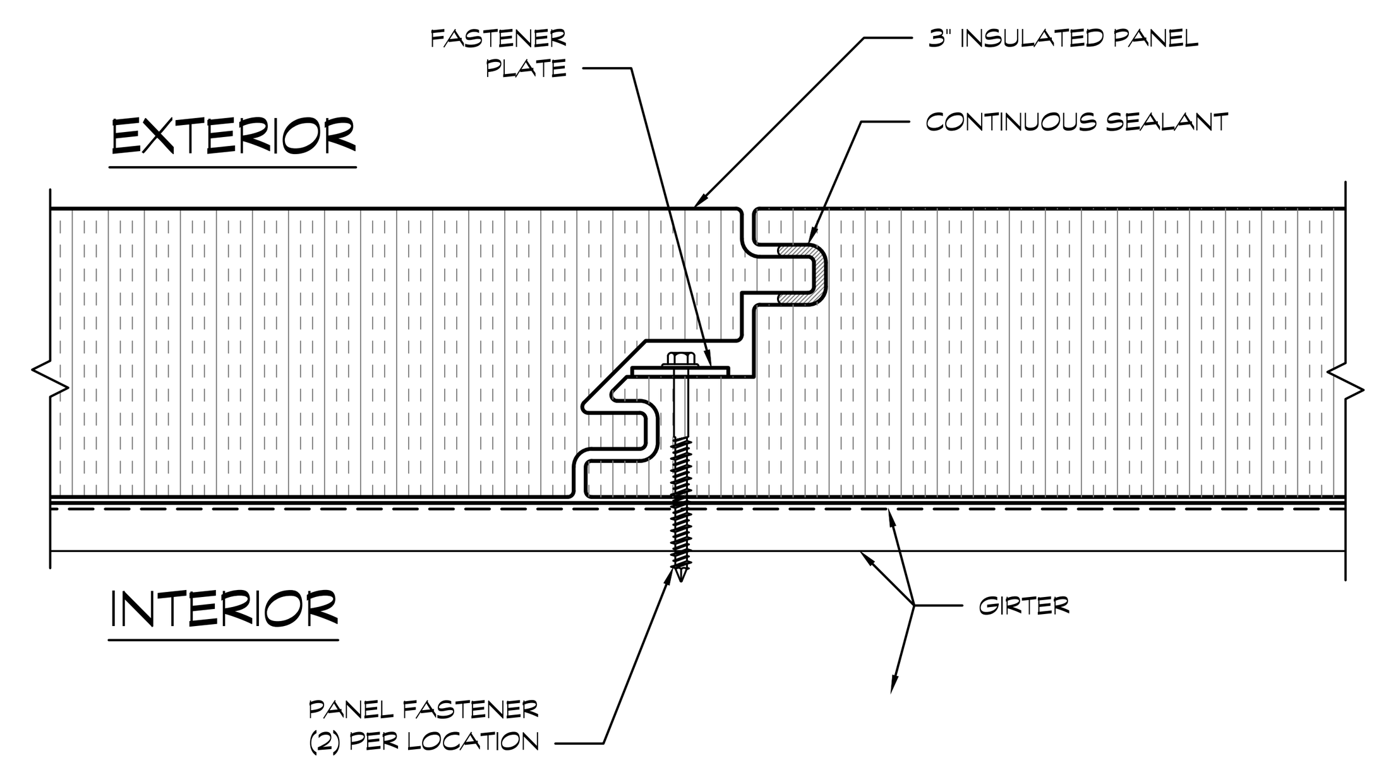
5 A3 OVERHEAD DOOR JAMB
SCALE: 3" = 1'-0"



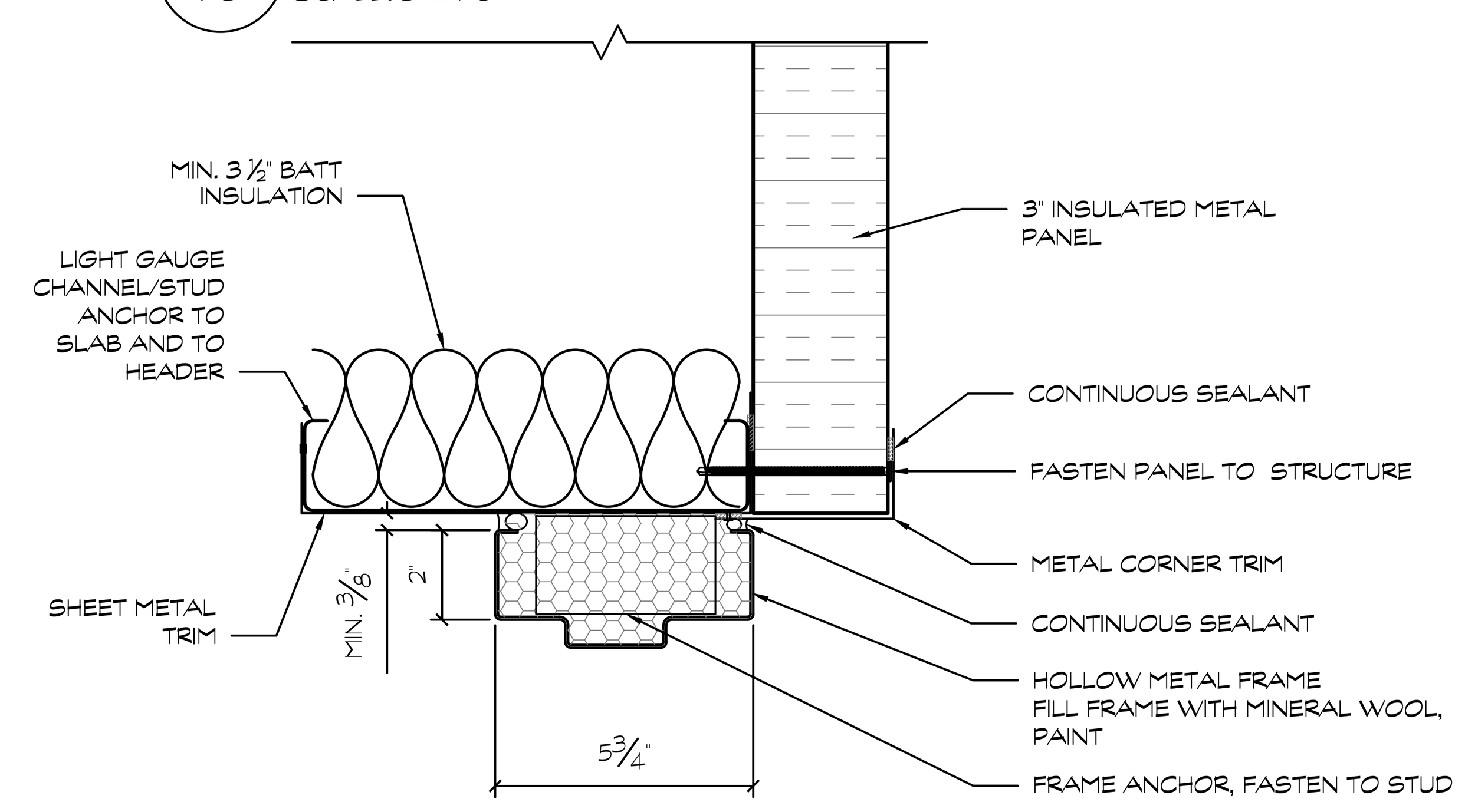
7 A1|A2 INTERMEDIATE PIER
SCALE: 3/4" = 1'-0"



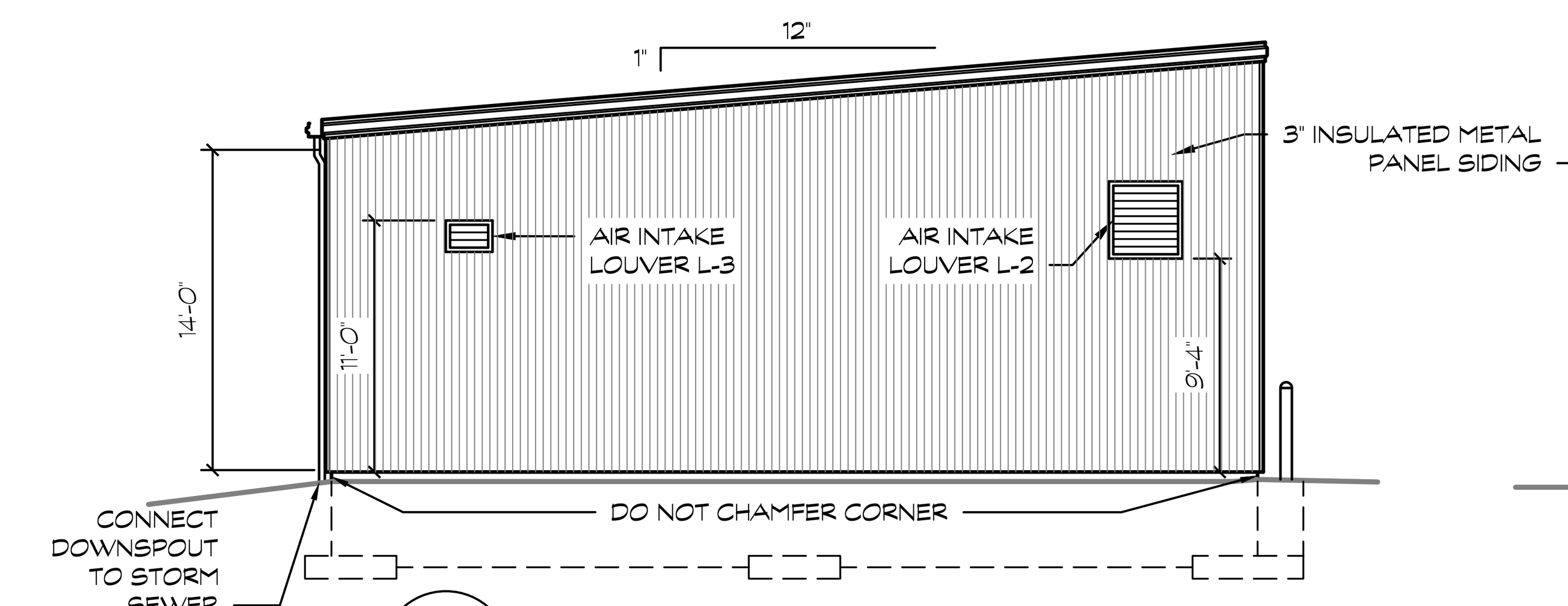
2 A1|A3 BOTTOM OF WALL DETAIL
SCALE: 1-1/2" = 1'-0"



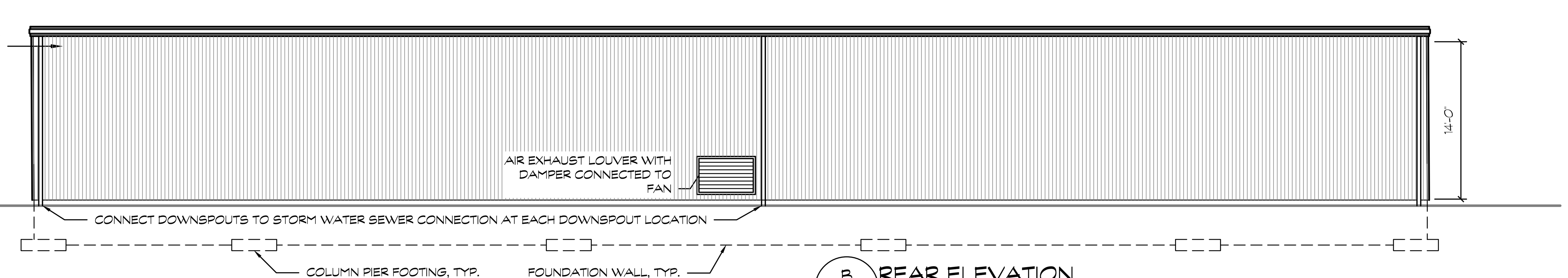
4 A3 PANEL SEAM DETAIL
SCALE: 6" = 1'-0"



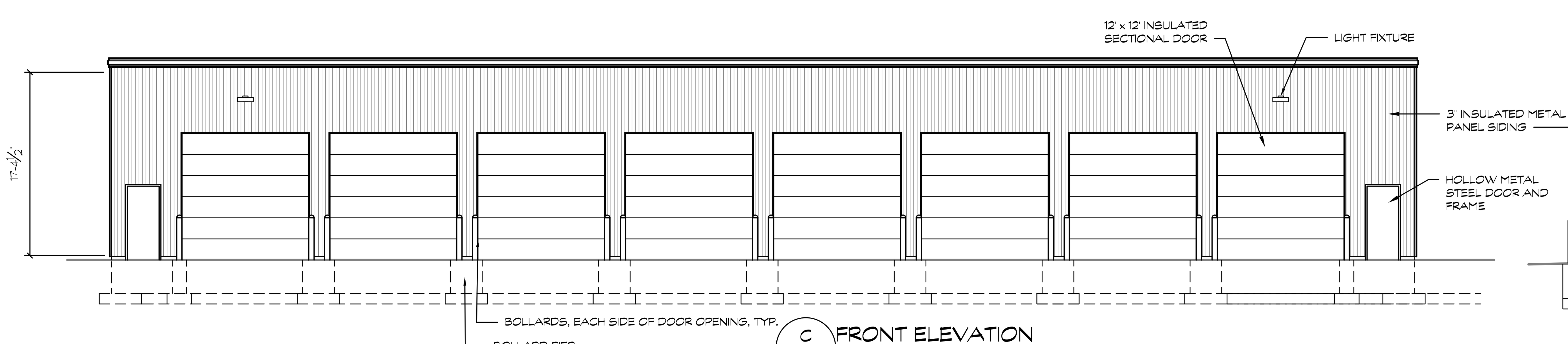
6 A3 MAN-DOOR HEAD
SCALE: 3" = 1'-0"



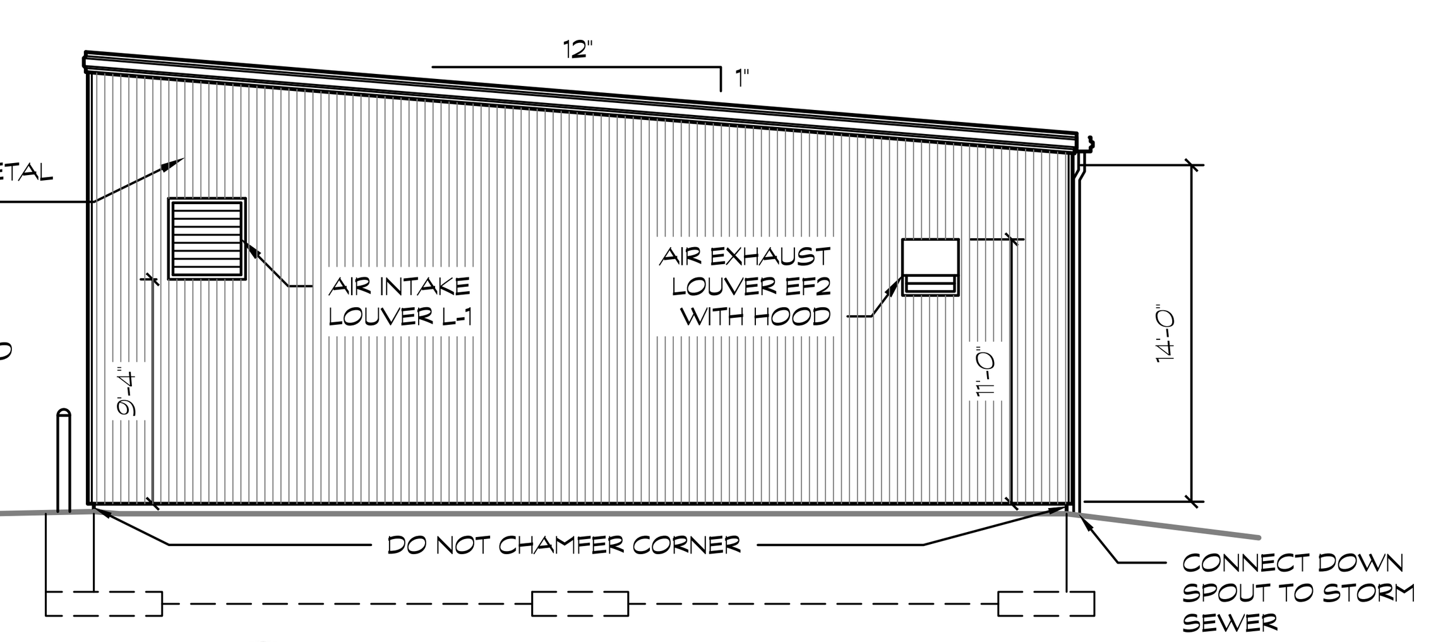
A A1 SIDE ELEVATION
SCALE: 1/8" = 1'-0"



B A1 REAR ELEVATION
SCALE: 1/8" = 1'-0"



C A1 FRONT ELEVATION
SCALE: 1/8" = 1'-0"



D A1 SIDE ELEVATION
SCALE: 1/8" = 1'-0"

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT + BUDGET
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

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Straub Pettitt Yaste

Department of Military and Veterans Affairs
Construct MVSB Howell
ELEVATIONS AND DETAILS

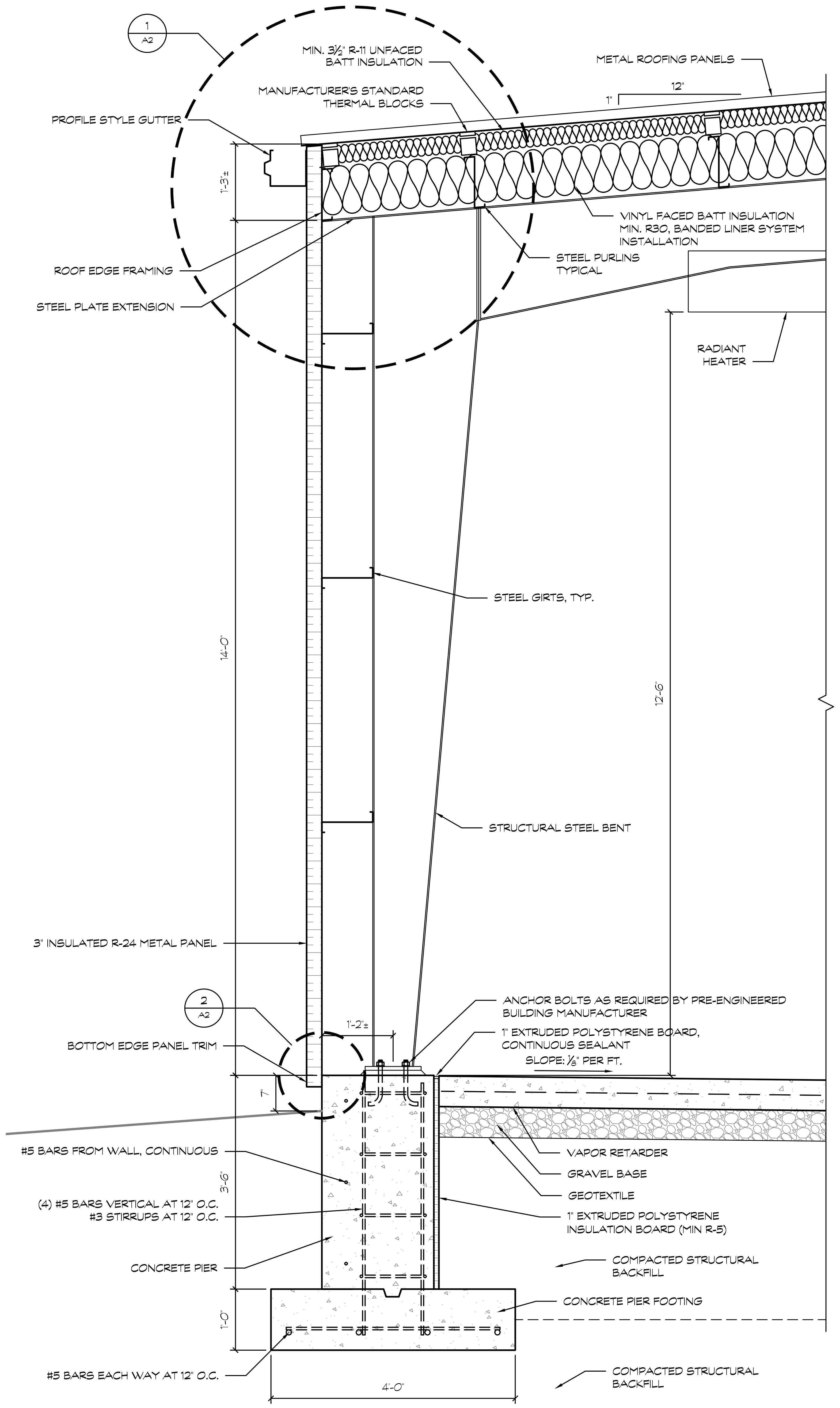
DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

ISSUED FOR		DATE
PRELIMINARY	■	JUL 25, 2024
CONSTRUCTION	■	AUG 9, 2024
FINAL RECORD	□	

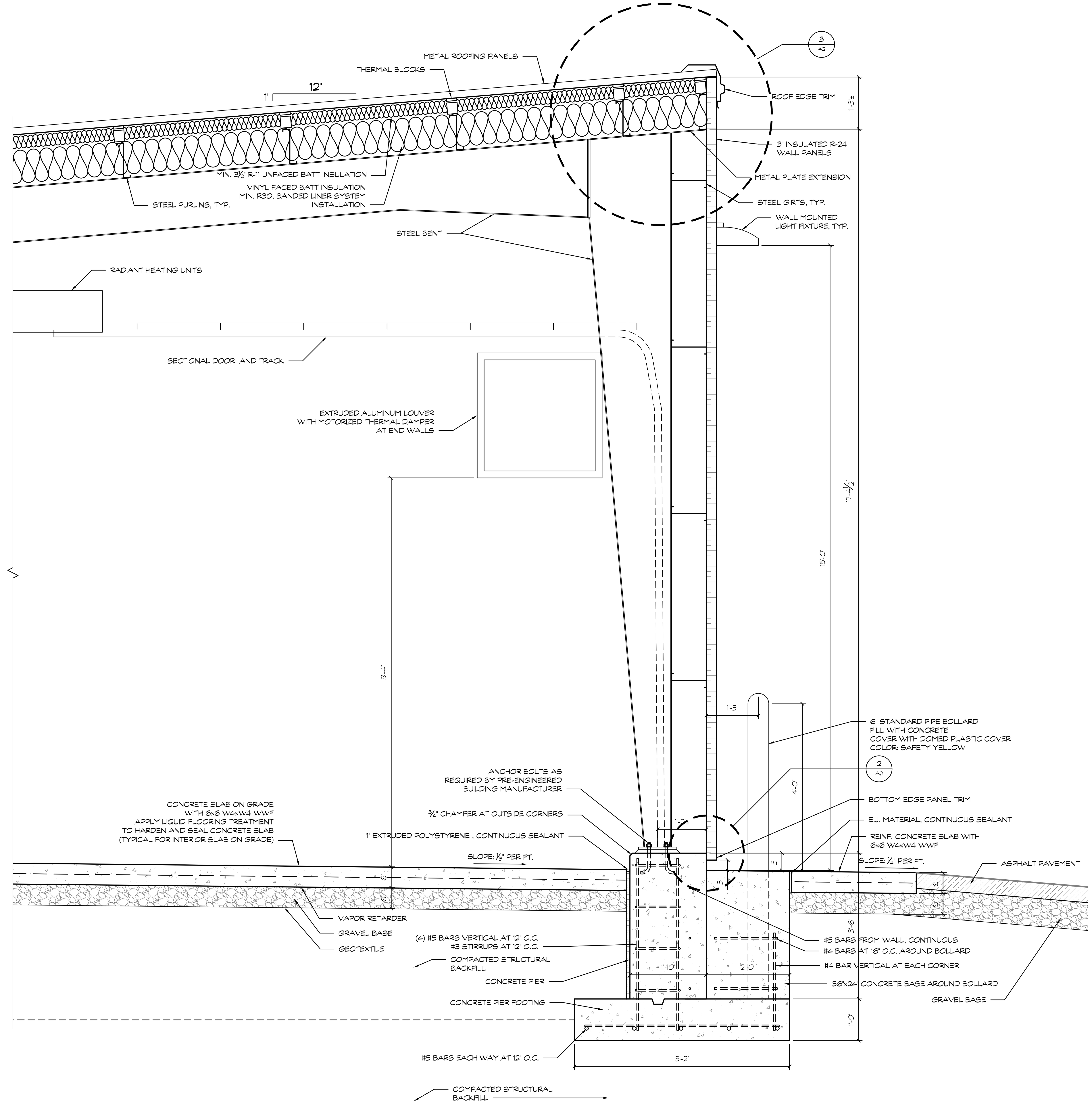
IDENTIFICATION NO.
DMVA PROJECT NO. 26S352004
DTMB PROJECT NO. 511/24024.CAK

SHEET A2.0

P:\2024\2423 - Howell Armory\ Floor Plan.dwg [8-08-2024]
Plotted Thu, 8-8-2024 at 2:28pm by RichardMann



