Highland Township Fire Station No. 2

Highland Township

2550 E. Wardlow Rd. Highland, MI 48356

PARTNERS

Celebrating 15 YEARS

Architect:
PARTNERS in Architecture, PLC
65 Market Street
Mount Clemens, MI 48043
586-469-3600

Owner:
Highland Township Fire Department
250 W Livingston Rd
Highland, MI 48357
(248) 887-8688

Builder:
Axiom Construction Services Group, LLC
7789 E. M-36
Whitmore Lake, MI 48189
248-446 1104

Civil Engineer:
Environmental Engineers, Inc.