1 A1 WALL SECTION (LOW SIDE)
SCALE: 3/4" = 1'-0"



2 A1 WALL SECTION (HIGH SIDE)
SCALE: 3/4" = 1'-0"

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT + BUDGET
DESIGN AND CONSTRUCTION DIVISION
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Department of Military and Veterans Affairs
Construct MVSB Howell
BUILDING SECTION

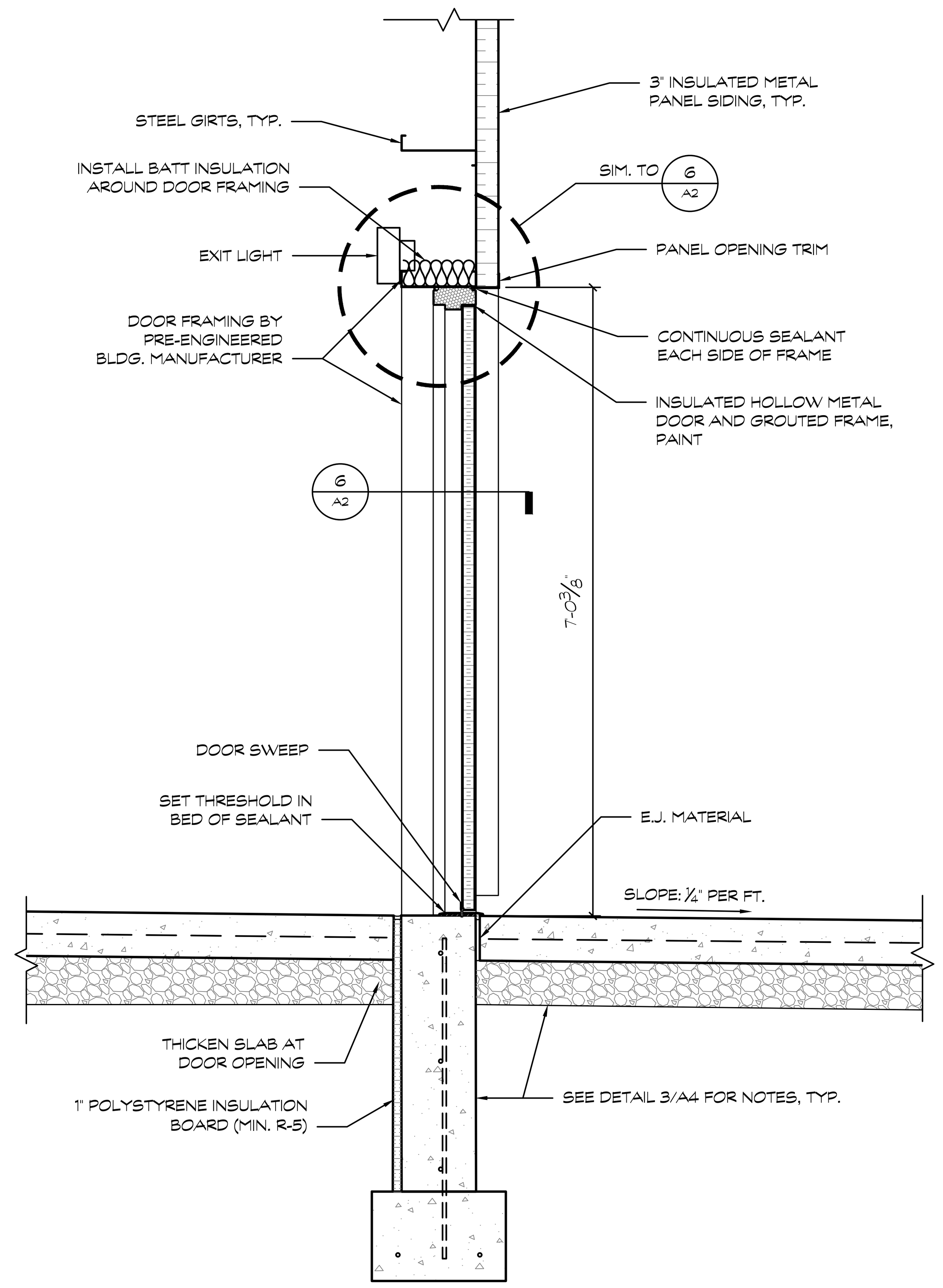
DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

ISSUED FOR		DATE
PRELIMINARY	■	JUL 25, 2024
CONSTRUCTION	■	AUG 9, 2024
FINAL RECORD	□	

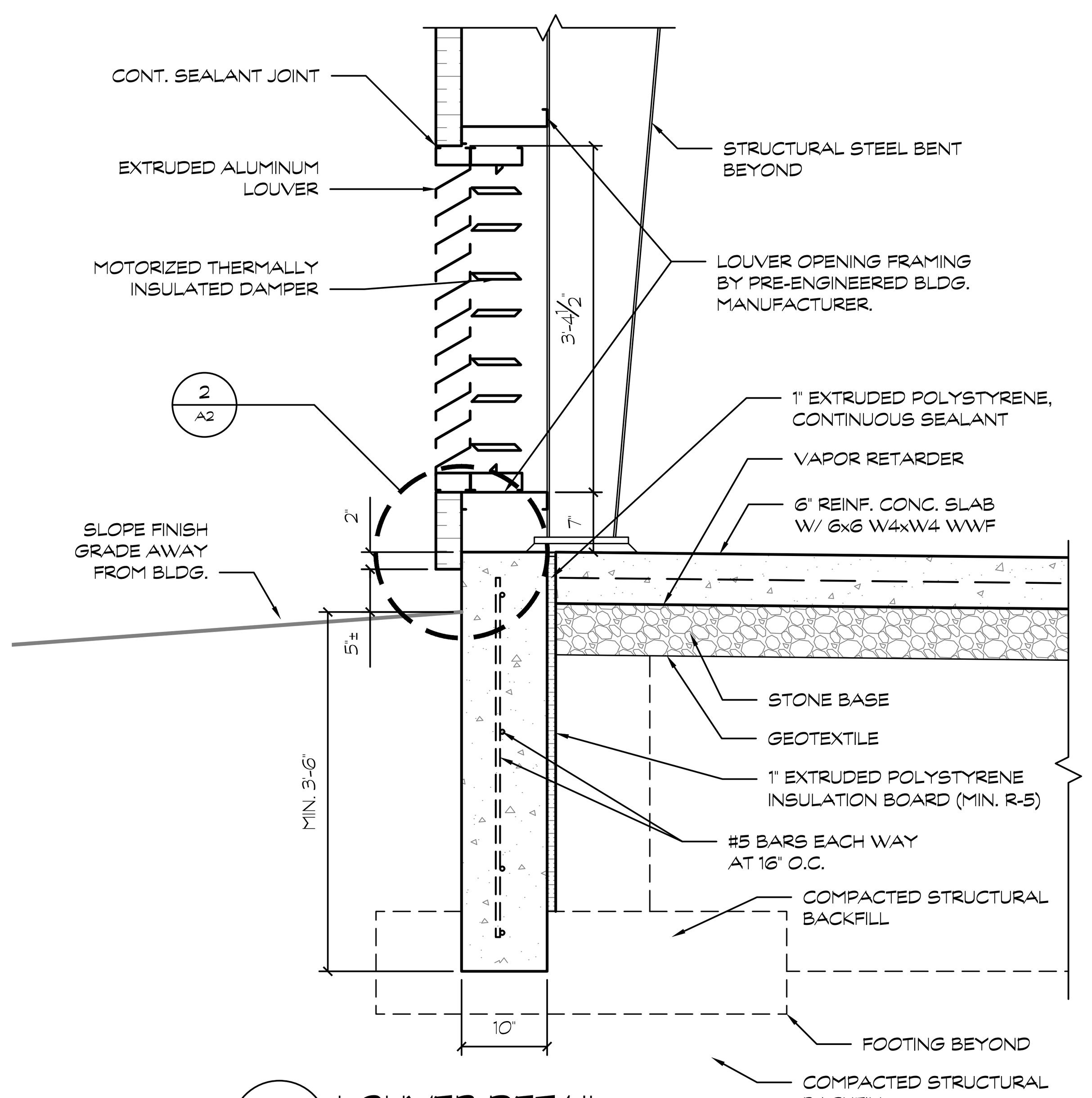
IDENTIFICATION NO.
DMVA PROJECT NO. 2663523004
DTMB PROJECT NO. 511/24024CAK

SHEET
A3.0

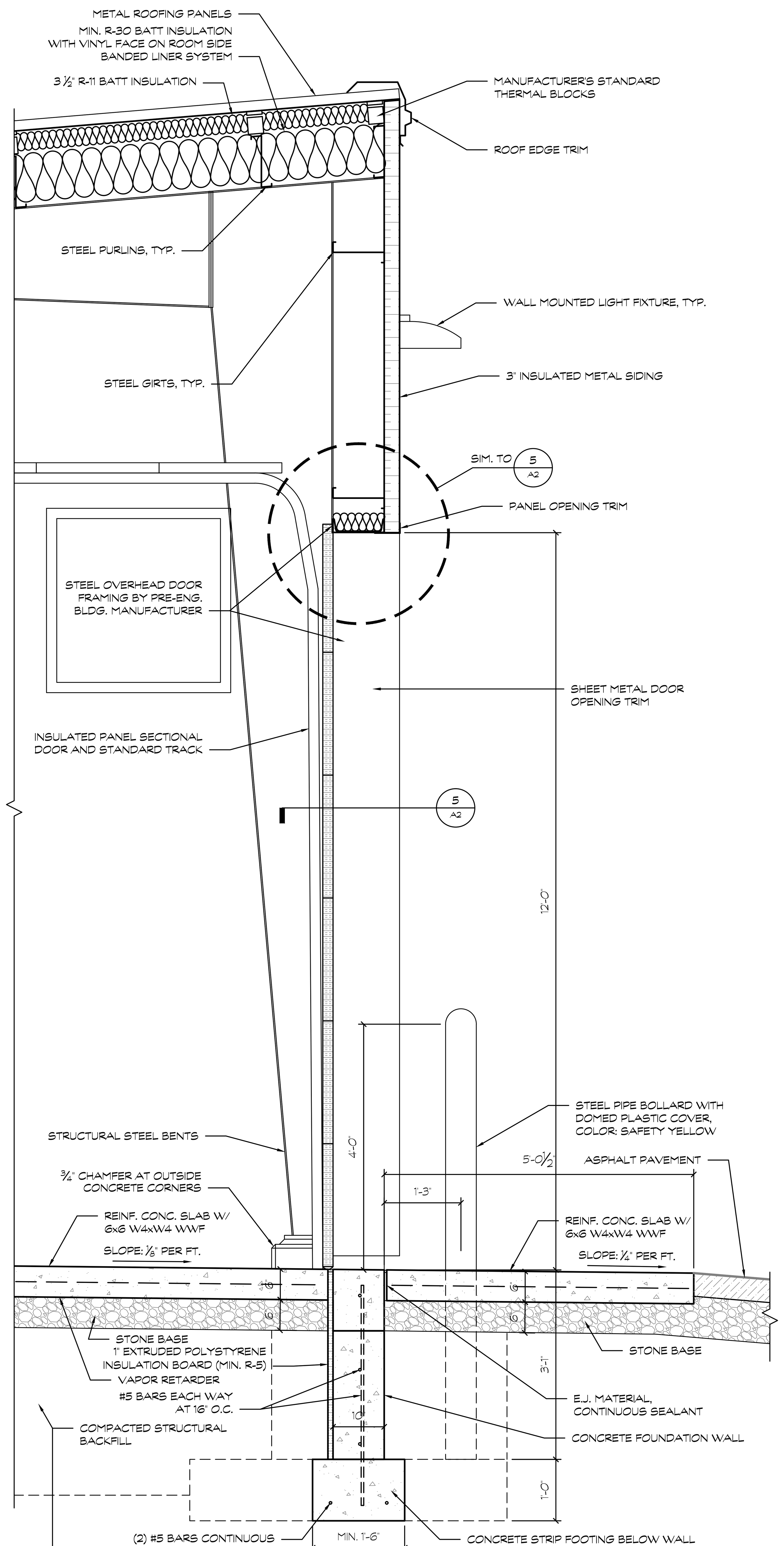
P:\2024\2423 - Howell Armory\... Floor Plan.dwg [8-08-2024]
Plotted Thu, 8-8-2024 at 2:29pm by RichardMann



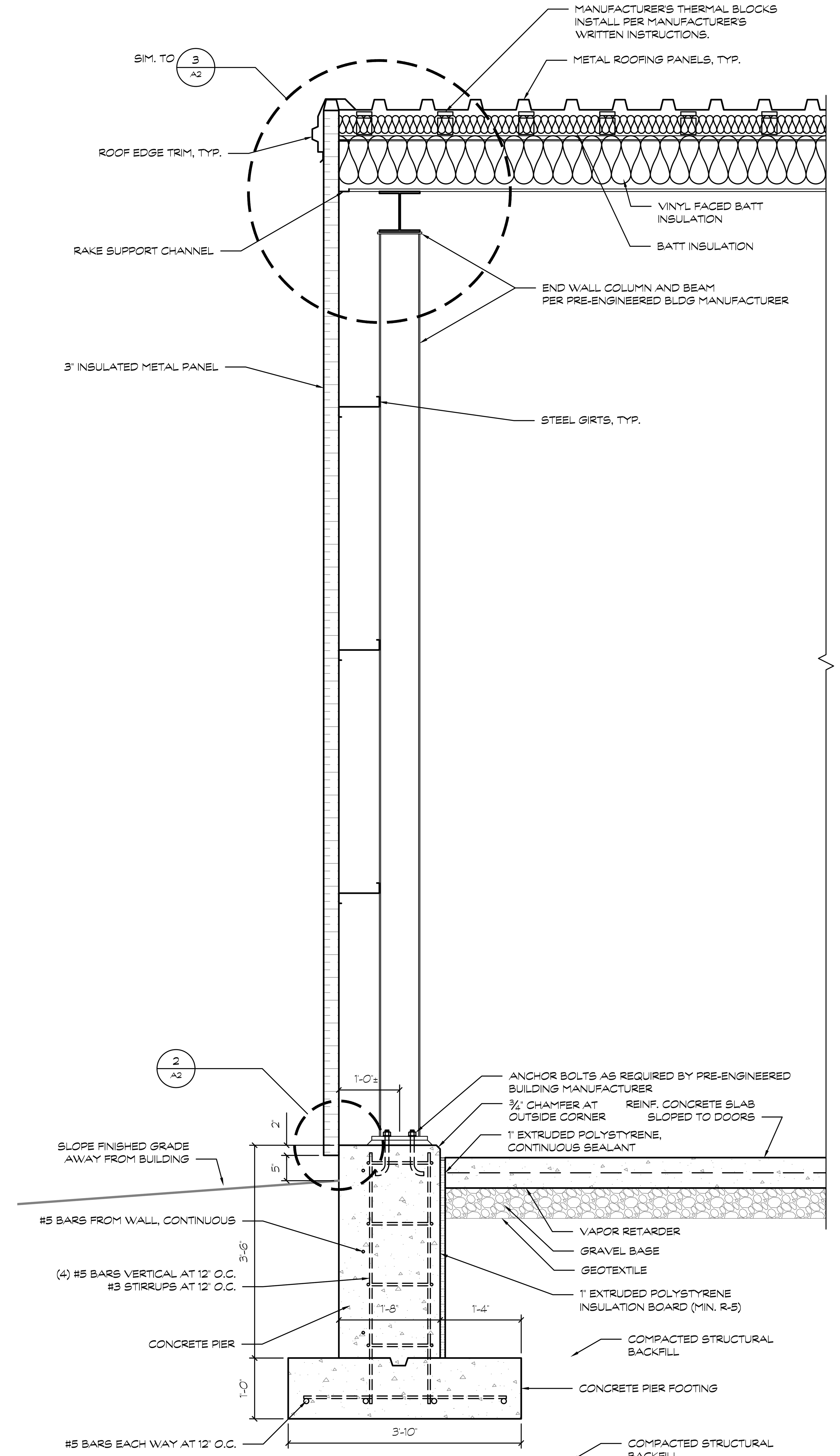
1 A1 MAN-DOOR DETAIL
SCALE: 3/4" = 1'-0"



2 A1 LOUVER DETAIL
SCALE: 3/4" = 1'-0"



3 A1 OVERHEAD DOOR SECTION
SCALE: 3/4" = 1'-0"



4 A1 END WALL SECTION
SCALE: 3/4" = 1'-0"

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT + BUDGET
DESIGN AND CONSTRUCTION DIVISION
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Straub Pettitt Yaste

Department of Military and Veterans Affairs
Construct MVSB Howell
WALL SECTIONS AND DETAILS

DESIGNED: KE
DRAWN: MK, BR
CHECKED: KE
APPROVED:

ISSUED FOR	DATE
PRELIMINARY	JUL 25, 2024
CONSTRUCTION	AUG 9, 2024
FINAL RECORD	

IDENTIFICATION NO.
DMVA PROJECT NO. 266352004
DTMB PROJECT NO. 511/24024.CAK

SHEET A4.0

P:\2024\2423 - Howell Armory\ Floor Plan.dwg [8-08-2024]
Plotted Thu, 8-8-2024 at 2:29pm by RichardMann

MECHANICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
S.O.M.	STATE OF MICHIGAN
(V.I.F.)	VERIFY IN FIELD
—— G ——	NATURAL GAS PIPING
(valve symbol)	I.F.G.C. GAS SHUT-OFF VALVE
I.R.H.	INRA RED HEATER (TUBULAR)
B	INRA RED HEATER BURNER
EF	EXHAUST FAN
L	LOUVER
EA	EXHAUST AIR
OA	OUTDOOR AIR
(T)	THERMOSTAT
[T]	CO / NO2 TRANSMITTER
[M]	MOTORIZED DAMPER
MBH / CFH	1000 BTU PER HOUR
A.F.F.	ABOVE FINISHED FLOOR
UNGRD	UNDERGROUND
M.M.C.	MICHIGAN MECHANICAL CODE
I.E.C.C.	INTERNATIONAL ENERGY CONSERVATION CODE
I.F.G.C.	INTERNATIONAL FUEL GAS CODE
M.C.	MECHANICAL CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR
S.C	SITE CONTRACTOR
A.H.J.	AUTHORITY HAVING JURISDICTION

OUTDOOR AND EXHAUST AIR VENTILATION SCHEDULE

EXHAUST AIR SYSTEMS	EXHAUST AIR REQUIRED TO BE PROVIDED BY SPECIFIED EXHAUST EQUIPMENT								
	OCCUPANCY CATEGORY	ZONE FLOOR AREA A_Z	AREA EXHAUST AIR RATE REQUIRED	BREATHING ZONE EXHAUST AIRFLOW	ZONE AIR DISTRIBUTION EFFECTIVENESS	MINIMUM INTERMITTANT EXHAUST AIR REQUIRED	INTERMITTANT EXHAUST AIR PROVIDED	MINIMUM CO / NO2 DEMAND EXH. AIR REQUIRED	CO / NO2 DEMAND EXH. AIR PROVIDED
EF-1, L-1 & L-2 5,600 CFM	PARKING GARAGE (CO / NO2 DEMAND)	5,000	.75 CFM PER SQ. FT	3,750	1.0	n/a	n/a	3,750	5,600
EF-2 & L-3 500 CFM	PARKING GARAGE (INTERMITTANT)	5,000	.05 CFM PER SQ. FT	250	1.0	250	500	n/a	n/a

TOTAL OUTDOOR AIR AND EXHAUST AIR PROVIDED IS IN COMPLIANCE WITH THE REQUIRED OUTDOOR VENTILATION AIR PER 2021 MICHIGAN MECHANICAL CODE SECTION 404

EXHAUST FAN SCHEDULE

MARK	GREENHECK MODEL No.	CFM	SP "WG	MOTOR (VARI-GREEN)		CONTROL	LOCATION	DRIVE	APPLICATION	REMARKS (BELOW SCHEDULE)
				HP	VOLTAGE					
EF-1	AER-E30C-615-C-VGD7	5,600	0.30	3/4	208 V 3 PH	T-STAT & GAS MONITOR	GARAGE	DIRECT	SUMMER VENTILATION & CO / NO2 DEMAND EXHAUST	E1
EF-2	SE1-12-426-VG	500	0.20	1/4	115 V 1 PH	INTERLOCK W / LIGHTS	GARAGE	DIRECT	INTERMITTANT GARGE EXHAUST	E1

E1 COMPLETE WITH DISCONNECT SWITCH, BACKDRAFT DAMPER, WALL HOUSING WITH GRILLE AND WEATHERHOOD. PROVIDE ALL ACCESSORIES REQUIRED FOR WALL INSTALLATION. (COORDINATE WITH ARCHITECTURAL TRADES).

GAS-FIRED INFRARED RADIANT HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	LENGTH FT	BTUH INPUT	ELECTRICAL			VENT SIZE	INTAKE SIZE	WEIGHT LBS	SERVICE	REMARKS (BELOW SCHEDULE)
					FLA	MOP	VOLT					
IRH-1	GORDEN -RAY	BH-80-20	20'-0"	80,000	1	15	115V-1Ø	4"	4"	100 +/-	GARAGE HEATING	R1 R2 R3 R4 R5 R6
IRH-2	GORDEN -RAY	BH-80-20	20'-0"	80,000	1	15	115V-1Ø	4"	4"	100 +/-	GARAGE HEATING	R1 R2 R3 R4 R5 R6
IRH-3	GORDEN -RAY	BH-80-20	20'-0"	80,000	1	15	115V-1Ø	4"	4"	100 +/-	GARAGE HEATING	R1 R2 R3 R4 R5 R6
IRH-4	GORDEN -RAY	BH-80-20	20'-0"	80,000	1	15	115V-1Ø	4"	4"	100 +/-	GARAGE HEATING	R1 R2 R3 R4 R5 R6
IRH-5	GORDEN -RAY	BH-80-20	20'-0"	80,000	1	15	115V-1Ø	4"	4"	100 +/-	GARAGE HEATING	R1 R2 R3 R4 R5 R6

R1 PROVIDE WITH REMOTE WALL MOUNTED THERMOSTAT (REFER TO PLAN).

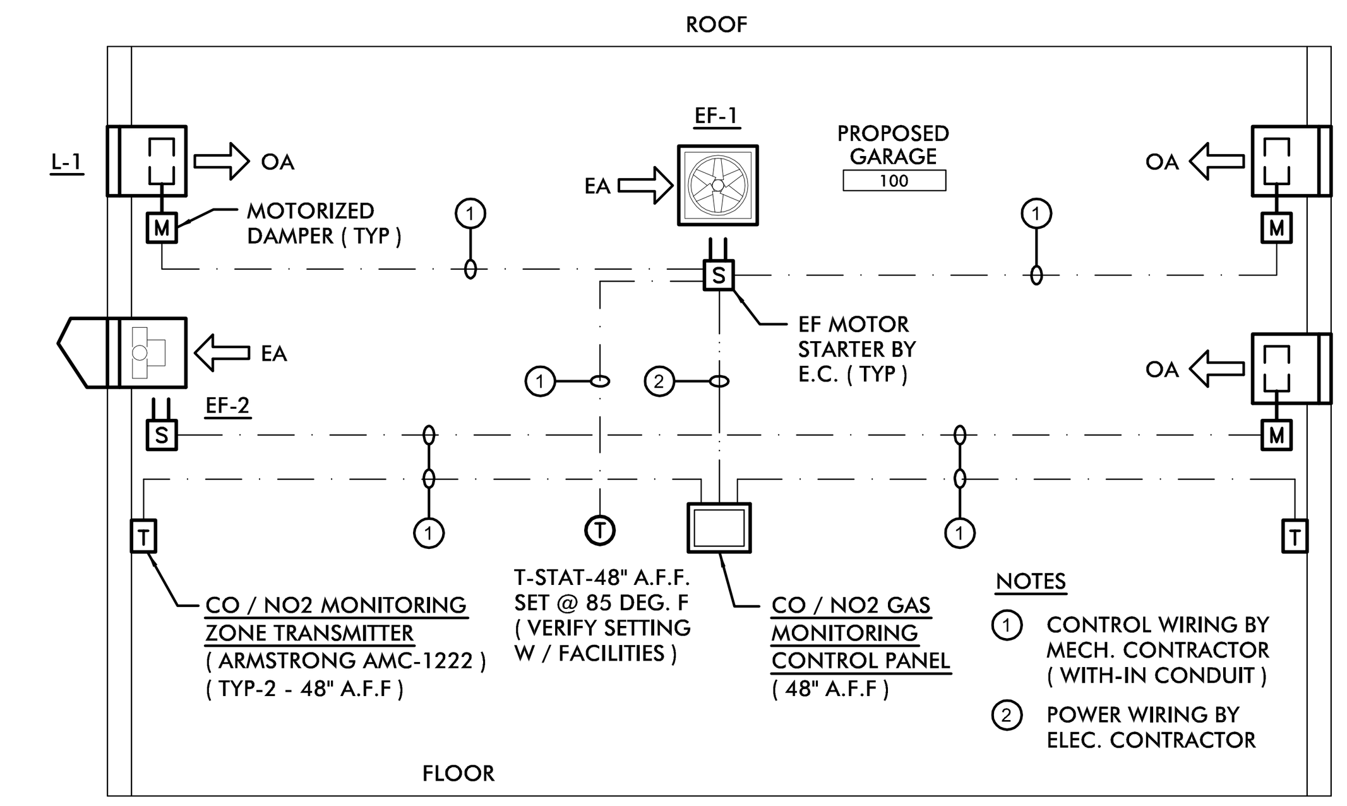
R2 PROVIDE WITH CATEGORY III EXHAUST VENT AND COMBUSTION AIR INTAKE THRU THRU ROOF (COORDINATE WITH ARCHITECTURAL TRADES).

R3 COORDINATE MOUNTING HEIGHT WITH ARCHITECTURAL TRADES CONFORMING TO ALL MANUFACTURER MOUNTING REQUIREMENTS INCLUDING CLEARANCE FROM ALL COMBUSTIBLES, GARAGE DOORS AND LIGHTING.

R4 PROVIDE REFLECTOR WITH BURNER TUBE AND PROVIDE ALL REQUIRED HEAT SHIELDS UNDER TUBES IF CLEARANCE ISSUES WITH COMBUSTIBLE ITEMS ARE ENCOUNTERED. FIELD COORDINATE IF REQUIRED.

R5 UNIT SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.

R6 ACCEPTABLE EQUIVALENT MANUFACTURERS INCLUDE SOLARONICS, RE-VERBRAY, REZNOR, MODINE, STERLING.



SCHEMATIC TEMPERATURE CONTROL DIAGRAM FOR EF-1, EF-2 & CO / NO2 MONITORING SYSTEM

NO SCALE

SEQUENCE OF CONTROL

EXHAUST FAN (EF-1)

1. THERMOSTAT SHALL ENERGIZE EXHAUST FAN (EF-1) & FULLY OPEN MOTORIZED DAMPERS IN LOUVERS L-1 & L-2 TO PROVIDE VENTILATION FOR SPACE BASED ON THE SET POINT OF THERMOSTAT. CO/ NO2 MONITOR SHALL OVERIDE THE THERMOSTAT WHEN REQUIRED IF THERMOSTAT IS NOT CALLING FOR FAN OPERATION. (FIELD VERIFY WITH E.C.)

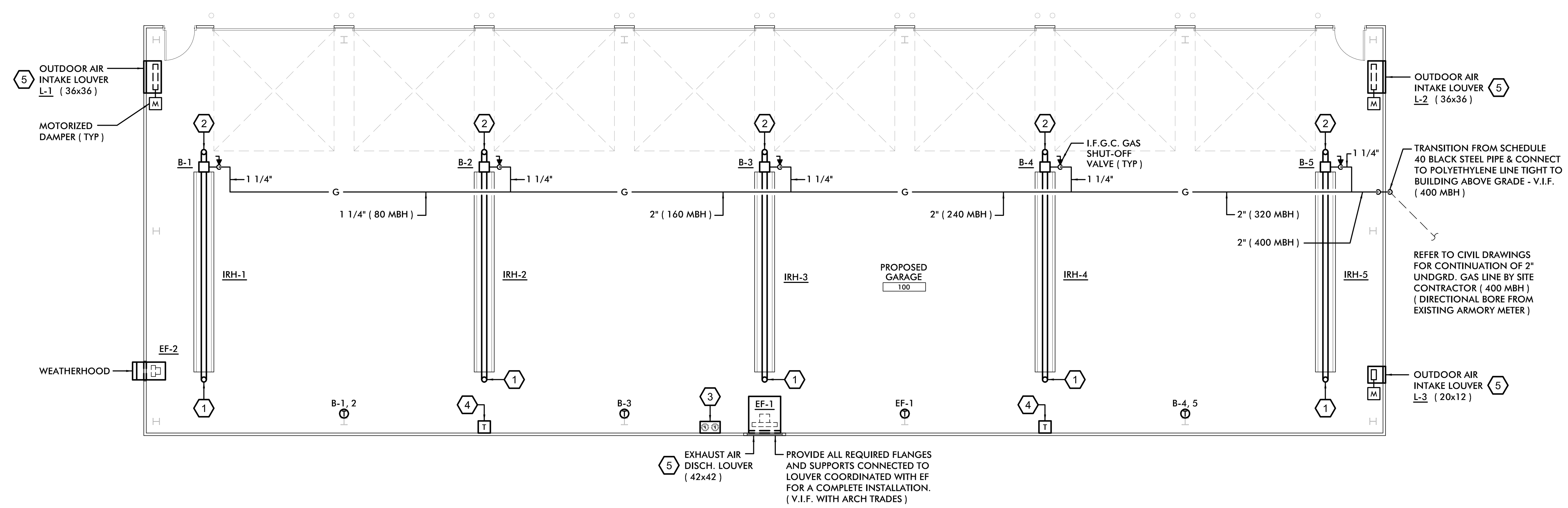
2 CO / NO2 MONITOR SHALL BE EQUAL TO " ARMSTRONG " AMC-1AD. THE MONITOR SHALL ENERGIZE EF-1 AND FULLY OPEN MOTORIZED DAMPERS IN LOUVERS L-1 & L-2 TO PROVIDE THE MAXIMUM EXHAUST AIR REQ'D (5600 CFM) IN THE EVENT THAT CO LEVELS RISE ABOVE 25 PPM AND/ OR NO2 LEVELS IN ABOVE 3 PPM DURING OCCUPIED OR UNOCCUPIED TIMES. EF-1 ALONG WITH OUTDOOR AIR INTAKE LOUVERS PROVIDES THE LATEST M.M.C. REQUIRED VENTILATION AIR (.75 CFM / FT2) TO GARAGE AREA UNTIL CO & NO2 LEVELS DROP BELOW 25 PPM AND 3 PPM RESPECTIVELY & CONTINUE TO OPERATE FOR 30 MINUTES AFTER LEVELS DROP AS REQ'D BY THE LATEST M.M.C. (CO/ NO2 MONITOR SHALL OVERIDE THERMOSTAT WHEN REQUIRED IF THE THERMOSTAT NOT CALLING FOR FAN OPERATION)

EXHAUST FAN (EF-2)

1. MECH. CONTRACTOR SHALL COORDINATE WITH ELECT. CONTRACTOR TO INTERLOCK EF-2 MOTOR STARTER WITH LIGHTS TO ENERGIZE FAN AND FULLY OPEN MOTORIZED DAMPER IN LOUVER (L-3) TO PROVIDE THE MINIMUM INTERMITTANT VENTLATION REQ'D BY THE LATEST M.M.C. (.05 CFM / FT2 RELATIVE TO CO / NO2 DETECTION SYSTEM). FIELD COORDINATE

SPECIAL TEMPERATURE CONTROLS NOTE

THE CONTROL DIAGRAMS AND SEQUENCE OF CONTROLS SHOWN ON THESE DRAWINGS ARE FOR DESIGN INTENT ONLY & MUST NOT BE CONSTRUED AS COMPLETE SYSTEM WIRING DIAGRAMS OR FINAL SEQUENCE OF CONTROLS. MECHANICAL CONTRACTOR MUST PROVIDE COMPLETE SHOP DRAWINGS INDICATING ALL CONTROL WIRING, SYSTEM COMPONENTS, COMPONENT MANUFACTURER AND APPLIED SEQUENCE OF CONTROLS FOR ALL SYSTEMS FOR THE ENGINEERS REVIEW BEFORE PURCHASING ANY EQUIPMENT OR PERFORMING ANY INSTALLATION. ALL CONTROL WIRING SHALL BE INSTALLED IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS.



1 / M1.0 HEATING AND VENTILATION FLOOR PLAN

SCALE: 1/8" = 1'-0"

5,000 SQ FT

SCALE: 1/8" = 1'-0"

MECHANICAL GENERAL NOTES

1. THIS DRAWING IS DIAGRAMATIC & SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE M.C. SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE M.C. TAKING FULL RESPONSIBILITY & LIABILITY FOR SAID DISCREPANCIES.
2. ALL WORK SHALL BE DONE IN ACCORDANCE W / ALL LOCAL, STATE, COUNTY CODE REGULATIONS, OSHA, AND ADA.
3. DUE TO LIMITED SPACE IT IS CRITICAL THAT THE LOCATION OF ALL EQUIPMENT, PIPING & RELATED ACCESSORIES IN CEILING SPACE BE COORDINATED WITH ALL OTHER TRADES IN FIELD.
4. MOUNT ALL THERMOSTATS SERVING ALL UNITS 48" A.F.F. IF DESIRED BY OWNER, PROVIDE HIGH IMPACT GUARDS FOR ALL THERMOSTATS FIELD COORDINATE DURING CONSTRUCTION.

MECHANICAL KEY NOTES

1 4" DIA TYPE "B" FLUE DISCHARGE CAP MOUNTED ON PITCHED 12" H ROOF CURB. PROVIDE FLASHING & ALL REQUIRED SEALS FOR WATER TIGHT INSTALLATION. EXTEND AND TERMINATE AT CODE APPROVED HEIGHT. (FIELD VERIFY WITH ROOF PITCH)

2 4" DIA OUTDOOR AIR INTAKE FOR BURNER MOUNTED ON PITCHED 12" H ROOF CURB. PROVIDE FLASHING & ALL REQUIRED SEALS FOR WATER TIGHT INSTALLATION. (FIELD VERIFY WITH ROOF PITCH)

3 CO / NO2 MONITOR EQUAL TO " ARMSTRONG " AMC-1AD. FIELD VERIFY EXACT LOCATION (SEE CONTROL DIAGRAM THIS SHEET)

4 REMOTE CO / NO2 GAS SENSOR MONITORING MODULE EQUAL TO " ARMSTRONG " AMC-1222. FIELD VERIFY EXACT LOCATION (REFER CONTROL DIAGRAM THIS SHEET)

5 LOUVER WITH 50% (MIN) FREE AREA PROVIDED BY ARCHITCTURAL TRADES. M.C. SHALL VERIFY THE SIZE INDICATED & REQ'D FREE AREA IS PROVIDED. MOTORIZED DAMPER & CONTROLS BY M.C.

INSTALLATION COORDINATION

WHEN A CONFLICT BETWEEN INSTALLATION DETAILS, SUCH AS, BUT NOT LIMITED TO PIPING DIAGRAMS, EQUIP. DETAILS AND CONNECTIONS, ETC., INDICATED ON THE DRAWINGS AND THE MANUFACTURERS INSTALLATION INSTRUCTIONS PROVIDED WITH REVIEWED SHOP DRAWINGS, THE MANUF. INSTALLATION INSTRUCTIONS SHALL TAKE PRECEDENT. NO ADDITIONAL COST WILL BE ALLOWED IF THE MANUF. INSTALLATION INSTRUCTIONS ARE NOT FOLLOWED.

STATE OF MICHIGAN
JAYSON J. VANHOOSEAR
ENGINEER
No. 52010
LICENSED PROFESSIONAL ENGINEER

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
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Department of Military and Veterans Affairs
Construct MSVB Howell
HEATING AND VENTILTION PLAN

DESIGNED: KP	DRAWN: KEP	CHECKED: KP	APPROVED: KP

DATE: AUG 12, 2024

ISSUED FOR: PRELIMINARY ☐ CONSTRUCTION ■ FINAL RECORD ☐

IDENTIFICATION NO.
DMVA PROJECT NO. 26B3523004
DTMB PROJECT NO. 511/24024.CAK

SHEET M1.0

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION
"OE"	LED FULL CUT-OFF TYPE WALL MOUNTED LUMINAIRE. HIGH OUTPUT LED LIGHT ENGINE USING ACCULED OPTICS SYSTEM, MODIFIED IES TYPE IV OPTICS WITH WIDE DISTRIBUTION, AND PROVIDING A TOTAL DELIVERED LUMEN OUTPUT OF 11,843 LUMENS AT A COLOR TEMPERATURE OF 4,000 DEGREE K AND A MINIMUM OF 70 CRI, RATED FOR A MINUMUM OF 100,000 HOURS OF CONTINUOUS OPERATION FROM MINUS 30 DEGREE C TO PLUS 40 DEGREE C. FIXTURE TO BE DLC COMPLIANT. FIXTURE TO HAVE A B.U.G. RATING OF B2-U0-G2. ALUMINUM HOUSING. 15-11/16" WIDE X 6-1/2" HIGH X 12-1/8" DEEP. BRONZE FINISH. 800MA DRIVE CURRENT. TOTAL FIXTURE WATTAGE TO BE 86 WATTS. FIXTURE TO BE UL LISTED FOR WET LOCATION USE. FIXTURE TO INCLUDE INTEGRAL POWER SUPPLY (DRIVER), UL LISTED. FIXTURE TO INCLUDE WAVELINX PRO WIRELESS OUTDOOR CONTROL MODULE TO ALLOW FOR WIRELESS TIME OF DAY ON/OFF CONTROL AND WIRELESS TIME OF DAY DIMMING CONTROL FOR THE FIXTURE, AND INDEPENDENT GROUPING OF FIXTURES BASED ON FIXTURE LOCATIONS. FIXTURE TO INCLUDE 10K SURGE MODULE. UNIVERSAL 120-277 VOLT OPERATION. 5-YEAR WARRANTY. MCGRAW-EDISON GALLEON WALL GWC-SA2B-740-U-T4W-BZ-10K-PER7-WOLC-7P-10A SERIES OR EQUAL KIM LIGHTING "WDM" OR LITHONIA.
"OA-EM"	SIMILAR TO TYPE "OA" EXCEPT WITH FACTORY INSTALLED UL924 GENERATOR TRANSFER DEVICE WITH DIMMING BYPASS, BODINE GTDU OR EQUAL, TO BYPASS WIRELESS CONTROL IN THE EVENT OF NORMAL POWER LOSS. MCGRAW-EDISON GALLEON WALL GWC-SA2B-740-U-T4W-BZ-10K-PER7-WOLC-7P-10A-BODINE-GTDU SERIES OR EQUAL KIM LIGHTING "WDM" OR LITHONIA.
"LA"	SOLID-STATE TYPE SUSPENDED HIGH-BAY LED LIGHT FIXTURE. LED ENGINE TO BE 4,000 DEGREE K, WITH 80 CRI AND A DELIVERED LUMEN OUTPUT OF 14,921 LUMENS (15,000 LUMEN OPTION), WITH WIDE DISTRIBUTION. L70 PER TM-21 CALCULATIONS OF 117,000 HOURS. 5-YEAR WARRANTY. CODE GAUGE STEEL CONSTRUCTION WITH STEEL END CAPS FOR MAXIMUM RIGIDITY. WIDE DISTRIBUTION LENS OPTION CONSTRUCTED OF FROSTED ACRYLIC TO DIFFUSE LEDS AND MINIMIZE GLARE. FIXTURE TO INCLUDE CABLE KIT CONSISTING OF TWO (2) 10 FOOT AIRCRAFT CABLES (ONE PAIR) FOR SUSPENSION MOUNTING OF THE FIXTURE AT THE ELEVATION NOTED ON THE FLOOR PLANS. UV STABLE FROSTED POLYCARBONATE LENS WITH WIDE DISTRIBUTION. 10-1/2" WIDE X 23-1/2" LONG X 2-7/8" DEEP. HIGH-EFFICIENCY ELECTRONIC LED DRIVER MOUNTED IN CENTER CHANNEL OF FIXTURE. INPUT WATTAGE OF FIXTURE IS 97 WATTS, WITH AN EFFICACY OF 154 LUMENS PER WATT. 0-10V DIMMING DRIVER STANDARD. COOPER WAVELINX PRO IN-FIXTURE WIRELESS CONTROL OPTION WITH HIGH MOUNT PASSIVE INFRARED OCCUPANCY AND DIMMING DAYLIGHT HARVESTING SENSOR AND WAVELINX WIRELESS RADIO. FIVE-YEAR LIMITED WARRANTY. UNIVERSAL 120-277 VOLT OPERATION, THERMALLY PROTECTED, U.L. LISTED AND LABELED. FIXTURE TO INCLUDE NEMA L5-15P RECEPTACLE ON A 6'-0" LONG CORD TO ALLOW FOR CORD AND PLUG CONNECTION AT CEILING. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE MATING RECEPTACLE AT THE CEILING FOR CONNECTION OF THE LIGHT FIXTURE. THE CONTRACTOR MAY AT THEIR OPTION ELECT TO HARDWIRE THE FIXTURE AND NOT USE THE CORD AND PLUG CONNECTION METHOD. METALUX "OHB" OHB-15SE-W-UNV-L840-CD-PC6/120-WPS4 -Y-TOGGLE-10-2PK SERIES OR EQUAL COLUMBIA LIGHTING PELOTON OR LITHONIA.
"LA-EM"	SIMILAR TO TYPE "LA" EXCEPT WITH EMERGENCY DRIVER CAPABLE OF DRIVING THE FIXTURE AT 20 WATTS FOR 90 MINUTES, PROVIDING A TOTAL LUMEN OUTPUT OF APPROXIMATELY 3,080 LUMENS. EMERGENCY DRIVER TO BE FACTORY INSTALLED IN FIXTURE. METALUX "OHB" OHB -15SE-W-UNV-L840-EL20W-CD-PC6/120-WPS4-Y-TOGGLE-10-2PK SERIES OR EQUAL COLUMBIA LIGHTING PELOTON OR LITHONIA.
"LB"	SOLID-STATE TYPE SUSPENDED HIGH-BAY LED LIGHT FIXTURE. LED ENGINE TO BE 4,000 DEGREE K, WITH 80 CRI AND A DELIVERED LUMEN OUTPUT OF 11,592 LUMENS (12,000 LUMEN OPTION), WITH MEDIUM DISTRIBUTION WITH FROSTED LENS. L70 PER TM-21 CALCULATIONS OF 117,000 HOURS. 5-YEAR WARRANTY. CODE GAUGE STEEL CONSTRUCTION WITH STEEL END CAPS FOR MAXIMUM RIGIDITY. WIDE DISTRIBUTION LENS OPTION CONSTRUCTED OF FROSTED ACRYLIC TO DIFFUSE LEDS AND MINIMIZE GLARE. FIXTURE TO INCLUDE CABLE KIT CONSISTING OF TWO (2) 10 FOOT AIRCRAFT CABLES (ONE PAIR) FOR SUSPENSION MOUNTING OF THE FIXTURE AT THE ELEVATION NOTED ON THE FLOOR PLANS. UV STABLE FROSTED POLYCARBONATE LENS WITH WIDE DISTRIBUTION. 10-1/2" WIDE X 23-1/2" LONG X 2-7/8" DEEP. HIGH-EFFICIENCY ELECTRONIC LED DRIVER MOUNTED IN CENTER CHANNEL OF FIXTURE. INPUT WATTAGE OF FIXTURE IS 76 WATTS, WITH AN EFFICACY OF 153 LUMENS PER WATT. 0-10V DIMMING DRIVER STANDARD. COOPER WAVELINX PRO IN-FIXTURE WIRELESS CONTROL OPTION WITH HIGH MOUNT PASSIVE INFRARED OCCUPANCY AND DIMMING DAYLIGHT HARVESTING SENSOR AND WAVELINX WIRELESS RADIO. FIVE-YEAR LIMITED WARRANTY. UNIVERSAL 120-277 VOLT OPERATION, THERMALLY PROTECTED, U.L. LISTED AND LABELED. FIXTURE TO INCLUDE NEMA L5-15P RECEPTACLE ON A 6'-0" LONG CORD TO ALLOW FOR CORD AND PLUG CONNECTION AT CEILING. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE MATING RECEPTACLE AT THE CEILING FOR CONNECTION OF THE LIGHT FIXTURE. THE CONTRACTOR MAY AT THEIR OPTION ELECT TO HARDWIRE THE FIXTURE AND NOT USE THE CORD AND PLUG CONNECTION METHOD. METALUX "OHB" OHB-12SE-MFL-UNV-L840-CD-PC6/120-WPS4 -Y-TOGGLE-10-2PK SERIES OR EQUAL COLUMBIA LIGHTING PELOTON OR LITHONIA.
"XA"	UNIVERSAL MOUNTING "EXIT" LIGHT FIXTURE, HIGH BRIGHTNESS LED'S, 25 YEAR LIFE, ACRYLIC DIFFUSING LENS, SINGLE FACE, ARROWS AS INDICATED ON PLAN, POLYCARBONATE HOUSING AND FACE, 6" RED LETTERS, WHITE FINISH, LED POWER SUPPLY CIRCUIT; FIXTURE TO BE POWERED BY THE COMPACT EMERGENCY LIGHTING INVERTER "ELI-A" AS INDICATED ON THE DRAWINGS; UNIVERSAL 120-277 VOLT OPERATION. SURE-LITES LPX6 SERIES OR EQUAL DUAL-LITE, LITHONIA OR LIGHTALARMS.
"XB"	SIMILAR TO TYPE "XA" EXCEPT DOUBLE FACE.

ELECTRICAL SYMBOL LIST

SYMBOL	DESCRIPTION
	SITE LIGHTING FIXTURE - POLE MOUNTED (DOUBLE HEAD INDICATED)
	SITE LIGHTING FIXTURE - BUILDING MOUNTED. SEE FIXTURE SCHEDULE
S	SINGLE POLE SWITCH
S_3	THREE WAY SWITCH
S_4	FOUR WAY SWITCH
S_A	WALL MOUNTED OCCUPANCY SENSOR. REFER TO SCHEDULE ON LIGHTING DRAWINGS
	2' X 4' FIXTURE
	1' X 4' FIXTURE
	2' X 2' FIXTURE
	RECESSED ROUND LED FIXTURE
	WALL MOUNTED LIGHT FIXTURE
	NIGHT LIGHT FIXTURE
N.L. EM	NIGHT LIGHT / EMERGENCY FLUORESCENT FIXTURE
	EXIT LIGHT, SINGLE FACE
	EXIT LIGHT DOUBLE FACE (SHADING INDICATES FACE OF FIXTURE)
EM	EMERGENCY FIXTURE (2X2 FLUORESCENT EMERGENCY FIXTURE INDICATED)
	WALL MOUNTED EMERGENCY BATTERY UNIT (EBU)
	CEILING MOUNTED EMERGENCY BATTERY UNIT (EBU)
	DUPLEX RECEPTACLE
	DOUBLE DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE MOUNTED AT 6" ABOVE COUNTER TOP
	SPECIAL PURPOSE OUTLET - TYPE AND SIZE AS INDICATED ON PLAN
	COMBINATION TELEPHONE/DATA OUTLET
W	WALL MOUNTED COMBINATION TELEPHONE/DATA OUTLET, MOUNTED AT 48" A.F.F.
TV	CABLE TELEVISION SYSTEM OUTLET
	TELEPHONE ONLY OUTLET
W	WALL MOUNTED TELEPHONE ONLY OUTLET, MOUNTED AT 54" A.F.F.
	PANEL BOARD
J	JUNCTION BOX
	FIRE ALARM SYSTEM AUDIBLE / VISUAL NOTIFICATION APPLIANCE
	FIRE ALARM SYSTEM VISUAL NOTIFICATION APPLIANCE
HD	FIRE ALARM SYSTEM HEAT DETECTOR
SD	FIRE ALARM SYSTEM SMOKE DETECTOR
F	FIRE ALARM SYSTEM MANUAL PULL STATION
N.L.	NIGHT LIGHT
EM	DEVICE OR LIGHTING FIXTURE SERVED FROM EMERGENCY POWER
AFF	ABOVE FINISH FLOOR
(E)	EXISTING ELECTRICAL DEVICE OR FIXTURE TO REMAIN
(R)	NEW LOCATION OF RELOCATED ELECTRICAL DEVICE OR FIXTURE
WP	WEATHER PROOF
GFI	GROUND FAULT INTERRUPTER

ELECTRICAL DRAWING INDEX

SHEET NUMBER	SHEET TITLE
E0.0	ELECTRICAL DRAWING INDEX, SYMBOL LIST, LIGHTING FIXTURE SCHEDULE & GENERAL NOTES
E0.5	SITE PLAN - ELECTRICAL
E1.0	FLOOR PLAN - ELECTRICAL
E2.0	PARTIAL POWER ONE-LINE DIAGRAM - NEW WORK
E2.1	ELECTRICAL SCHEDULES
E2.2	ELECTRICAL SCHEDULES
E3.0	MISCELLANEOUS DETAILS & WIRING DIAGRAMS
E3.1	MISCELLANEOUS DETAILS & WIRING DIAGRAMS
E3.2	MISCELLANEOUS DETAILS & WIRING DIAGRAMS
EX1	FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY

ELECTRICAL GENERAL NOTES

1. EXTENT OF DEMOLITION IS NOT INTENDED TO BE SHOWN IN FULL ON THESE DRAWINGS. FINAL DESIGNED CONDITIONS ARE SHOWN. EACH TRADE/CONTRACTOR IS RESPONSIBLE FOR REMOVAL AS REQUIRED TO ACHIEVE FINAL DESIGN CONDITIONS. REFERENCES TO EXISTING AS IDENTIFIED ARE TO CLARIFY SCOPE OF NEW CONSTRUCTION.

2. ALL WORK CONDITIONS ARE TO BE FIELD VERIFIED AND DETAILS ADJUSTED AS REQUIRED TO MAINTAIN FIRE RESISTIVE RATINGS. INTEGRITY OF INSTALLED SYSTEMS (EXISTING AND NEW) AND THE MATCHING OF WORK WITH EXISTING CONDITIONS AND FINISHES.

3. REMOVAL WORK SHALL BE EXECUTED WITH DUE CARE, INCLUDING PROTECTION OF EXISTING MATERIALS/SYSTEMS TO REMAIN SHORING, BRACING, ETC. EACH TRADE/SUBCONTRACTORS WILL BE RESPONSIBLE FOR ANY DAMAGE THEY CAUSE TO OTHER'S WORK.

4. THE FULL EXTENT OF THE WORK FOR EACH TRADE IS IDENTIFIED THROUGHOUT ALL THE DRAWINGS. DO NOT ASSUME OR OMIT INDIVIDUAL TRADE WORK NOT SHOWN IN THE INDIVIDUAL TRADE DRAWINGS. FAILURE TO REVIEW ALL DRAWINGS FOR AN INDIVIDUAL TRADE'S COMPLETE SCOPE OF WORK WILL RESULT IN DENIAL FOR ANY CHANGE ORDER REQUESTS FOR MISSED ITEMS DURING BIDDING.

5. SUBCONTRACTORS AND ALL TRADES MUST EXAMINE AREAS, DIMENSIONS CONDITIONS AND SUBSTRATES AFFECTING THE WORK AND THE CONDITIONS UNDER WHICH THE WORK IS TO BE INSTALLED, APPLIED AND COMPLETED. NOTIFY THE ARCHITECT IN WRITING OF UNSATISFACTORY CONDITIONS AND OTHER CONDITIONS DETRIMENTAL TO THE PROPER AND TIMELY COMPLETION OF THE WORK.
   A. DO NOT PROCEED WITH THE WORK UNTIL THE UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN THE MANNER ACCEPTABLE TO THE CONTRACTOR OR TRADE PERFORMING THE WORK. PROCEED WITH INSTALLATION ONLY AFTER UNSAFE OR UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
   B. BEGINNING WORK MEANS ACCEPTANCE OF THE CONDITIONS.
   C. NO CHANGE ORDERS FOR ADDITIONAL WORK WILL BE ACCEPTED FOR CONDITIONS NOT IDENTIFIED DURING THE EXAMINATION PERIOD PRIOR TO THE COMMENCING OF WORK.

6. CONTRACTOR(S) WARRANTS THEY HAVE EXAMINED THOROUGHLY ALL DRAWINGS AND SPECIFICATIONS DIRECTLY AND INDIRECTLY RELATED TO THEIR WORK. BY BEGINNING THE WORK, CONTRACTOR CERTIFIES THAT ALL NECESSARY ITEMS REQUIRED TO PERFORM HIS WORK HAVE BEEN IDENTIFIED AND DOCUMENTED IN THE DRAWINGS AND/OR SPECIFICATIONS.
   A. NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES, MISSING INFORMATION OR ANY UNCLEAR ITEMS WHICH WILL AFFECT THE WORK TO BE PERFORMED. DO NOT PROCEED WITH THE WORK UNTIL THE DISCREPANCIES, MISSING INFORMATION OR ANY UNCLEAR ITEMS HAVE BEEN CLARIFIED OR CORRECTED TO THE CONTRACTOR OR TRADE PERFORMING THE WORK.
   B. BEGINNING THE WORK INDICATES FULL ACCEPTANCE AND CORRECTNESS OF THE INFORMATION PROVIDED.
   C. NO CHANGE ORDERS FOR ADDITIONAL WORK WILL BE ACCEPTED FOR ANY DISCREPANCIES, MISSING INFORMATION OR UNCLEAR ITEMS OR INFORMATION NOT IDENTIFIED DURING THE EXAMINATION PERIOD PRIOR TO THE COMMENCING OF WORK.

7. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY FIRESTOPPING AROUND ALL PENETRATIONS OF FIRE RATED WALLS, CEILINGS AND FLOORS. REFER TO ARCHITECTURAL AND ELECTRICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING THE SPECIFIC FIRESTOPPING REQUIREMENTS AND PRODUCT SPECIFICATIONS.

8. ALL ANCHORS FOR ELECTRICAL SYSTEMS SHALL BE STEEL. REFER TO SPECIFICATIONS FOR SPECIFIC APPROVED PRODUCTS. **UNDER NO CIRCUMSTANCES SHALL PLASTIC ANCHORS BE USED.**

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SEALED & SIGNED 08/12/2024; SEAL APPLIES ONLY TO THE ELECTRICAL DOCUMENTS PREPARED BY TAC ASSOCIATES, LLC

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Military and Veterans Affairs
Construct MSVB Howell
Symbol List, Fixture Schedule, Index

DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED: .

DATE: AUG 12, 2024

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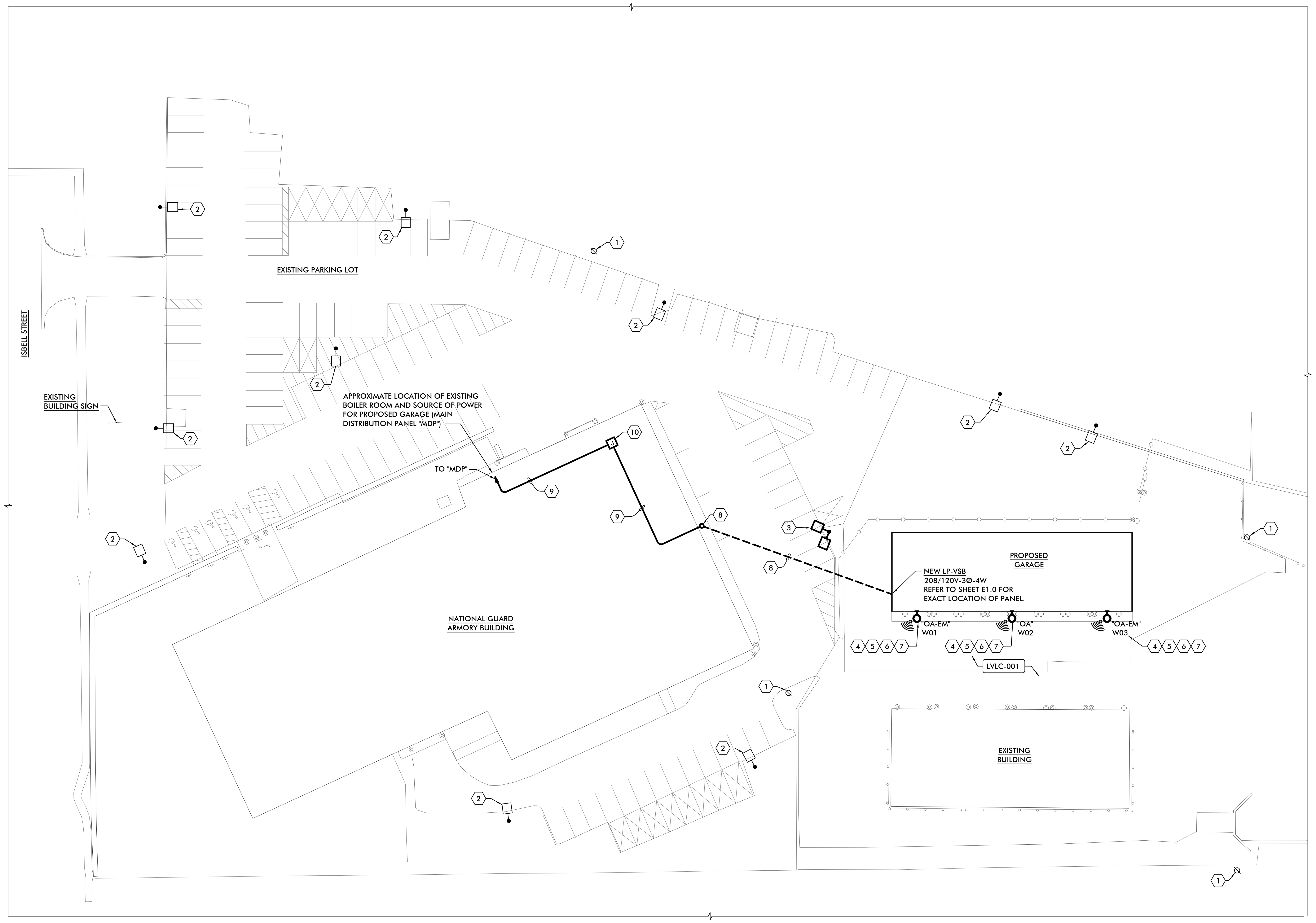
IDENTIFICATION NO.
DMVA PROJECT NO. 26B3523004
DTMB PROJECT NO. 511/24024.CAK

SHEET E0.0



SITE PLAN - ELECTRICAL

1 / E0.5

SCALE: 1" = 30'-0"

0 15' 30' 60'

SCALE: 1" = 30'-0"

SITE PLAN GENERAL NOTES:

1. REFER TO ARCHITECTURAL SITE PLAN FOR ADDITIONAL INFORMATION REGARDING PROPOSED WALKWAYS, PATIOS AND OTHER RENOVATION WORK ASSOCIATED WITH THE PROJECT.
2. COORDINATE WORK WITH OTHER TRADES. COORDINATE LOCATIONS OF UNDERGROUND UTILITIES AND OTHER OBSTRUCTIONS WITH CIVIL TRADES. CALL "MISS DIG" TO MARK UTILITIES BEFORE START OF WORK.

ELECTRICAL KEY NOTES

1. EXISTING UTILITY POLE TO REMAIN.
2. EXISTING POLE MOUNTED LIGHT FIXTURE TO REMAIN.
3. EXISTING POLE MOUNTED DUAL HEAD SITE LIGHTING FIXTURE TO BE REPAIRED. EXISTING FIXTURE IS CURRENTLY NOT OPERATIONAL, WITH THE EXACT CAUSE UNKNOWN. THE ELECTRICAL CONTRACTOR SHALL INVESTIGATE THE EXISTING WIRING, FIXTURE DRIVERS, BALLAST, LED'S AND OTHER COMPONENTS TO DETERMINE THE CAUSE OF THE NON-OPERATIONAL CONDITION OF THE FIXTURE AND PROVIDE A PLAN FOR CORRECTING THE EXISTING CONDITION AND RESTORING OPERATION OF THE FIXTURES. THE ELECTRICAL CONTRACTOR SHALL INCLUDE AN ALLOWANCE FOR THE INVESTIGATION AND REPAIR OF THE EXISTING FIXTURES, INCLUDING REPLACEMENT OF THE EXISTING UNDERGROUND WIRING IF IT IS DISCOVERED THAT THERE IS DAMAGED WIRING AND THAT IS THE CAUSE OF THE NON-FUNCTIONING LIGHT FIXTURES. THE NOTED ALLOWANCE SHALL BE A SEPARATE LINE ITEM AMOUNT INDICATED ON THE BID FORM. IF THE REMEDY TO CORRECT THE NON-OPERATIONAL FIXTURES EXCEEDS THE ALLOWANCE AMOUNT THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE OWNER'S CONSTRUCTION REPRESENTATIVE AND THE ARCHITECT / ENGINEER PRIOR TO START OF ANY WORK TO CORRECT THE ISSUE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AN EXACT ESTIMATE OF THE WORK NECESSARY TO REPAIR FIXTURES IN WRITING AND RECEIVE WRITTEN APPROVAL BEFORE PROCEEDING WITH ANY WORK TO CORRECT THE ISSUE.
4. NEW WALL MOUNTED SITE LIGHTING FIXTURE TO HAVE IN-FIXTURE WIRELESS CONTROL MODULE FOR TIME CLOCK SCHEDULE ON/OFF CONTROL AND DIMMING BASED ON TIME OF DAY, FOR COMPLIANCE WITH THE ENERGY CODE, AS DESCRIBED IN THE LIGHTING FIXTURE SCHEDULE. REFER TO LIGHTING FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION REGARDING THE WIRELESS CONTROL MODULE FUNCTION. REFER TO WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.1 FOR ADDITIONAL INFORMATION REGARDING THE PROGRAMMING AND CONTROL OF THE FIXTURES. NOTE THAT THE "WXX" DESIGNATION (i.e. W01) INDICATES THE WIRELESS IDENTIFICATION FOR THE FIXTURE, FOR THE PURPOSES OF PROGRAMMING THE FUNCTION OF THE FIXTURE THROUGH THE WIRELESS LIGHTING CONTROL SYSTEM.
5. WALL MOUNT FIXTURE AT 15-0" ABOVE FINISHED GRADE, MEASURED TO BOTTOM OF FIXTURE. COORDINATE EXACT LOCATION WITH ARCHITECTURAL ELEVATIONS AND ADJUST AS NECESSARY TO AVOID CONFLICT WITH ARCHITECTURAL FEATURES OR WALL MOUNTED ELEMENTS. VERIFY IN FIELD EXACT MOUNTING LOCATION PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. NOTE THAT EXACT ELEVATION ABOVE FINISHED GRADE MAY VARY DUE TO THE GRADE CONDITIONS. THE ELEVATION OF THE FIXTURES SHALL BE UNIFORM AND ALIGNED AS SHOWN ON THE ARCHITECTURAL ELEVATIONS.
6. REFER TO FIXTURE TYPE "OA" MOUNTING DETAIL ON SHEET E3.0 FOR ADDITIONAL INFORMATION.
7. REFER TO FLOOR PLAN - LIGHTING ON SHEET E1.0 FOR CIRCUITING AND CONTROL OF WALL MOUNTED LIGHT FIXTURES ON PROPOSED GARAGE BUILDING.
8. NEW UNDERGROUND FEEDER SERVING PROPOSED GARAGE. AT EXTERIOR WALL OF EXISTING BUILDING, TURN CONDUIT UP AND ROUTE ON EXTERIOR WALL TO AN ELEVATION TO ALLOW THE CONDUIT TO ENTER THE EXISTING BUILDING WITHIN THE EXISTING BUILDING CEILING SPACE / JOIST SPACE. REFER TO PARTIAL POWER ONE-LINE DIAGRAM ON SHEET E2.0 FOR FEEDER SIZES.
9. NEW FEEDER SERVING PROPOSED GARAGE, ROUTED WITHIN EXISTING BUILDING, ABOVE THE EXISTING CEILING SPACE / WITHIN THE EXISTING JOIST SPACE, FROM THE EXTERIOR WALL INDICATED TO THE EXISTING BOILER ROOM AND ASSOCIATED MAIN DISTRIBUTION PANEL "MDP". REFER TO PARTIAL POWER ONE-LINE DIAGRAM ON SHEET E2.0 FOR FEEDER SIZES.
10. NEW PULL BOX LOCATED PER THE N.E.C. AS REQUIRED FOR THE INSTALLATION CONFIGURATION OF THE NEW FEEDER INDICATED. QUANTITY AND LOCATION OF PULL BOXES ARE NOT REFLECTED ON THE PLAN, BUT RATHER THE PULL BOX NOTED IS INTENDED TO CONVEY THE REQUIRED FOR PULL BOXES ALONG THE LENGTH OF THE FEEDER AS REQUIRED FOR COMPLIANCE WITH THE N.E.C. AND TO ACCOMMODATE THE PHYSICAL INSTALLATION CONDITIONS IN THE EXISTING BUILDING.

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Department of Military and Veterans Affairs
Construct MSVB Howell
Site Plan - Electrical

DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED: .

DATE: AUG 12, 2024

ISSUED FOR: PRELIMINARY ☐ CONSTRUCTION ☐ FINAL RECORD ☐

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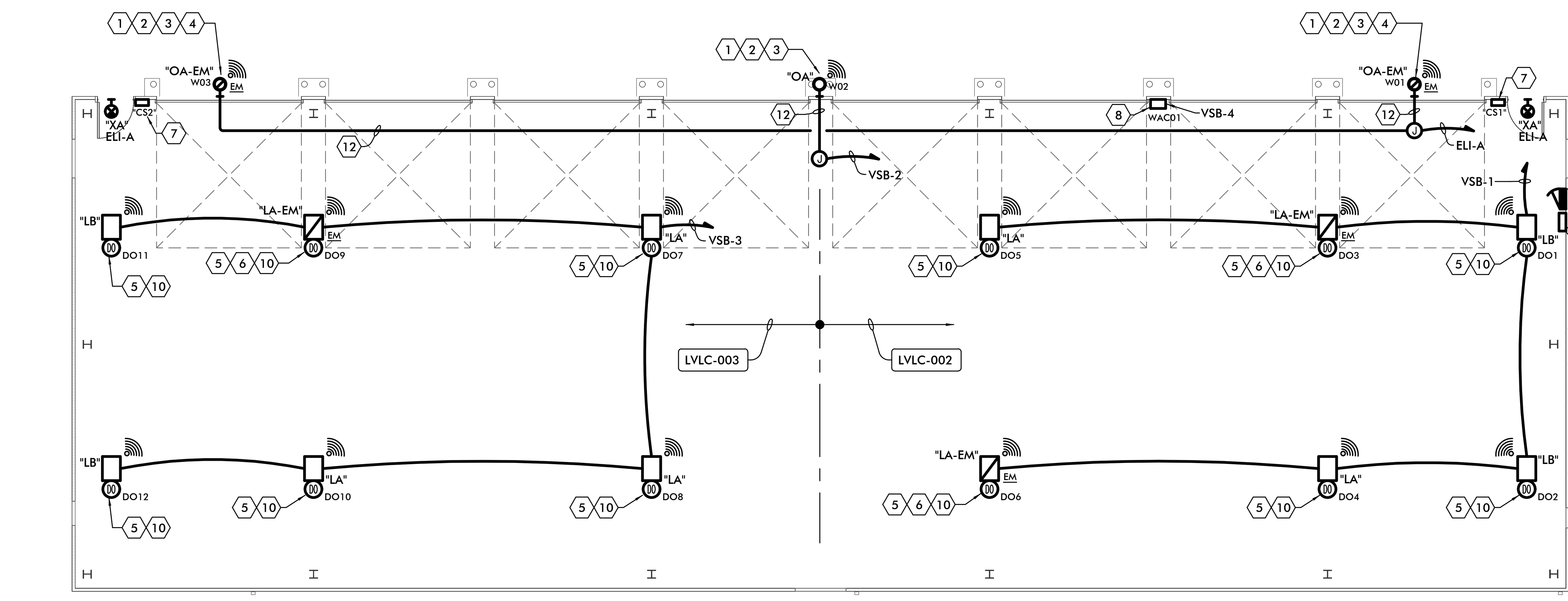
SHEET E0.5

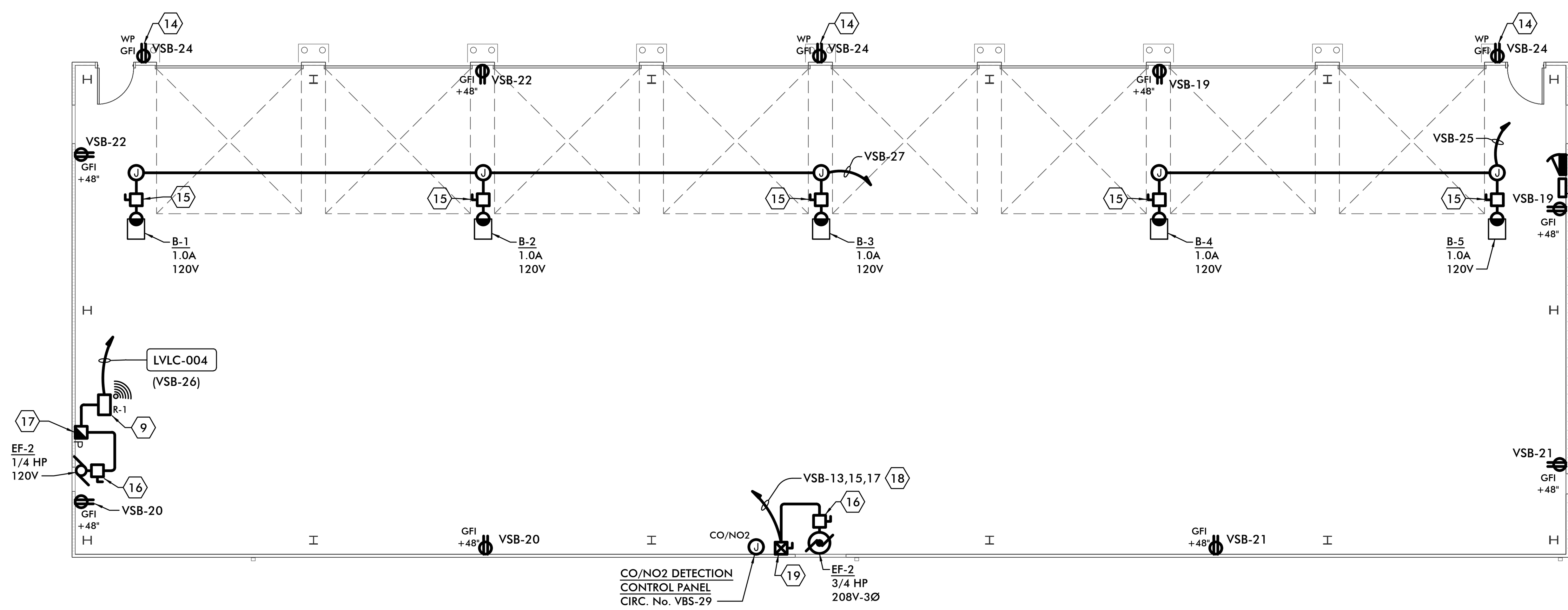


1 E1.0

FLOOR PLAN - LIGHTING

SCALE: 1/8" = 1'-0"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"



2 E1.0

FLOOR PLAN - POWER & SYSTEMS

SCALE: 1/8" = 1'-0"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. ALL JUNCTION BOXES SERVING BRANCH CIRCUIT WIRING SHALL BE LABELED WITH CIRCUITS SERVED. USE BROTHER P-TOUCH LABEL OR EQUAL ON BOX COVER.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.
3. ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
4. TO ACCOUNT FOR VOLTAGE DROP OVER THE LENGTH OF THE BRANCH CIRCUIT CONDUCTOR RUN THE ELECTRICAL CONTRACTOR SHALL INCREASE THE BRANCH CIRCUIT CONDUCTOR SIZES AS FOLLOWS: ALL 120-VOLT BRANCH CIRCUITS OVER 100 FEET IN LENGTH SHALL UTILIZE AWG #10 CONDUCTORS; ALL 120-VOLT BRANCH CIRCUITS OVER 200 FEET IN LENGTH SHALL UTILIZE AWG #8 CONDUCTORS; ALL 120-VOLT BRANCH CIRCUITS OVER 300 FEET IN LENGTH SHALL UTILIZE AWG #6 CONDUCTORS. FOR ALL BRANCH CIRCUITS WHERE THE CONDUCTORS ARE INCREASED TO ACCOUNT FOR VOLTAGE DROP, THE EQUIPMENT GROUND CONDUCTOR SHALL BE INCREASED PROPORTIONALLY IN ACCORDANCE WITH THE N.E.C. ARTICLE 250.
5. SECURITY SYSTEM IS OWNER FURNISHED, INSTALLED BY THE OWNER'S SECURITY SYSTEM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE OWNER FURNISHED SECURITY SYSTEM WITH THE OWNER'S CONTRACTOR IN THE FIELD PRIOR TO START OF CONSTRUCTION AND SHALL PROVIDE ALL REQUIRED 120-VOLT BRANCH CIRCUITS, EMPTY RACEWAYS AND OTHER ELECTRICAL COMPONENTS NECESSARY TO SUPPORT THE INSTALLATION OF THE OWNER FURNISHED SECURITY SYSTEM.
6. VIDEO SURVEILLANCE SYSTEM IS OWNER FURNISHED, INSTALLED BY THE OWNER'S VIDEO SURVEILLANCE SYSTEM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE OWNER FURNISHED VIDEO SURVEILLANCE SYSTEM WITH THE OWNER'S CONTRACTOR IN THE FIELD PRIOR TO START OF CONSTRUCTION AND SHALL PROVIDE ALL REQUIRED 120-VOLT BRANCH CIRCUITS, EMPTY RACEWAYS AND OTHER ELECTRICAL COMPONENTS NECESSARY TO SUPPORT THE INSTALLATION OF THE OWNER FURNISHED VIDEO SURVEILLANCE SYSTEM.
7. INTERCOM SYSTEM IS OWNER FURNISHED, INSTALLED BY THE OWNER'S INTERCOM SYSTEM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE OWNER FURNISHED INTERCOM SYSTEM WITH THE OWNER'S CONTRACTOR IN THE FIELD PRIOR TO START OF CONSTRUCTION AND SHALL PROVIDE ALL REQUIRED 120-VOLT BRANCH CIRCUITS, EMPTY RACEWAYS AND OTHER ELECTRICAL COMPONENTS NECESSARY TO SUPPORT THE INSTALLATION OF THE OWNER FURNISHED INTERCOM SYSTEM.

ELECTRICAL KEY NOTES

(1) WALL MOUNTED SITE LIGHTING FIXTURE WITH WIRELESS OUTDOOR CONTROL MODULE, AS DESCRIBED IN THE LIGHTING FIXTURE SCHEDULE ON SHEET E0.0. FIXTURE SHALL WIRELESSLY COMMUNICATE WITH THE WIRELESS AREA CONTROLLER INSIDE THE BUILDING FOR TIME SCHEDULE ON/OFF CONTROL AND DIMMING FUNCTIONS FOR COMPLIANCE WITH THE MICHIGAN ENERGY CODE, AS WELL AS SOFTWARE GROUPING AND ZONING OF THE FIXTURES BASED ON COORDINATION WITH THE OWNER'S CONSTRUCTION MANAGER. REFER TO WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.2 FOR ZONING, GROUPING OF CONTROLS AND ADDITIONAL INFORMATION.

(2) WALL MOUNT FIXTURE AT 15-0" ABOVE FINISHED GRADE, MEASURED TO BOTTOM OF FIXTURE. COORDINATE EXACT LOCATION WITH ARCHITECTURAL ELEVATIONS AND ADJUST AS NECESSARY TO AVOID CONFLICT WITH ARCHITECTURAL FEATURES OR WALL MOUNTED ELEMENTS. VERIFY IN FIELD EXACT MOUNTING LOCATION PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. NOTE THAT EXACT ELEVATION ABOVE FINISHED GRADE MAY VARY DUE TO THE GRADE CONDITIONS. THE ELEVATION OF THE FIXTURES SHALL BE UNIFORM AND ALIGNED AS SHOWN ON THE ARCHITECTURAL ELEVATIONS.

(3) REFER TO FIXTURE TYPE "OA" MOUNTING DETAIL ON SHEET E3.0 FOR ADDITIONAL INFORMATION.

(4) EMERGENCY FIXTURE POWERED FROM COMPACT EMERGENCY LIGHTING INVERTER "ELI-A". FIXTURE SHALL OPERATE IN THE NORMAL CONDITION AS A SWITCHED FIXTURE AS INDICATED (FROM THE LIGHTING CONTROL SYSTEM). UPON LOSS OF NORMAL POWER, THE FIXTURE SHALL ENERGIZE TO THE FULL LUMEN OUTPUT, POWERED FROM THE COMPACT EMERGENCY LIGHTING INVERTER, REGARDLESS OF THE POSITION OF THE SWITCHING CONTROL SERVING THE FIXTURE.

(5) LIGHTING FIXTURE WITH IN-FIXTURE PASSIVE INFRARED OCCUPANCY AND DAYLIGHT SENSOR AND WIRELESS RADIO FOR WIRELESS CONNECTIVITY. REFER TO LIGHTING FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION REGARDING THE IN-FIXTURE CONTROL SYSTEM. REFER TO LOW VOLTAGE LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.2 FOR ZONING, GROUPING OF CONTROLS AND ADDITIONAL INFORMATION.

(6) EMERGENCY FIXTURE WITH INTERNAL BATTERY BACKUP. FIXTURE SHALL OPERATE IN THE NORMAL CONDITION AS A SWITCHED/DIMMED FIXTURE FROM THE WIRELESS LIGHTING CONTROL SYSTEM. UPON LOSS OF NORMAL POWER, THE FIXTURE SHALL ENERGIZE TO THE LUMEN OUTPUT AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE, REGARDLESS OF THE SWITCHED OR DIMMED STATE CONTROLLED BY THE LIGHTING CONTROL SYSTEM. REFER TO THE MANUFACTURES WIRING DIAGRAMS FOR EXACT WIRING OF THE INTERNAL BATTERY BACKUP WHEN CONTROLLED BY THE WIRELESS LIGHTING CONTROL SYSTEM.

(7) WIRELESS LIGHTING CONTROL SYSTEM WALL MOUNTED CONTROL STATION. CONTROL STATION TO CONNECT WIRELESS TO THE ASSOCIATED WIRELESS SWITCHPACK FOR CONTROL OF THE LIGHTING LOADS AS NOTED IN THE WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.1. NOTE THAT THE WALLSTATION REQUIRES 120-VOLT FOR OPERATION AND SHALL BE CIRCUITED TO THE SAME 120-VOLT BRANCH CIRCUIT THAT SERVES THE CLOSEST SWITCHPACK ASSOCIATED WITH THE WALLSTATION, OR THE BRANCH CIRCUIT THAT SERVES THE GROUP OF FIXTURES WITH IN-FIXTURE SENSORS. REFER TO WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.2 FOR SWITCHPACKS CONTROLLED BY THE CONTROL STATION, FUNCTIONALITY TO BE INCLUDED IN STATION (i.e. SWITCHED ONLY, DIMMING, ETC), AND THE STYLE OF CONTROL STATION TO BE PROVIDED. THE SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR PREPARING SHOP DRAWINGS / INSTALLATION DRAWINGS SHOWING THE COMPLETE SYSTEM AND ALL ALL DEVICES ON THE NETWORK, THE LOCATIONS WHERE INTERCONNECTING CABLING MAY BE REQUIRED AND THE LOCATIONS OF ADDITIONAL EQUIPMENT AND OTHER DEVICES REQUIRED FOR A COMPLETE AND OPERATING SYSTEM. THE DEVICES INDICATED ON THE DRAWINGS ARE LIMITED TO THE SWITCHPACKS, WIRELESS AREA CONTROLLERS, CONTROL STATIONS, OCCUPANCY SENSORS AND DAYLIGHT SENSORS.

(8) LIGHTING CONTROL SYSTEM WIRELESS AREA CONTROLLER, MOUNTED ABOVE ACCESSIBLE CEILING SPACE, HIGH ON WALL. MOUNT TO STUD WALL TO ENSURE WIRELESS SIGNAL INTEGRITY. COORDINATE EXACT LOCATION OF AREA CONTROLLER WITH THE LIGHTING CONTROL SYSTEM MANUFACTURE BASED ON THEIR INSTALLATION DRAWINGS. NOTE THAT THE AREA CONTROLLER IS POWERED FROM A POWER OVER ETHERNET CONNECTION. PROVIDE CAT-5E CABLE FROM THE WIRELESS AREA CONTROLLER TO THE POE INJECTOR AS DIRECTED BY THE WIRELESS LIGHTING CONTROL SYSTEM MANUFACTURE.

(9) LIGHTING CONTROL SYSTEM WIRELESS SWITCHPACK PROVIDING CONTROL OF EXHAUST FAN INDICATED BASED ON OCCUPANCY IN SPACE AS DETECTED BY THE IN-FIXTURE OCCUPANCY SENSORS IN THE LIGHTING IN THE SPACE. REFER TO LOW VOLTAGE LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E3.2 FOR ADDITIONAL INFORMATION REGARDING WIRELESS SWITCHPACK PROGRAMMING.

(10) MOUNT SUSPENDED FIXTURE AT APPROXIMATELY 11'-6" ABOVE FINISHED FLOOR, MEASURED TO BOTTOM FIXTURE. ADJUST FINAL MOUNTING ELEVATION BASED ON STEEL STRUCTURAL ELEMENTS, PIPING, DUCTWORK AND WORK OF OTHER TRADES TO AVOID CONFLICT WITH THE STEEL AND THE NOTED ELEMENTS. VERIFY IN FIELD WITH THE ARCHITECT THE EXACT MOUNTING ELEVATION OF THE FIXTURE PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC.

(11) COMPACT EMERGENCY LIGHTING INVERTER "ELI-A" SERVING EXTERIOR EMERGENCY LIGHTING FIXTURES, AS WELL AS THE EXIT LIGHT FIXTURES. REFER TO COMPACT EMERGENCY LIGHTING INVERTER CONTROL WIRING DIAGRAM ON SHEET E3.0 FOR ADDITIONAL INFORMATION. NOTE THAT THE INVERTER IS TO BE MOUNTED HIGH ON THE WALL TO AVOID CONFLICT WITH EQUIPMENT IN THE SPACE. MOUNT AT APPROXIMATELY 9'-0" ABOVE FINISHED FLOOR, MEASURED TO THE BOTTOM OF THE INVERTER. ADJUST MOUNTING HEIGHT AS REQUIRED TO AVOID CONFLICT WITH WORK OF OTHER TRADES.

(12) 2 #12 + 1 #12 GRD - 3/4"C. ROUTED CONCEALED IN BUILDING INTERIOR, HIGH IN THE STRUCTURAL ROOF JOIST SPACE, OR WITHIN WALL CONSTRUCTION TO SERVE NEW LIGHTING FIXTURES INDICATED. ALL CONDUIT SHALL BE INSTALLED WITHIN THE BUILDING ENVELOPE AND CONCEALED.

(13) REFER TO PARTIAL POWER ONE-LINE DIAGRAM ON SHEET E2.0 FOR ADDITIONAL INFORMATION.

(14) WEATHER-PROOF / GFCI DUPLEX RECEPTACLE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE A "WR" LABELED WEATHER-RESISTANT GFCI DUPLEX RECEPTACLE, IN ADDITION TO A WEATHER-PROOF COVER TO COMPLY WITH THE N.E.C.

(15) 20A-1P NON-FUSED DISCONNECT SWITCH FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR AT EQUIPMENT INDICATED. COORDINATE EXACT MOUNTING LOCATION OF DISCONNECT SWITCH AND WIRING CONNECTION TO EQUIPMENT WITH THE EQUIPMENT MANUFACTURES INSTALLATION DRAWINGS AND WIRING DIAGRAMS. NOTE THAT THE EQUIPMENT SELECTED BY THE RESPECTIVE SUPPLIER AND/OR CONTRACTOR MAY BE CORD AND PLUG CONNECTED RATHER THAN A HARD-WIRED CONNECTION AS INDICATED AS THE BASIS OF DESIGN. WHERE THE EQUIPMENT TO BE INSTALLED IS CORD AND PLUG CONNECTED, THE ELECTRICAL CONTRACTOR SHALL REVISE THE DISCONNECT FROM THE DISCONNECT SWITCH INDICATED TO A WALL MOUNTED DUPLEX RECEPTACLE; COORDINATE EXACT MOUNTING ELEVATION OF DUPLEX RECEPTACLE WITH RESPECTIVE EQUIPMENT SUPPLIER AND/OR CONTRACTOR IN FIELD BASED ON THE FINAL MOUNTING ELEVATION OF THE EQUIPMENT.

(16) DISCONNECT SWITCH FURNISHED WITH EQUIPMENT BY MECHANICAL TRADES, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. COORDINATE EXACT DETAILS WITH THE MECHANICAL CONTRACTOR IN THE FIELD PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC.

(17) MANUAL MOTOR STARTER WITH PILOT LIGHT, FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR TO SERVE EXHAUST FAN INDICATED. COORDINATE EXACT MOUNTING OF STARTER IN FIELD WITH MECHANICAL CONTRACTOR BASED ON FINAL LOCATION OF EXHAUST FAN. WHERE THE MOTOR STARTER SERVES A DUAL-FUNCTION AS THE LOCAL DISCONNECTING MEANS, THE STARTER SHALL BE LOCATED ADJACENT TO THE MOTOR AND WITHIN SIGHT. THE EXHAUST FAN IS TO BE CONTROLLED BY THE LIGHTING CONTROL SYSTEM. REFER TO TYPICAL LIGHTING CONTROL SYSTEM CONTROLLED SINGLE-PHASE EXHAUST FAN WIRING DIAGRAM ON SHEET E3.0 FOR ADDITIONAL INFORMATION.

(18) 3 #12 + 1 #12 GRD - 3/4"C TO 15A-3P HACR CIRCUIT BREAKER IN PANEL NOTED, CIRCUIT NUMBER AS INDICATED. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT RECOMMENDED CIRCUIT BREAKER TRIP SETTING WITH MECHANICAL CONTRACTOR IN FIELD PRIOR TO ORDERING OF DISTRIBUTION EQUIPMENT. SIZE INDICATED IS BASED UPON THE DESIGN CRITERIA PROVIDED BY THE MANUFACTURE; HOWEVER THE FINAL SETTING SHOULD BE BASED UPON THE ACTUAL UNIT NAMEPLATE DATA OF THE EQUIPMENT TO BE INSTALLED IN THE FIELD, WHICH MAY RESULT IN THE SIZE OF THE OVERCURRENT PROTECTIVE DEVICE POSSIBLY INCREASING OR DECREASING IN SIZE. NOTE THAT THE COORDINATION SHALL EXTEND TO THE BRANCH CIRCUIT CONDUCTORS AS WELL, BASED ON THE MANUFACTURES MCA AND MOCP DATA, AND MAY RESULT IN THE CONDUCTORS AND CONDUIT HAVING TO BE REVISED TO REFLECT THE EQUIPMENT FURNISHED BY THE MECHANICAL CONTRACTOR.

(19) NEMA SIZE 1 COMBINATION MAGNETIC MOTOR STARTER WITH HAND-OFF-AUTO CONTROL, FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR TO SERVE EXHAUST FAN INDICATED. COORDINATE EXACT MOUNTING OF STARTER IN FIELD WITH MECHANICAL CONTRACTOR BASED ON FINAL LOCATION OF EXHAUST FAN. WHERE THE MOTOR STARTER SERVES A DUAL-FUNCTION AS THE LOCAL DISCONNECTING MEANS, THE STARTER SHALL BE LOCATED ADJACENT TO THE MOTOR AND WITHIN SIGHT. THE EXHAUST FAN IS TO BE CONTROLLED BY THE CO / NO_2 DETECTION SYSTEM. REFER TO TYPICAL THREE-PHASE CO/NO_2 DETECTION SYSTEM EXHAUST FAN CONTROL WIRING DIAGRAM ON SHEET E3.0 FOR ADDITIONAL INFORMATION. DETECTION SYSTEM CONTACT TO BE WIRED TO THE "AUTO" START INPUT OF STARTER. AN AUXILIARY CONTACT IN THE COMBINATION STARTER SHALL BE UTILIZED TO CONTROL THE DAMPER, AS INDICATED ON THE WIRING DIAGRAM.

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STATE FACILITIES ADMINISTRATION
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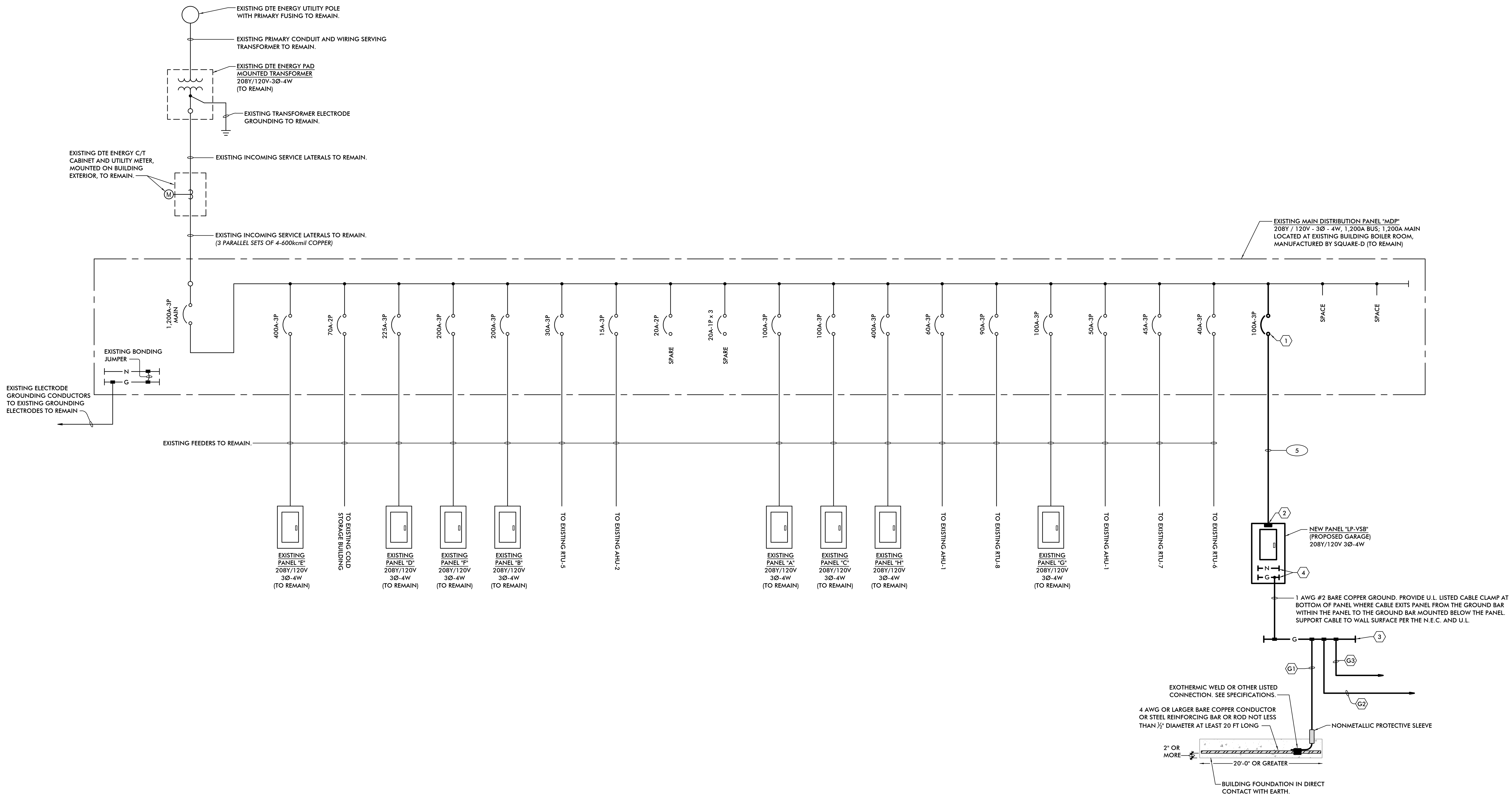
Department of
Military and Veterans Affairs
Construct MSVB Howell
Floor Plans - Electrical

DESIGNED: TGC	DRAWN: CAD	CHECKED: TGC	APPROVED: .

ISSUED FOR	DATE
PRELIMINARY ☐	
CONSTRUCTION ☐	AUG 12, 2024
FINAL RECORD ☐	

IDENTIFICATION NO.
DMVA PROJECT NO. 26B3523004
DTMB PROJECT NO. 511/24024.CAK

SHEET E1.0



PARTIAL POWER ONE - LINE DIAGRAM - NEW WORK

NO SCALE

CONDUIT AND WIRING SCHEDULE

MARK	CONDUIT SIZE	WIRING
1	¾"	3 #12 + 1 #12GRD
2	¾"	3 #8 + 1 #10 GRD
3	1¼"	4 #4 + 1 #8 GRD ✳
4	1¼"	4 #3 + 1 #8 GRD
5	2"	4 #3/0 + 1 #2 GRD ✳
6	2"	4 #3/0 + 1 #6 GRD

ALL WIRING INDICATED IN SCHEDULE IS TO BE COPPER, 90°C RATED CONDUCTORS UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

✳ = WIRE SIZES INCREASED TO ACCOUNT FOR VOLTAGE DROP ACROSS THE LENGTH OF THE FEEDER. GROUND CONDUCTOR SIZE ADJUSTED BASED ON THE INCREASED SIZE OF THE PHASE CONDUCTORS PER THE N.E.C. ARTICLE 250. REFER TO VOLTAGE DROP CALCULATION SCHEDULE ON SHEET E2.1 FOR BASIS OF DESIGN. ADJUST FEEDER SIZE IF THE ACTUAL FEEDER LENGTH IS LESS THAN OR GREATER THAN THE LENGTH NOTED ON THE SCHEDULE.

ONE-LINE DIAGRAM GENERAL NOTES

1. REFER TO SHEET E2.1 FOR NEW ELECTRIC FEEDER LOAD CALCULATION AND PANEL SCHEDULE FOR ALL THE NEW LIGHTING PANEL TO BE INSTALLED ON THE PROJECT.
2. REFER TO SHEET E2.1 FOR REQUIREMENTS REGARDING SHORT-CIRCUIT, TIME CURRENT AND ARC FLASH HAZARD ANALYSIS STUDY TO BE PERFORMED BY THIS ELECTRICAL CONTRACTOR AS PART OF HER/HIS SCOPE OF WORK.

POWER ONE-LINE DIAGRAM KEY NOTES

(1) ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL A NEW 100A-3P CIRCUIT BREAKER IN THE EXISTING SPACE OF THE EXISTING SWITCHBOARD INDICATED. COORDINATE EXACT CATALOG NUMBER OF NEW CIRCUIT BREAKER REQUIRED WITH THE EXISTING SWITCHBOARD MANUFACTURE, AND INCLUDE ALL REQUIRED HARDWARE, BRACKETS, SUPPORTS AND OTHER ITEMS REQUIRED FOR THE INSTALLATION OF THE NEW CIRCUIT BREAKER IN THE EXISTING SWITCHBOARD. NEW CIRCUIT BREAKER SHALL BE U.L. LISTED FOR USE IN THE EXISTING SWITCHBOARD, SHALL BE THE SAME MANUFACTURE AS THE EXISTING SWITCHBOARD (SQUARE-D) AND SHALL HAVE AN A.I.C. RATING EQUAL TO THAT OF THE PANEL RATING AND THE OTHER OVERCURRENT PROTECTIVE DEVICES IN THE SWITCHBOARD.

(2) 100A-3P MAIN CIRCUIT BREAKER AND TRANSIENT VOLTAGE SURGE SUPPRESSOR (TVSS), BUS CONNECTED AS A FACTORY OPTION.

(3) 4" HIGH x ¼" THICK x 2'-0" LONG COPPER GROUND BAR IN PROPOSED GARAGE, ON EXTERIOR WALL BELOW LIGHTING PANEL "LP-VSB". REFER TO TYPICAL GROUND BAR DETAIL ON SHEET E3.0.

(4) NEUTRAL BAR AND GROUND BAR ARE NOT BONDED IN ACCORDANCE WITH NEC ARTICLE 250.32(B)(1), TO ELIMINATE THE CREATION OF PARALLEL PATHS FOR NEUTRAL CURRENT ALONG THE ELECTRICAL SYSTEM.

ELECTRIC SERVICE GROUNDING ELECTRODE SYSTEM KEY NOTES

(G1) 1 - #2 Cu GROUND TO REBAR STEEL IN FOUNDATION WALL; NOTE THAT THE REBAR STEEL SHALL BE AT LEAST 20-FEET OR MORE IN LENGTH AND BONDED TOGETHER WITH STEEL TIE WIRES OR OTHER EFFECTIVE MEANS. COORDINATE THE FOUNDATION INSTALLATION DETAILS WITH STRUCTURAL TRADES IN FIELD PRIOR TO START OF CONSTRUCTION. REFER TO N.E.C. ARTICLE 250.52(C)(3) FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

(G2) SUPPLEMENTAL GROUNDING ELECTRODE REQUIRED IN ACCORDANCE WITH N.E.C. ARTICLE 250.32(B)(1). THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL 1 #6 Cu GROUND TO A MINIMUM OF TWO (2) ⅝" DIAMETER x 10'-0" LONG COPPER GROUND RODS DRIVEN NEAR THE POINT OF THE ELECTRIC SERVICE ENTRANCE. THE ELECTRICAL CONTRACTOR SHALL CONFIRM THAT THE RESISTANCE TO GROUND OF THE GROUNDING ELECTRODES IS 25 OHMS OR LESS, AS REQUIRED BY N.E.C. ARTICLE 250.56. IF THE RESISTANCE TO GROUND IS GREATER THAT 25 OHMS, THE ELECTRICAL CONTRACTOR SHALL DRIVE ADDITIONAL GROUND RODS A MINIMUM OF ONE ROD LENGTH APART (10'-0") UNTIL THE CODE REQUIRED RESISTANCE TO GROUND IS MET.

(G3) 1 #2 Cu GROUND TO BUILDING STRUCTURAL STEEL THAT IS CONNECTED TO THE EARTH BY ANY OF THE METHODS DESCRIBED IN NEC ARTICLE 250.52(A)(2). COORDINATE EXACT LOCATION OF STRUCTURAL STEEL AND COMPLIANCE WITH THE REFERENCED NEC ARTICLE WITH STRUCTURAL AND ARCHITECTURAL TRADES.

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Department of Military and Veterans Affairs
Construct MSVB Howell
Power One-Line Diagram - New Work

DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED: .

DATE	ISSUED FOR	IDENTIFICATION NO.	SHEET
AUG 12, 2024	PRELIMINARY ☐ CONSTRUCTION ☐ FINAL RECORD ☐	DMVA PROJECT NO. 26B3523004 DTMB PROJECT NO. 511/24024.CAK	E2.0

Existing Electric Service Sizing Calculations

Load Description	Load (VA)		Sizing Factor	Sizing Load (VA)	
EXISTING BUILDING SERVICE					
Existing Building Load - based on historic peak demand kW information provided by Facilities Energy Monitoring System for 12-month period from August 7, 2023 to August 6, 2024, the peak demand was recorded to be 69.67kW, with a Power Factor of 0.90, resulting in a peak demand kVA of 77.41kVA.	77,410		Per NEC Article 220.87; the maximum demand taken at 125%	96,763	
SUB-TOTAL (VA) - Existing Service	77,410			96,763	
at 208v three phase (Amperes)	215	Amperes		269	Amperes
PROPOSED VEHICLE STORAGE BUILDING					
Lighting	2,063		1.25	2,579	
Receptacles (non-continuous)	1,980		100% first 10,000VA, 50% thereafter	1,980	
Mechanical	3,205		1.00	3,205	
Electric Heat	0		1.25	0	
Largest Motor (Exhaust Fan - 1/2HP)			25% Additional Load per NEC 220.50 and 430.24	360	
Kitchen Equipment	0		Per Table 220.56 of NEC - Demand Factors for kitchens - Other than Dwelling Units - with 6 units of equipment, use a demand factor of 65%	0	
Other Power Loads	0		1.00	0	
SUB-TOTAL (VA) - Vehicle Storage	7,248			8,124	
at 208v three phase (Amperes)	20	Amperes		23	Amperes
TOTALS (VA) - EXISTING & NEW	**84,658**			**104,886**	
at 208v three phase (Amperes)	**235**	**Amperes**		**291**	**Amperes**

As Demonstrated above, the existing 1,200 Ampere Service Laterals and 1,200 Ampere Main Distribution Panel has sufficient Capacity to support the proposed added load on the existing service.

Service Calculations Based Upon the Following:

NEC Article 230.42

Lighting: Per NEC 220.12 AND Table 220.12; NEC 220.42; and calculated at 125% as continuous load

Fixed Electric Heating: per NEC 220.51 and calculated at 125% as continuous load per NEC 424.3(B)

Receptacles: Per NEC 220.44

Mechanical / Motors: Per NEC 220.50, 430.24 - 430.26, 430.62, Table 430.250 and NEC 440.6, based upon the equipment served.

Elevators / Intermittent Duty Motors: Per NEC 430.22 and Table 430.22(E).

Noncoincident Loads: Per NEC 220.60 Where Electric Heating is the Largest Load when compared to Air Conditioning.

Commercial Kitchen Equipment: Per NEC 220.56 and Table 220.56

PANEL SCHEDULE

TYPE	DESCRIPTION	CB	VA	#	ØA	ØB	ØC	#	VA	CB	DESCRIPTION	TYPE
L	GARAGE LIGHTING - WEST SIDE	20/1	640	1	1243			2	603	20/1	ELI-A & EXTERIOR WALL MOUNTED LIGHTS	L
L	GARAGE LIGHTING - EAST SIDE	20/1	620	3		820		4	200	20/1	WIRELESS AREA CONTROLLER	L
C	SPARE	20/1		5				6		20/1	SPARE	C
C	SPARE	20/1		7				8		20/1	SPARE	C
C	SPARE	20/1		9				10		20/1	SPARE	C
C	SPARE	20/1		11				12		20/1	SPARE	C
M	EXHAUST FAN EF-1 (3/4HP, 208V-3PH) - SEE NOTE - 3	15/3	445	13	445			14		20/1	SPARE	C
M			445	15		445		16		20/1	SPARE	C
M			445	17			445	18		20/1	SPARE	C
D	(2) GFI DUPLEX - GARAGE	20/1	360	19	720			20	360	20/1	(2) GFI DUPLEX - GARAGE	D
D	(2) GFI DUPLEX - GARAGE	20/1	360	21		720		22	360	20/1	(2) GFI DUPLEX - GARAGE	D
C	SPARE	20/1		23			540	24	540	20/1	(3) WP/GFI DUPLEX - NORTH EXTERIOR OF GARAGE	D
M	B-4 and B-5 (1A, 120V ea.) - SEE NOTE - 3	15/1	240	25	910			26	670	15/1	EF-2 (1/4HP, 120V) - SEE NOTE - 3	M
M	B-1 thru B-3 (1A, 120V ea.) - SEE NOTE - 3	15/1	360	27		360		28		20/1	SPARE	C
M	CO / NO2 CONTROL PANEL - SEE NOTE -3	20/1	600	29			600	30		20/1	SPARE	C
	SPACE			31				32			SPACE	
	SPACE			33				34			SPACE	
	SPACE			35				36			SPACE	
	SPACE			37				38			SPACE	
	SPACE			39				40			SPACE	
	SPACE			41				42			SPACE	
					3318	2345	1585					
					ØA	ØB	ØC					
					27.63	19.53	13.20					
					AMPS PER PHASE							

PANELBOARD INFORMATION

DESIGNATION:	**LP-VBS**
VOLTAGE:	**208Y/120**
PHASE-WIRE:	**3Ø-4W**
BUS AMPACITY:	**125A**
MAIN TYPE:	**100A MCB**
MINIMUM A.I.C.:	**10,000**
NEUTRAL SIZE:	**100%**
MOUNTING:	**SURFACE**
TOTAL POLES:	**42**
ENGINEER:	**TGC**
DATE:	**8/12/24**

PANEL LOCATION

Proposed Vechicle Storage Garage

REMARKS

PROVIDE WITH INTEGRAL SPD

See Note 1 for Minimum A.I.C. Note

NEC ARTICLE 220 DEMAND CALCULATIONS

CONTINUOUS LOAD (C):	
KITCHEN LOAD (K):	
RECEPT BASE LOAD (D):	**1980**
RECEPT DEMAND LOAD (D):	
LIGHTING LOAD (L):	**2063**
ELECTRIC HEAT LOAD (H):	
MECHANICAL LOAD (M):	**3205**
OTHER LOAD (O):	
CONNECTED 3Ø LOAD (kVA):	**7.25**
CONNECTED 3Ø LOAD (AMPS):	**20.12**
DEMAND 3Ø LOAD (kVA):	**7.25**
DEMAND 3Ø LOAD (AMPS):	**20.12**

NOTES:

1. EXACT SHORT CIRCUIT AND INTERRUPTING RATINGS OF THE PANEL AND OVER-CURRENT PROTECTIVE DEVICES TO BE DETERMINED BY STUDY TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. PROVIDE "HACR" MOTOR RATED CIRCUIT BREAKERS FOR ALL CIRCUITS SERVING MOTOR LOADS
3. PRIOR TO ORDERING OF PANELS, ELECTRICAL CONTRACTOR SHALL VERIFY RECOMMENDED OVER-CURRENT PROTECTIVE DEVICE SETTING WITH MECHANICAL AND/OR PLUMBING CONTRACTOR BASED ON THE MECHANICAL AND/OR PLUMBING EQUIPMENT SHOP DRAWINGS. ADJUST OVER-CURRENT PROTECTIVE DEVICE SETTING AND ASSOCIATED CONDUCTOR SIZES WHERE THE INSTALLED EQUIPMENT RECOMMENDED OVER-CURRENT PROTECTIVE DEVICE SETTING DIFFERS FROM THE SETTING INDICATED. NOTE THAT THE SETTING INDICATED IS BASED ON THE INFORMATION PROVIDED BY THE MECHANICAL ENGINEER DURING THE DESIGN PHASE OF THE PROJECT.

HOWELL ARMORY GARAGE PANEL "LP-VSB" - FEEDER VOLTAGE DROP CALCULATION SCHEDULE - COPPER CONDUCTORS

Panel Designation *See Note - 3*	Ampere *See Note 1*	Feeder Size *(Copper Conductors)*	Feeder Length *(Feet)*	Effective Z (0.85PF) *(Per N.E.C. Table 9)*	Voltage Drop - Volts *(AC Resistive Method)*	Percent Voltage Drop	REMARKS
NEW PANEL "LP-VSB"	80.0	#3/0	307	0.094	4.0	1.9%	Calculated Voltage Drop is within an acceptable tolerance of the Maximum Allowed Voltage Drop of 2%

NOTES:

1. Load indicated reflects the full capacity of the panel feeder, which includes capacity for future load. For the purposes of the voltage drop calculations the potential future load is considered. Actual connected load is lower.

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Department of
Military and Veterans Affairs
Construct MSVB Howell
Electrical Schedules

DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED:

DATE: AUG 12, 2024

ISSUED FOR: PRELIMINARY / CONSTRUCTION / FINAL RECORD

IDENTIFICATION NO.
DMVA PROJECT NO. 26935/2004
DTMB PROJECT NO. 511/24024.CAK

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SHEET E2.1

RED BACKGROUND WITH WHITE TEXT.

DANGER

NO SAFE PPE EXISTS
ENERGIZED WORK PROHIBITED

183 Inches	Flash Hazard Boundary
54 cal/cm^2	Flash Hazard at 18 Inches
Dangerous!	No FR Category Found
480 VAC	Shock Hazard when cover is removed
00	Glove Class
42 Inches	Limited Approach
12 Inches	Restricted Approach
1 Inches	Prohibited Approach
LOCATION:	MAIN DISTRIBUTION PANEL "MDP"

Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements.

TYPICAL LEVEL "DANGEROUS" ARC FLASH HAZARD LABEL DETAIL

NO SCALE

YELLOW BACKGROUND WITH BLACK TEXT.

WARNING

Arc Flash and Shock Hazard
Appropriate PPE Required

123 Inches	Flash Hazard Boundary
28 cal/cm^2	Flash Hazard at 18 Inches
Level 4	Arc-rated FR Shirt & Pants & Arc Flash Suit
480 VAC	Shock Hazard when cover is removed
00	Glove Class
42 Inches	Limited Approach
12 Inches	Restricted Approach
1 Inches	Prohibited Approach
LOCATION:	"MCC-1"

Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements.

TYPICAL LEVEL 3 AND 4 ARC FLASH HAZARD LABEL DETAIL

NO SCALE

WARNING

YELLOW BACKGROUND WITH BLACK TEXT.

Arc Flash and Shock Hazard
Appropriate PPE Required

31 Inches	Flash Hazard Boundary
2.9 cal/cm^2	Flash Hazard at 18 Inches
Level 1	Arc-rated FR Shirt & Pants
480 VAC	Shock Hazard when cover is removed
00	Glove Class
42 Inches	Limited Approach
12 Inches	Restricted Approach
1 Inches	Prohibited Approach
LOCATION:	"DP-A"

Warning: Changes in equipment settings or system configuration will invalidate the calculated values and PPE requirements.

TYPICAL LEVEL 1 AND 2 ARC FLASH HAZARD LABEL DETAIL

NO SCALE

NOTE: REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SHORT-CIRCUIT STUDY & ARC-FLASH HAZARD ANALYSIS TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THE PROJECT SCOPE OF WORK. LABEL SHOWN IS INTENDED TO CONVEY THE GENERAL CONFIGURATION OF THE ARC-FLASH WARNING LABEL. ALL LABELS SHALL COMPLY WITH THE REQUIREMENTS OF N.E.C. 110.16 AND NFPA 70E.

PRELIMINARY SHORT-CIRCUIT FAULT CURRENT STUDY AND ARC FLASH EVALUATION SCHEDULE

BUS NAME	BUS kV	PROTECTIVE DEVICE NAME	BUS BOLTED FAULT (kA)	BUS ARCING FAULT (kA)	PROT BOLTED FAULT (kA)	PROT ARCING FAULT (kA)	TRIP / DELAY TIME (sec)	BREAKER OPENING TIME (sec)	EQUIP TYPE	GAP (mm)	ARC FLASH BOUNDARY (in)	WORKING DISTANCE (in)	INCIDENT ENERGY (cal/cm2)	REQUIRED PROTECTIVE FR CLOTHING CATEGORY
DTE Energy Pad Mtd Transf Secondary	0.208	Primary Fuse	50.79	13.62	50.79	13.62	0.000	2.000	PNL	25	299.00	18.00	120.24	SEE NOTE - 1
Existing Main Distribution Panel "MDP"	0.208	MDP_Main	43.14	12.14	43.14	12.14	0.000	2.000	PNL	25	277.25	18.00	106.22	SEE NOTE - 1
New Lighting Panel "LP-VSB"	0.208	MDP_SW_18	3.89	2.24	3.89	2.24	0.000	2.000	PNL	25	91.07	18.00	17.09	SEE NOTE - 1

All short-circuit and Arc Flash analysis performed using SKM Systems Analysis, Inc. Power Tools for Windows software v8.0. Short-circuit fault current values are based upon an arbitrary maximum available primary fault current (750 MVA three phase and 250 MVA line to ground, both with an X/R of 15), with the a DTE Energy pad mounted 300kVA transformer with a transformer impedance of 1.6% as the basis for this preliminary short-circuit current study and arc flash hazard analysis. The preliminary study results documented in the above schedule are provided as support for the minimum AIC ratings indicated for the distribution equipment, lighting and receptacle panels, and is intended to provide an example to the Electrical Contractor for Arc Flash Hazard labeling requirements. This preliminary study is based on the primary fault current contribution noted above, and does not include any motor contribution. The final study to be performed by this Electrical Contractor shall utilize the actual available primary fault current contribution from the DTE Energy service, as well as the actual transformer impedance values and contributions for ALL MOTORS installed on the project. The final study and arc flash hazard analysis shall also be based upon the actual distribution equipment and over-current protective devices installed in the field on the project, and the actual installed feeder lengths, wiring types (i.e. THHN or THWN) and conduit type (i.e. metallic or non-metallic). The use of generic over-current protective devices or arbitrary feeder lengths in the study shall result in the study being REJECTED and the Electrical Contractor being forced to revise the study to reflect the actual installed conditions prior to final acceptance of the study and the required verification of equipment ratings. THE SHORT-CIRCUIT PORTION OF THE STUDY SHALL BE PERFORMED PRIOR TO ORDERING OF ANY EQUIPMENT TO VERIFY THAT THE AIC RATING OF THE EQUIPMENT ORDERED IS SUFFICIENT TO ACCOMMODATE THE MAXIMUM AVAILABLE FAULT CURRENT THAT WILL BE SEEN AT THE DISTRIBUTION EQUIPMENT. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION. The preliminary study looked at two scenarios: one using the actual clearing time expected for the specified circuit breakers used in the distribution equipment; and a second scenario looks at a worst case approach to the Trip / Delay Time and the Breaker Opening Time, and the incident energy in this scenario has been calculated at the maximum 2 seconds discussed in the IEEE1584 Standard. The actual incident energy is expected to be lower once the final analysis is performed by the Electrical Contractor as part of their scope of work; however consideration should be given to the potential for circuit breaker mal-function or delay in operation of the device when determining the labeling requirements, and serious consideration given to using a longer clearing time in the study to ensure that maintenance workers are provided with the necessary protection in the event that the breaker takes longer to clear than would normally be expected. REFER TO SPECIFICATIONS FOR EXACT REQUIREMENTS ASSOCIATED WITH THE STUDY TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK. NOTE THAT IN ADDITION TO THE SHORT-CIRCUIT CURRENT STUDY AND ARC FLASH HAZARD ANALYSIS DISCUSSED ABOVE, THE SPECIFICATION ALSO REQUIRES THE ELECTRICAL CONTRACTOR TO INCLUDE A TIME-CURRENT COORDINATION STUDY AS PART OF THE SCOPE OF WORK AS PART OF THE ARC FLASH MITIGATION, AND SHALL INCLUDE SELECTION OF OVERCURRENT PROTECTIVE DEVICES WHERE POSSIBLE THAT WILL MINIMIZE THE INCIDENT ENERGY AT THE DISTRIBUTION EQUIPMENT. NOTE THAT THE FINAL STUDY SHALL INCLUDE ALL DISTRIBUTION, LIGHTING, POWER AND RECEPTACLE PANELS AND MOTORS THAT ARE CONNECTED TO THE ELECTRIC SERVICE AS INDICATED ON THE ONE-LINE DIAGRAM ON SHEET E2.0. THE ABOVE PRELIMINARY STUDY ONLY LOOKED AT THE MAJOR PIECES OF DISTRIBUTION EQUIPMENT LOCATED CLOSEST TO THE MAIN SERVICE EQUIPMENT TO PROVIDE A WORST-CASE ANALYSIS OF THE MAXIMUM FAULT CURRENT THAT MAY BE EXPECTED AT THE DISTRIBUTION EQUIPMENT. THE ABOVE LIST OF EQUIPMENT IS NOT INTENDED TO BE THE TOTAL NUMBER OF PANELS OR EQUIPMENT TO BE INCLUDED IN THE STUDY.

SHORT-CIRCUIT AND ARC FLASH HAZARD EVALUATION SCHEDULE NOTE:

1. PER NFPA 70E, THE EMPLOYER / BUILDING OWNER SHALL BE RESPONSIBLE FOR DEVELOPING AN OVERALL SAFETY PROGRAM THAT DIRECTS ACTIVITY APPROPRIATE TO THE RISK ASSOCIATED WITH THE ELECTRICAL HAZARD. THE DETERMINATION OF THE PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR THE ASSOCIATED RISK AT EACH PIECE OF ELECTRICAL DISTRIBUTION EQUIPMENT SHALL BE DETERMINED BASED ON THE CALCULATED INCIDENT ENERGY INDICATED IN THE SCHEDULE AND THE ASSOCIATED PPE LEVELS INDICATED IN THE NFPA 70E DOCUMENT. THE PPE LEVELS ARE NO LONGER PROVIDED AS PART OF THE ARC FLASH HAZARD EVALUATION AT THIS PRELIMINARY STAGE OF THE PROJECT DUE TO THE NEED FOR PERFORMING A DETAILED RISK ASSESSMENT AS PART OF THE OVERALL SAFETY PROGRAM THAT IS TO BE DEVELOPED BY THE BUILDING OWNER / EMPLOYER.

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Department of
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Construct MSVB Howell
Electrical Schedules

DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED: .

DATE
AUG 12, 2024

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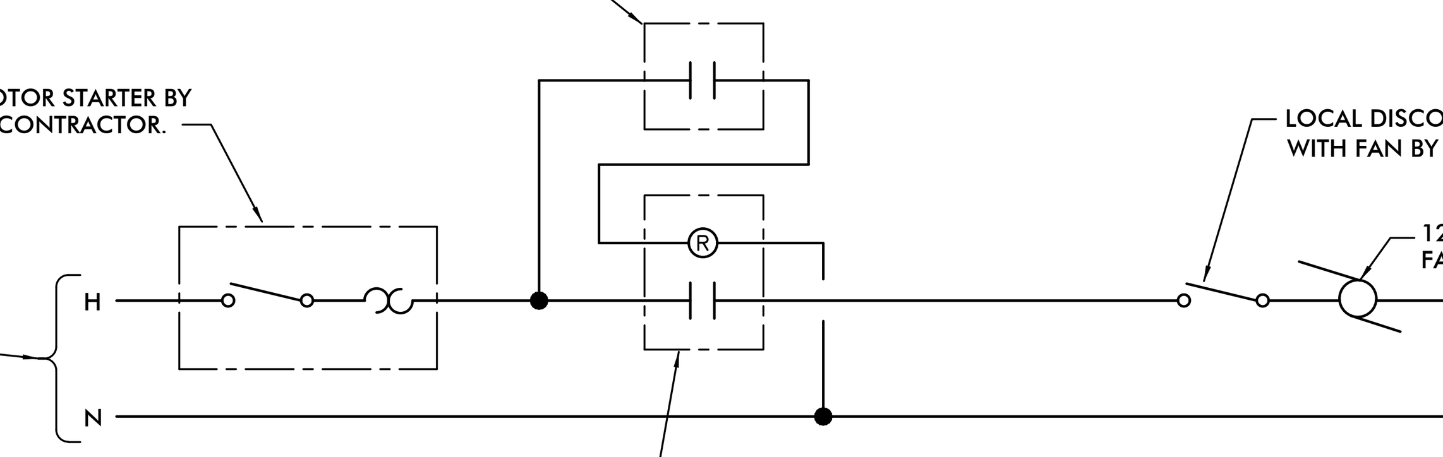
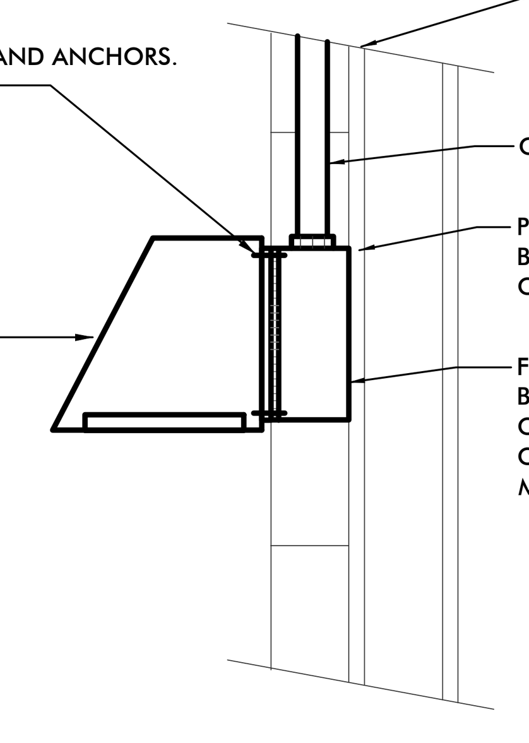
SHEET
E2.2



TYPICAL LIGHTING CONTROL SYSTEM CONTROLLED SINGLE PHASE EXHAUST FAN WIRING DIAGRAM

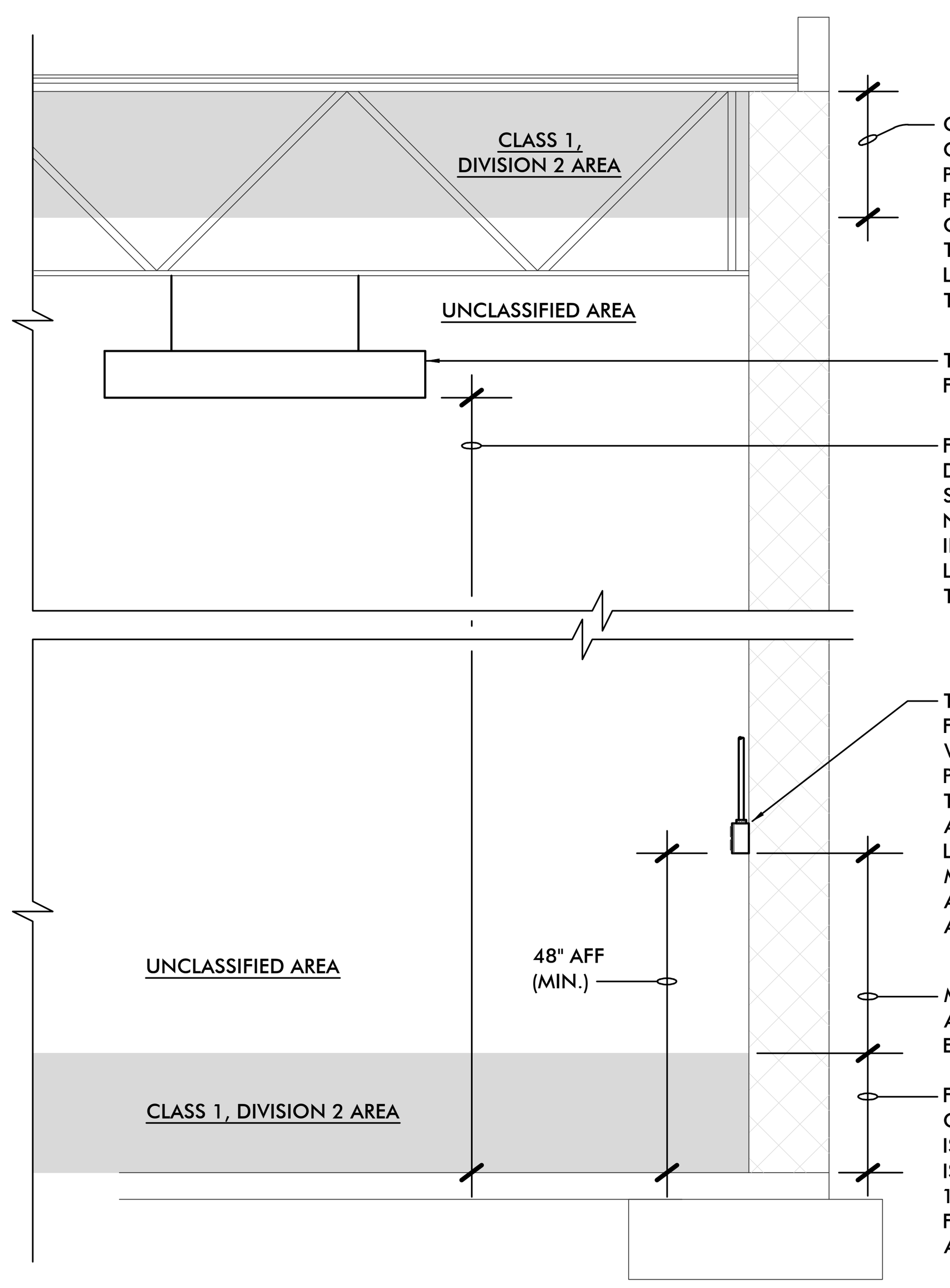
NO SCALE



FIXTURE TYPE "OE" MOUNTING DETAIL "B" (SECTION)

NO SCALE

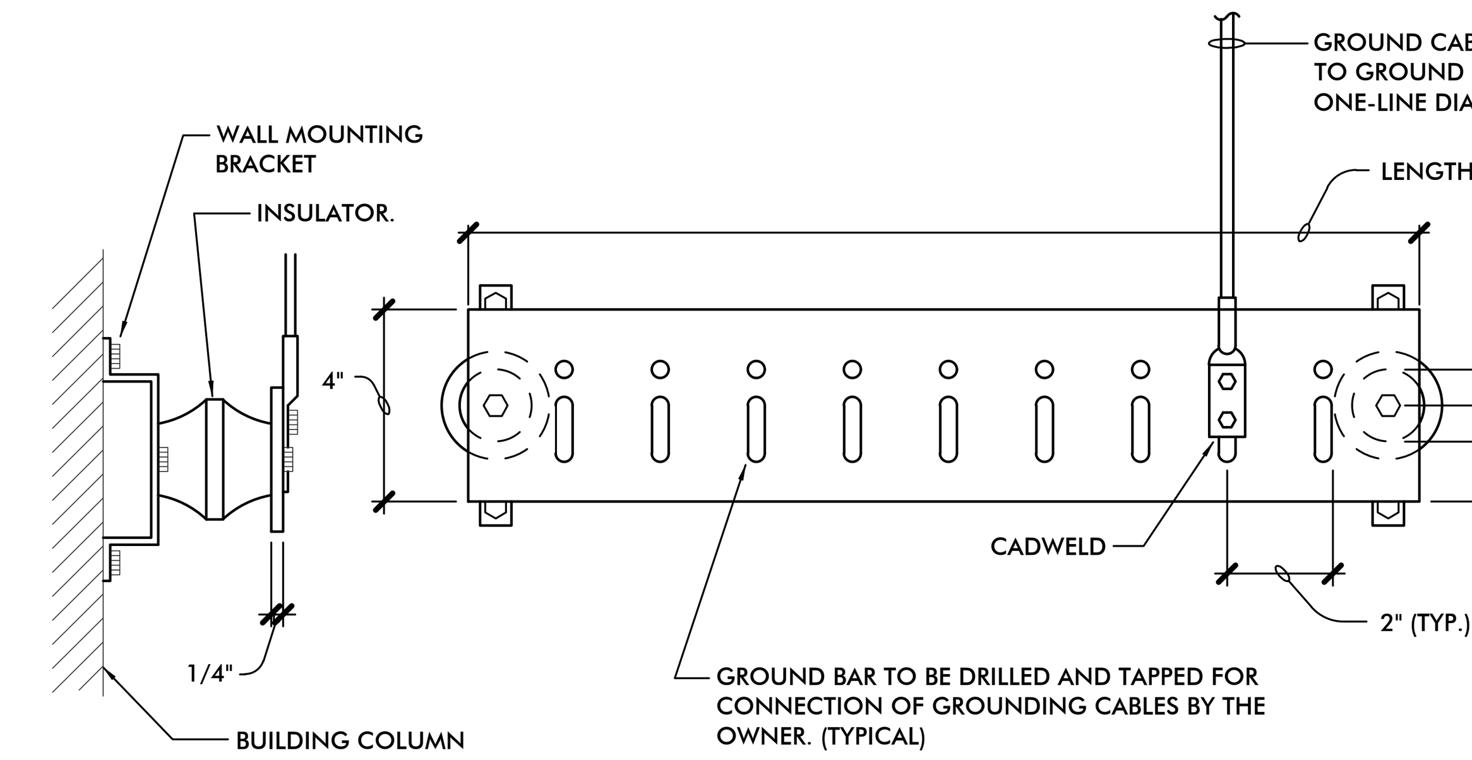
NOTE: FIXTURE SHAPE CONVEYED IN THE ABOVE DETAIL IS INTENDED TO REPRESENT THE GENERAL SHAPE OF THE LIGHT FIXTURE; HOWEVER THE DETAIL IS NOT INTENDED TO BE AN EXACT GRAPHICAL REPRESENTATION OF THE SPECIFIED FIXTURE. REFER TO THE LIGHTING FIXTURE SCHEDULE AND ASSOCIATED CUT SHEET FOR AN EXACT DESCRIPTION AND REPRESENTATION OF THE SPECIFIED FIXTURE.



1 / E3.0 TYPICAL CLASSIFIED LOCATION DETAIL

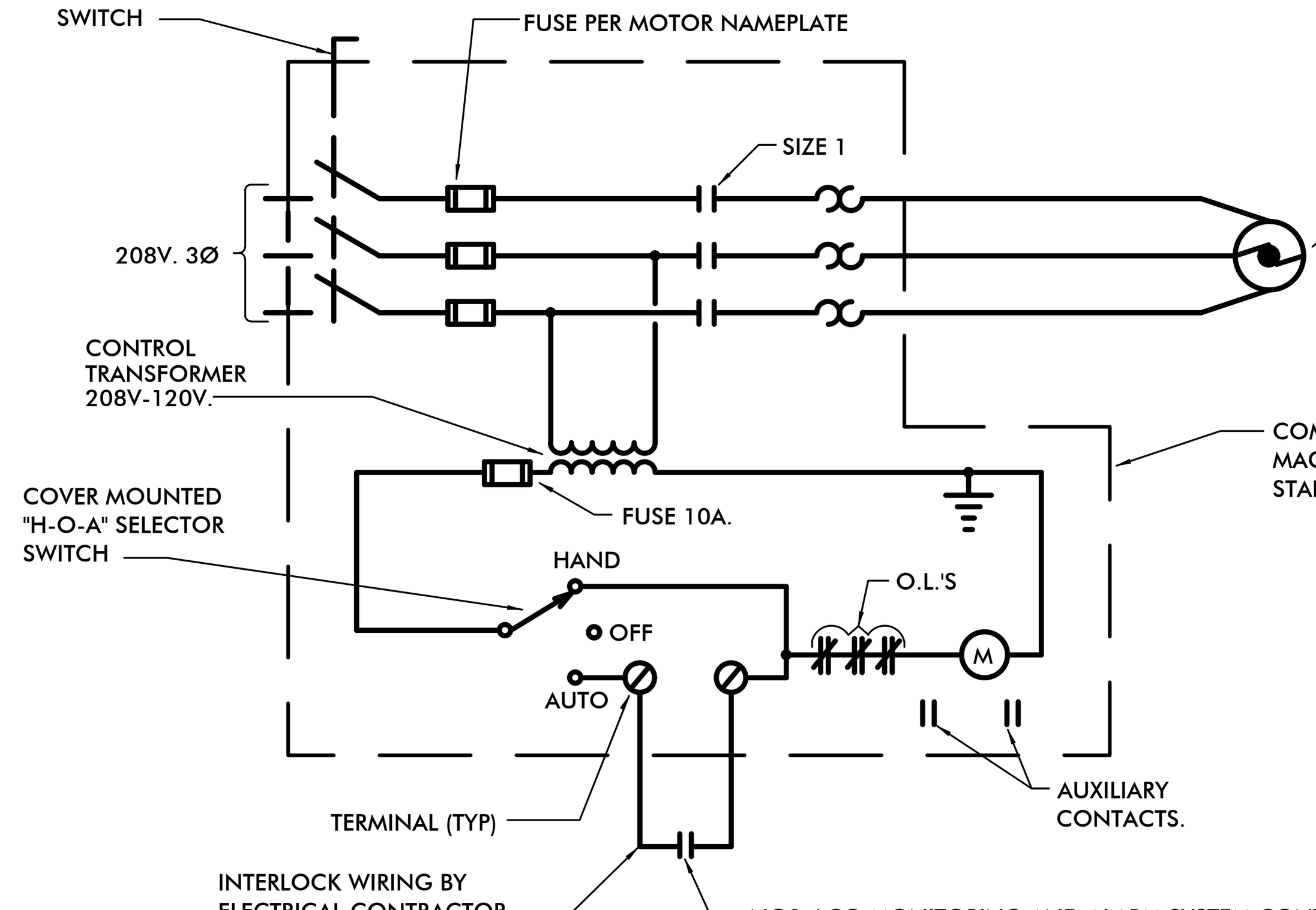
NOT TO SCALE

CLASS 1, DIVISION 2 CLASSIFIED LOCATION NOTE:
THE ELECTRICAL INSTALLATION OF ANY ELECTRICAL RACEWAYS WITHIN THE CLASSIFIED LOCATION SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF N.E.C. ARTICLE 501, WITH ALL CONDUIT WITHIN THE CLASSIFIED LOCATION BEING RIGID OR INTERMEDIATE METAL CONDUIT, WITH EXPLOSION PROOF FITTINGS AND SEAL-OFF FITTINGS AT THE BOUNDARY TO THE CLASSIFIED LOCATION. REFER TO THE N.E.C. ARTICLE 501 FOR ADDITIONAL INFORMATION AND INSTALLATION REQUIREMENTS. **THE INTENT OF THE PROJECT IS TO KEEP ALL ELECTRICAL RACEWAYS, DEVICE, EQUIPMENT AND OTHER ELECTRICAL ITEMS IN THE GARAGE OUT OF THE CLASSIFIED LOCATION.** ALL FIXED WIRING INSTALLED ABOVE A CLASS 1 LOCATION SHALL BE INSTALLED IN METAL RACEWAYS OR OTHER APPROVED RACEWAYS AS LISTED IN NEC ARTICLE 511.7(A)(1).



TYPICAL GROUND BAR DETAIL

NO SCALE



WIRING DIAGRAM NOTE:
ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE SEQUENCE OF OPERATION AND THE EXACT SYSTEM WIRING AND INTERLOCKING OF THE EXHAUST FAN "EF-1" AND INTAKE AIR LOUVERS "L-1" AND "L-2" WITH THE MECHANICAL CONTRACTOR IN THE FIELD PRIOR TO START OF CONSTRUCTION AND PRIOR TO THE ROUGH-IN OF ANY BOXES, RACEWAYS, STARTERS, ETC. THE WIRING DIAGRAM INDICATED IS DIAGRAMMATIC ONLY AND INTENDED TO DEMONSTRATE THE GENERAL SYSTEM POWER WIRING AND INTERLOCKING WITH THE NO2/CO DETECTION SYSTEM. NOTE THAT THE VARI-GREEN MOTOR TECHNOLOGY INCLUDES A STEP-DOWN TRANSFORMER, CONTROLS AND A TERMINAL STRIP FOR ANCILLARY CONTROL FUNCTIONS, AS SHOWN ON THE MANUFACTURES WIRING DIAGRAMS AND INSTALLATION DRAWINGS.

TYPICAL THREE PHASE NO2 / CO DETECTION SYSTEM EXHAUST FAN CONTROL WIRING DIAGRAM

NO SCALE

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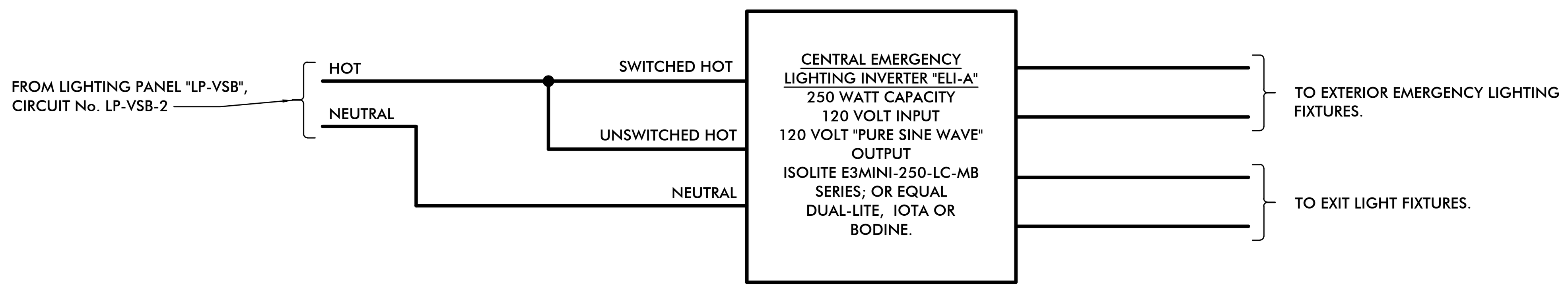
SHEET E3.0



COMPACT EMERGENCY LIGHTING INVERTER "ELI-A" WIRING DIAGRAM

NO SCALE

COMPACT EMERGENCY LIGHTING INVERTER WIRING DIAGRAM NOTES:

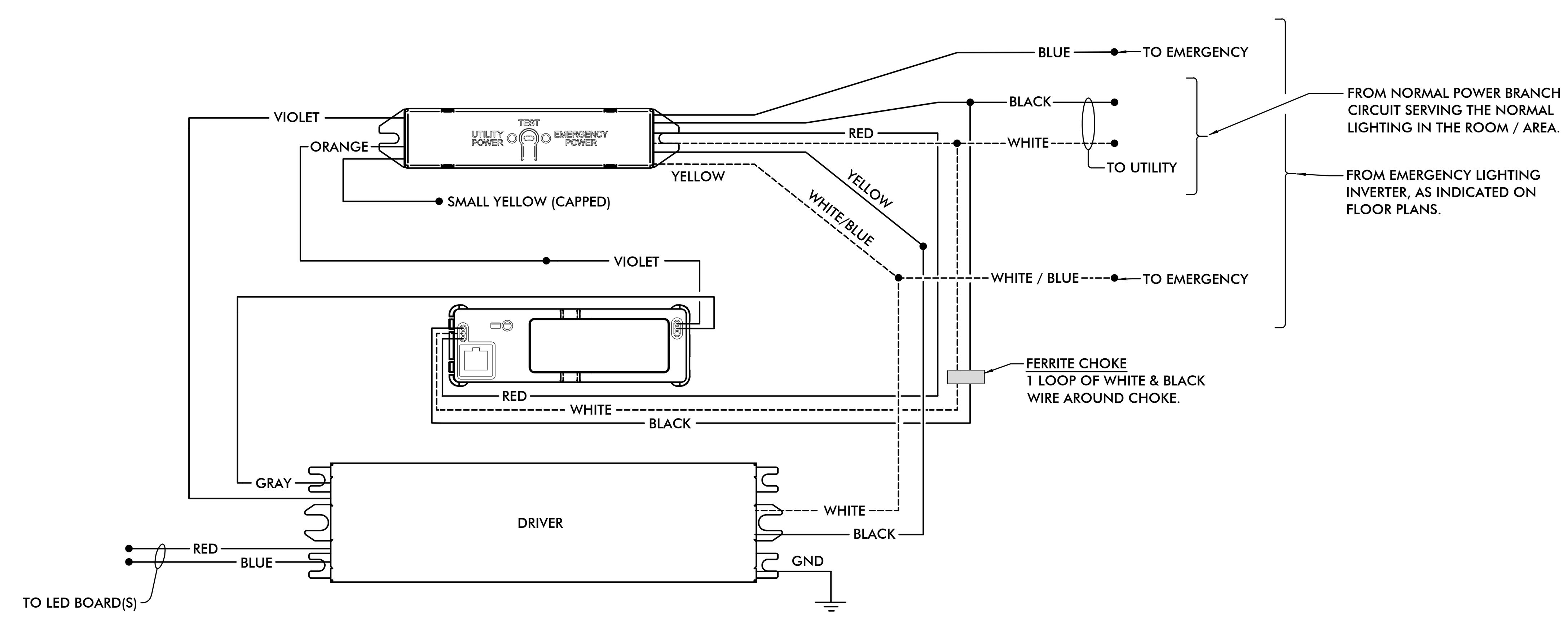
DIAGRAM IS BASED ON EQUIPMENT MANUFACTURED BY ISOLITE, DUAL-LITE, IOTA ENGINEERING OR BODINE, AND UL924 LISTED, WITH SELF-TESTING / DIAGNOSTICS OPTION.

SEQUENCE OF OPERATION

DURING NORMAL OPERATION, WHEN NORMAL POWER IS AVAILABLE, EMERGENCY FIXTURE OPERATES NORMALLY, CONTROLLED BY THE LOW VOLTAGE LIGHTING CONTROL SYSTEM, AS NOTED ON THE SCHEDULE ON SHEET E3.2.

UPON LOSS OF NORMAL POWER, THE INTERNAL SWITCH BY-PASS DEVICE IN THE COMPACT EMERGENCY LIGHTING INVERTER AUTOMATICALLY TRANSFERS OVER TO THE EMERGENCY INVERTER POWER SOURCE, AND ENERGIZES THE EMERGENCY LIGHT FIXTURE TO FULL BRIGHTNESS, REGARDLESS OF THE POSITION OF THE LOW VOLTAGE LIGHTING RELAY SERVING THE LIGHTING FIXTURE(S).

UPON RESTORATION OF NORMAL POWER, THE INTERNAL SWITCH BY-PASS DEVICE IN THE COMPACT EMERGENCY LIGHTING INVERTER SHALL AUTOMATICALLY RE-TRANSFER BACK TO THE NORMAL POWER FEED, AND RESUME OPERATION BASED UPON THE LOW VOLTAGE LIGHTING CONTROL SYSTEM, AS INDICATED ON THE SCHEDULE ON SHEET 3.2.



TYPICAL EMERGENCY DIMMING BYPASS MODULE IN-FIXTURE CONTROLS - WIRING DIAGRAM

NO SCALE

IN-FIXTURE DIMMING BYPASS MODULE DEVICE WIRING DIAGRAM NOTES:

DIAGRAM IS BASED ON EQUIPMENT MANUFACTURED BY COLUMBIA LIGHTING AND UL924 LISTED, AND IS PROVIDED TO ILLUSTRATE THE GENERAL SYSTEM WIRING; COORDINATE THE EXACT SYSTEM WIRING WITH THE MANUFACTURES APPROVED WIRING DIAGRAMS AND INSTALLATION INSTRUCTIONS.

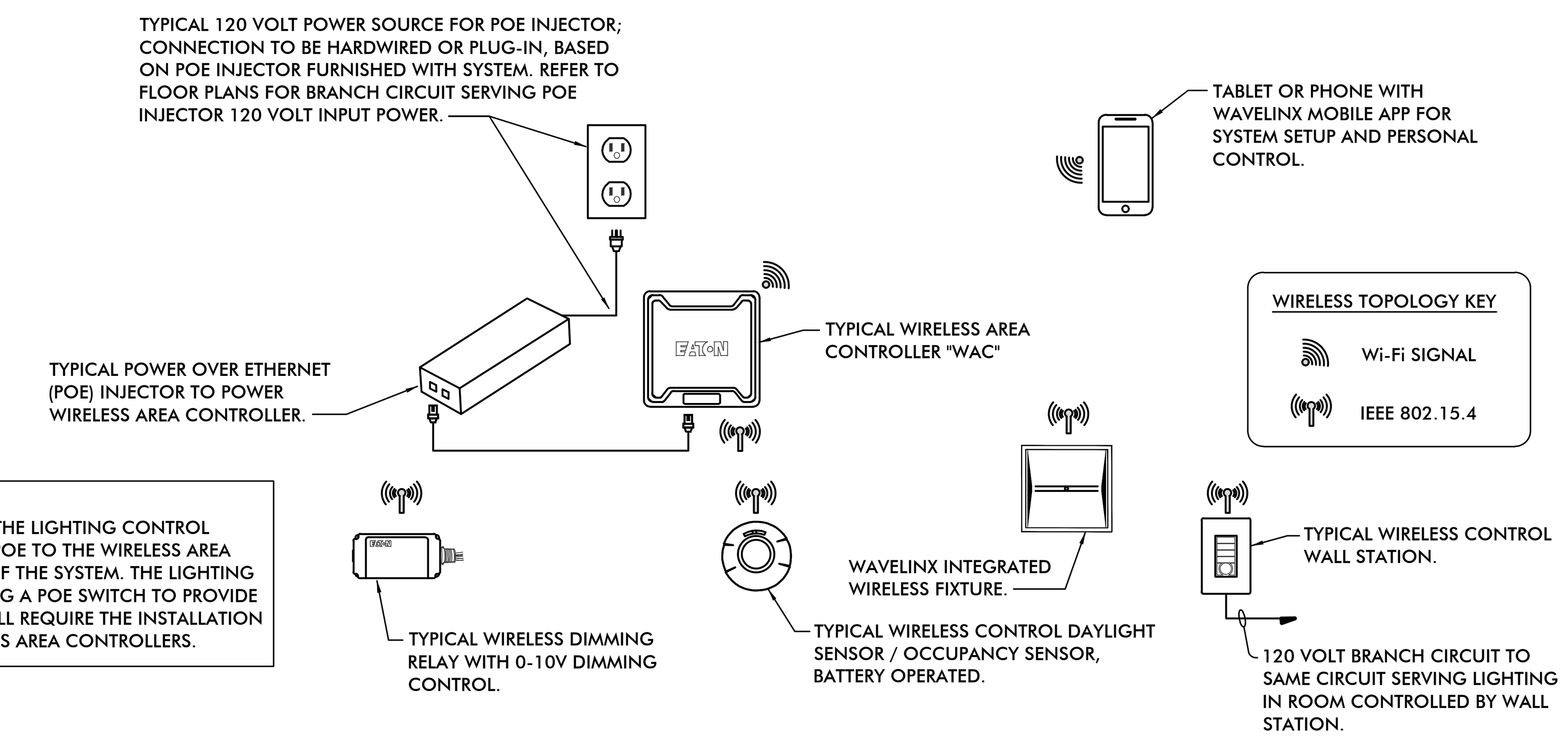
EXACT WIRING OF DEVICE SHALL BE PER THE MANUFACTURES APPROVED WIRING DIAGRAMS FURNISHED WITH THE EQUIPMENT. THE ABOVE WIRING DIAGRAM IS INTENDED TO PROVIDE AN INDICATION OF THE GENERAL OPERATION OF THE DEVICE, BUT IS NOT INTENDED TO REPRESENT THE EXACT DEVICE WIRING OR WIRING TERMINATION LOCATIONS.

SEQUENCE OF OPERATION

DURING NORMAL OPERATION, WHEN NORMAL POWER IS AVAILABLE, LED FIXTURE(S) OPERATE NORMALLY FROM THE LIGHTING CONTROL SYSTEM AND IN-FIXTURE SENSORS AND WIRELESS RADIO.

UPON LOSS OF NORMAL POWER, THE DIMMING BYPASS DEVICE SHALL AUTOMATICALLY BY-PASS THE LIGHTING CONTROL SYSTEM PROGRAMMING AND IN-FIXTURE CONTROLS AND WIRELESS RADIO, AND THE 0-10V CONTROL WIRES CONTROLLING THE OPERATION OF THE FIXTURE, AND ENERGIZES THE FIXTURE TO FULL BRIGHTNESS, REGARDLESS OF THE POSITION OF THE LIGHTING CONTROL SYSTEM PROGRAMMING AND THE IN-FIXTURE SENSORS.

UPON RESTORATION OF NORMAL POWER, THE DIMMING BYPASS DEVICE SHALL AUTOMATICALLY RESTORE OPERATION OF THE LED FIXTURE(S) TO THE LIGHTING CONTROL SYSTEM PROGRAMMING AND THE IN-FIXTURE SENSORS AND WIRELESS RADIO, AND ASSOCIATED 0-10V DIMMING CONTROL, AND RESUME OPERATION BASED UPON THE SYSTEM PROGRAMMING.



POE SOURCE NOTE:
THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE LIGHTING CONTROL SYSTEM MANUFACTURE REGARDING THE SOURCE OF THE POE TO THE WIRELESS AREA CONTROLLER AND OTHER COMPONENTS THAT ARE PART OF THE SYSTEM. THE LIGHTING CONTROL SYSTEM MANUFACTURE MAY OPT FOR PROVIDING A POE SWITCH TO PROVIDE THE POE TO THE WIRELESS AREA CONTROLLERS, WHICH WILL REQUIRE THE INSTALLATION OF CAT5 CABLING FROM THE POE SWITCH TO THE WIRELESS AREA CONTROLLERS.

WIRELESS LIGHTING CONTROL SYSTEM - GENERAL SYSTEM TOPOLOGY DIAGRAM

NO SCALE

WIRING DIAGRAM SHOWN IS BASED ON A WIRELESS LIGHTING CONTROL SYSTEM MANUFACTURED BY COOPER; THE COOPER "WAVELINX" SYSTEM. SYSTEMS FROM "EQUAL" MANUFACTURES ARE THE SENSOR SWITCH "nLIGHTAIR" SYSTEM AND THE CURRENT LIGHTING "NX WIRELESS" SYSTEM.

WIRELESS LIGHTING CONTROL SYSTEM GENERAL NOTES:

GENERAL REQUIREMENTS

1. The general system topology diagram is diagrammatic only, and intended to convey the general configuration of the lighting control system components used on the project and the method in which the system is interconnected, programmed and operates. Refer to the manufactures approved shop / installation drawings for exact system installation and locations where interconnecting wiring may be required. Refer to wireless lighting control system schedule on this sheet for additional information.
2. Electrical contractor shall provide and install 1" conduit sleeves between fire rated walls to accommodate routing of the low voltage cabling that may be required in order to support the system installation. The intent of the project is that the system is completely wireless; however, the lighting control system manufacture shall be responsible for directing the contractor where interconnecting wiring and cabling may be required. Provide fire proofing at all penetrations of fire rated walls, floors and ceilings to maintain the fire rating of the surface penetrated.

COORDINATION REQUIREMENTS

1. Prewire meeting: conducted on-site or during design meeting with lighting control system manufacturers or designated representative prior to commencing work as part of the manufacturer's standard practice and startup services. Manufacturer to review with the installer:

   a) Installation of lighting area controller and supervisory controller and locations
   b) Lighting control network wiring
   c) Network IT requirements
   d) Low voltage wiring requirements
   e) Lighting control integration requirements
   f) Lighting control system integration network wiring and connectivity
   g) Installer responsibilities
   h) Startup and training schedule and actions

CLOSEOUT SUBMITTALS

1. Sustainable design closeout documentation.
2. Wireless lighting control system manufacturer to provide an operation and maintenance manual that details the start-up procedure being performed including a process to follow, details on tests performed and an area that documents any test results.

APPROVALS

1. 10-working days prior approval before bid date is required for alternate proposals.
2. Complete catalog data, specifications and technical information on alternate equipment must be furnished to the architect and owner at least 30 business days in advance of the submission of approved construction documents.
3. For wired alternatives, manufacturer shall provide wiring diagrams and architectural details of interconnecting wiring for power signal and control. Contractor shall provide a labor cost (adder or deduction) to install the wired alternative to the lighting control system.

COMMISSIONING

1. Provide factory-certified field service engineer to a site visit to ensure proper system installation and operation.
2. Qualifications for factory-certified field service engineer:

   a) Certified by the equipment manufacturer on the system installed.

3. Conclude commissioning with or make a follow-up visit to:

   a) Verify system control operation area by area.
   b) Obtain sign-off on system functions.
   c) User to be trained on system operation.

MAINTENANCE MATERIAL SUBMITTALS

1. The manufacturer shall make available to the End-User a method of ordering new equipment for expansions, replacements and spare parts through established distributor channels.
2. The manufacturer shall make new replacement parts available for minimum of 5 years from date of manufacture.
3. The manufacturer shall make directly available to the owner additional software apps that may be desired for a minimum of 10 years from the system's date of purchase.

LIGHTING CONTROL APPLICATIONS

1. Minimum lighting control performance required, unless local energy code is more stringent.
2. Occupancy/vacancy requirements - provide an occupancy/vacancy sensor with manual on/ automatic off or automatic on/ automatic off functionality in all spaces. Manual on vacancy sensors should be used for any enclosed space with a manual on switch that does not require hands free operation. Spaces with multiple occupants or where line of sight might be obscured ceiling or corner mount sensors and manual wallstations would be required. Automatic on of lighting via occupancy sensor cannot exceed 50% of lighting. Systems that do that allow the user to select occupancy or vacancy mode shall not be acceptable.
3. Daylight zones - primary sidelit or toplit areas within an enclosed space shall be controlled separately and automatically by individual integrated daylight sensors. Adjustments to the daylight zones must be provided by a simple to use, intuitive mobile application.
4. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to dim electric light to the lowest light level and off.
5. Provide the ability to adjust the high-end and low-end trim of the dimmers to ensure the lighting automatically provides energy saving even when daylighting calls for full illumination.
6. Provide the ability for the dimmers and the relays to function separately. Systems where the 0-10v dimmers and relays are tied together reduce design capabilities and shall not be acceptable.

CYBERSECURITY

1. The network connectable products within the Wireless Lighting Control system must be UL2900-1 listed to the Standard for Software Cybersecurity for Network-Connectable Products. Wireless Lighting Control Systems that fail to meet this requirement will not be accepted.

INSTALLATION

1. The control system shall be installed and fully wired as shown on the plans by the installing contractor. The contractor shall complete all electrical connections to all control circuits.
2. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
3. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

   a) Sensor parameters, time delays, sensitivities and daylighting setpoints.
   b) Sequence of operation, (e.g. manual ON, Auto OFF. Etc.).
   c) Load parameters (e.g. blink warning, etc.).

PRODUCT SUPPORT AND SERVICE

1. Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

FACTORY COMMISSIONING

1. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
2. The electrical contractor shall provide both the manufacturer and the electrical engineer with twenty-one (21) working days written notice of the system startup and adjustment date.
3. Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
4. Qualifications for factory certified field service engineer:

   a) Certified by the equipment manufacturer on the system installed.

5. Make first visit upon completion of installation of WaveLinx Connected Lighting system:

   a) Verify locations of Wireless Area Controllers
   b) Verify implementation of Construction Group process

6. Identify connected devices and program using WaveLinx Mobile and Automatic Code Commissioning.
7. Verify that system operation control based on defined Sequence of Operations (SOO).
8. Obtain sign-off on system functions.

CLOSEOUT ACTIVITIES

1. Training Visit
2. Lighting control system manufacturer to provide one (1) day additional on-site system training to site personnel. This shall be a part of the second visit by field service to the site. A separate third visit will require an additional charge.
3. During this visit, the manufacturer's Field Service Engineer will perform tasks, at the request of the facility representative or Commissioning Agent, such as to demonstrate wall control functions, explain or describe occupancy and/or daylight sensor functionality.

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SHEET
E3.1

WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE

CIRCUIT TAG	ROOM CONTROLLER TAG	SWITCHPACK CONTROL FUNCTION (*Cooper WSP-MV-010 SERIES*)	BRANCH CIRCUIT No.	LIGHTING LOAD DESCRIPTION	CONTROL STATION - SEE NOTE - 4			ASTRO TIME CLOCK CONTROL		OCCUPANCY SENSOR CONTROL / OUTDOOR CONTROL MODULE				DAYLIGHT HARVESTING CONTROL			REMARKS
					STATION No.	ZONE No.	DIMMER	YES / NO	ON / OFF SET POINT	"ON" CONTROL	"OFF" CONTROL	TIME DELAY	SENSOR No.	"ON" SETPOINT	"OFF" SETPOINT	SENSOR No.	
LVLC-001	-	IN-FIXTURE MODULE WOLC-7P-10A	*SEE FLOOR PLAN*	DRIVE AREA AT FRONT OF PROPOSED GARAGE	-	-	-	YES	DUSK TO DAWN 11PM DIM 30%	"ON AT DUSK 11PM DIM 30%	5AM - FULL ON "OFF" AT DAWN	N/A	W01 thru W03	-	-	-	EXACT TIME CLOCK SETTING TO BE VERIFIED WITH OWNER'S CONSTRUCTION REPRESENTATIVE.
LVLC-002	-	IN-FIXTURE SENSOR / RADIO WAVELINX WPS4	LP-VSB-1 *(SEE NOTE - 5)*	GARAGE INTERIOR LIGHTING - WEST SIDE	"CS1", "CS2'	1	YES	YES	MIDNIGHT SWEEP - OFF	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO1" Thru "DO6"	-	-	-	EXACT TIME CLOCK SETTING TO BE VERIFIED WITH OWNER'S CONSTRUCTION REPRESENTATIVE.
LVLC-003	-	IN-FIXTURE SENSOR / RADIO WAVELINX WPS4	LP-VSB-3 *(SEE NOTE - 5)*	GARAGE INTERIOR LIGHTING - EAST SIDE	"CS1", "CS2'	2	YES	YES	MIDNIGHT SWEEP - OFF	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO7" Thru "DO12"	-	-	-	EXACT TIME CLOCK SETTING TO BE VERIFIED WITH OWNER'S CONSTRUCTION REPRESENTATIVE.
LVLC-004	R-1	SPST SWITCH WITH 0-10V DIMMING (0-10V NOT USED)	LP-VSB-26	GARAGE GENERAL EXHAUST FAN "EF-2"	-	-	NO	YES	MIDNIGHT SWEEP - OFF	AUTO-ON	AUTO-OFF	20-MINUTES	"DO1" Thru "DO12"	-	-	-	FAN TO RUN WHENEVER THE SPACE IS OCCUPIED, AS DETECTED BY THE IN-FIXTURE SENSORS IN THE LIGHT FIXTURES IN SPACE.

NOTES:

1. THE LIGHTING CONTROL SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR THE SELECTION OF THE EXACT SWITCHPACK AND ADDITIONAL COMPONENTS REQUIRED FOR ALL "SWITCHPACKS" / RELAYS INDICATED IN THE ABOVE SCHEDULE. THE RELAY TYPE INDICATED IN THE SCHEDULE ABOVE PROVIDES ONLY THE GENERIC GENERAL TYPE OF RELAY, AND IS NOT INTENDED TO CONVEY THE EXACT SPECIFIC TYPE OR MODEL NUMBER REQUIRED.
2. REFER TO WIRELESS LIGHTING CONTROL SYSTEM - GENERAL SYSTEM TOPOLOGY DIAGRAM ON SHEET E3.1 FOR ADDITIONAL INFORMATION REGARDING THE GENERAL CONFIGURATION OF THE SYSTEM AND THE ASSOCIATED COMPONENTS THAT COMPRISE THE SYSTEM. THE SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR PREPARING SYSTEM WIRING DIAGRAMS SPECIFIC TO THIS PROJECT FOR THE ELECTRICAL CONTRACTOR"S USE FOR THE SYSTEM INSTALLATION. THE NOTED WIRING DIAGRAM SHALL BE SUBMITTED DURING THE SHOP DRAWING PHASE OF THE PROJECT FOR REVIEW. THE MANUFACTURES GENERIC WIRING DIAGRAMS ARE NOT INCLUDED SINCE THESE DIAGRAMS DO NOT PROVIDE ANY CLARIFICATION OF HOW THIS SPECIFIC SYSTEM WILL BE INSTALLED. THE BIDDING CONTRACTOR SHALL CONTACT THE LOCAL MANUFACTURES REPRESENTATIVES TO GAIN A COMPLETE UNDERSTANDING OF HOW THE SYSTEM OPERATES AND HOW THE SYSTEM IS INSTALLED PRIOR TO SUBMITTING HIS/HER BID.
3. LIGHT FIXTURES CONTROLLED BY THIS SWITCHPACK RELAY (OR IN-FIXTURE CONTROLS) SHALL NOT BE CAPABLE OF BEING TURNED OFF. WHEN THE CONTROL STATION PUSHBUTTON SERVING THIS RELAY IS DEPRESSED TO THE "OFF" POSTION THE FIXTURES CONTROLLED BY THIS ROOM CONTROLLER SHALL DIM DOWN TO A DIMMED LEVEL OF 10%, TO ALLOW THE FIXTURES TO REMAIN ILLUMINATED AT A DIMMED LEVEL TO PROVIDE A LOW LEVEL OF NIGHT LIGHTING IN THE AREA. UPON DESPRESSING THE "ON" PUSHBUTTON, THE SWITCHPACK RELAY (OR IN-FIXTURE CONTROLS) SHALL BE ENERGIZED TO THE FULL ILLUMINATION LEVEL FOR THE FIXTURES, OR TO THE PRE-SET SCENE DIMMED STATE, WHICHEVER IS APPLICABLE FOR THE GIVEN CONTROL STATION. WHILE THE SWITCHPACK (OR IN-FIXTURE CONTROLS) IS CALLED TO BE "ON" THE FIXTURE SHALL OPERATE AS NORMAL, INCLUDING DIMMING CONTROL BASED ON THE OPERATION OF THE DIMMING PUSHBUTTONS ON THE CONTROL STATION AND THE DAYLIGHT HARVESTING CONTROLS; HOWEVER, THE SWITCHPACK (OR IN-FIXTURE CONTROLS) SHALL HAVE A PROGRAMMED MINIMUM DIMMED STATE LEVEL OF 10%, AND THE FIXTURE SHALL NOT BE CAPABLE OF BEING DIMMED ANY LOWER THAN THIS PRESET THRESHOLD.
4. REFER TO WIRELESS LIGHTING CONTROL STATION SCHEDULE THIS SHEET FOR PROGRAMMING AND ASSIGNING OF THE LIGHTING ZONES INDICATED TO THE RESPECTIVE CONTROL STATION SCENES AND/OR CONTROL BUTTONS.
5. REFER TO LIGHTING FLOOR PLANS FOR BRANCH CIRCUIT SERVING LIGHTING FIXTURES WITH IN-FIXTURE SENSORS AND WIRELESS RADIO. CIRCUIT NUMBER INDICATED IS THE BRANCH CIRCUIT SHOWN ON THE FLOOR PLANS TO SERVE THE FIXTURES WITH IN-FIXTURE SENSORS, BUT WILL ALSO SERVE THE ROOM CONTROLLER POWER FOR ALTERNATE MANUFACTURES LIGHTING CONTROL SYSTEMS WHICH REQUIRE A ROOM CONTROLLER TO BE PART OF THE WIRELESS CONTROL SYSTEM. THE BASIS OF DESIGN SYSTEM DOESN'T REQUIRE A ROOM CONTROLLER, BUT THIS DETAIL IS NOTED IN THE EVENT ONE OF THE ALTERNATE MANUFACTURE SYSTEMS IS UTILIZED.

WIRELESS LIGHTING CONTROL STATION SCHEDULE

STATION No.	CONTROL STATION MODEL NUMBER - SEE NOTES 1 & 2 (*Cooper WaveLinx SERIES*)	SCENE 1		SCENE 2		SCENE 3		SCENE 4		RAISE / LOWER BUTTON		REMARKS
		ZONES	DIM STATE	ZONES	DIM STATE	ZONES	DIM STATE	ZONES	DIM STATE	YES/NO	ZONES	
CS1	WW5-RL-X-ENGRV	1	"WEST LIGHTS" 50%	1	"WEST LIGHTS" 100%	2	"EAST LIGHTS" 50%	2	"EAST LIGHTS" 100%	YES	1,2	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS2	WW5-RL-X-ENGRV	1	"WEST LIGHTS" 50%	1	"WEST LIGHTS" 100%	2	"EAST LIGHTS" 50%	2	"EAST LIGHTS" 100%	YES	1,2	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.

NOTES:

1. CONTROL STATION FINISH TO BE SELECTED BY ARCHITECT. FINISH OPTION IS DENOTED BY THE "-X" IN THE SCHEDULE ABOVE.
2. PROVIDE CUSTOM ENGRAVING OF PUSHBUTTONS TO REFLECT SCENE DESCRIPTION INDICATED IN THE SCHEDULE ABOVE.

STATE OF MICHIGAN
THOMAS
GERARD
CROW
ENGINEER
License No.
6201055658
LICENSED PROFESSIONAL ENGINEER

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STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
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Straub Pettitt Yaste

Department of
Military and Veterans Affairs
Construct MSVB Howell
Miscellaneous Diagrams & Details

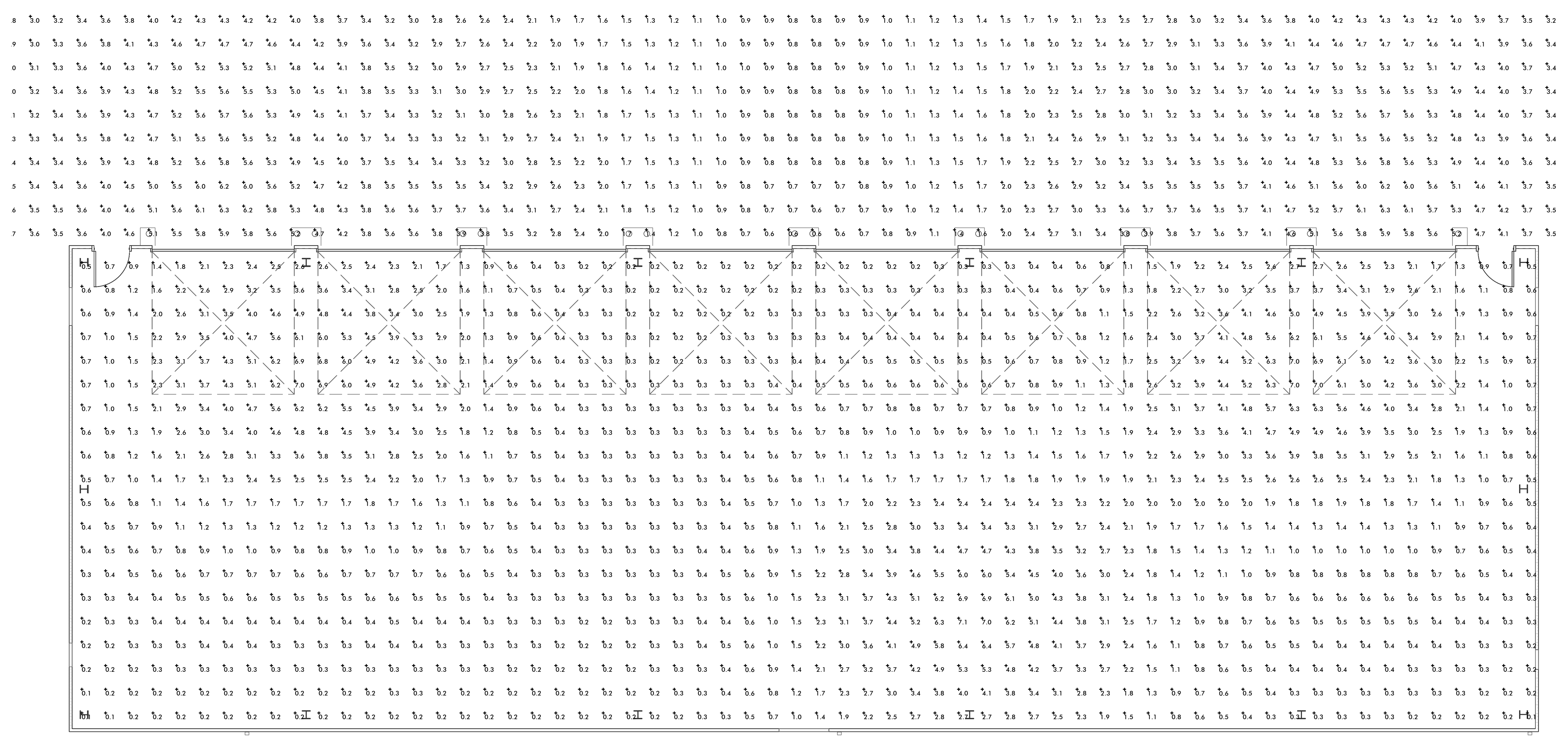
DESIGNED: TGC
DRAWN: CAD
CHECKED: TGC
APPROVED: .

DATE: AUG 12, 2024

ISSUED FOR: PRELIMINARY / CONSTRUCTION / FINAL RECORD

IDENTIFICATION NO.
DMVA PROJECT NO. 26B3523004
DTMB PROJECT NO. 511/24024.CAK

SHEET E3.2



FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY

1 / EX1

SCALE: 1/8" = 1'-0"

Emergency Egress Lighting Photometry Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Garage Exterior Grade North Side	Illuminance	Fc	3.15	6.3	0.6	5.25	10.50
Garage East Exterior Exit Landing	Illuminance	Fc	4.09	4.7	3.6	1.14	1.31
Garage Emergency Egress Path	Illuminance	Fc	1.76	7.0	0.2	8.80	35.00
Garage West Exterior Exit Landing	Illuminance	Fc	4.23	5.1	3.5	1.21	1.46

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Department of
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Construct MSVB Howell
Floor Plan - Em. Lighting Photometry

DESIGNED: TGC
DRAWN: CAD
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APPROVED:

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SHEET
EX1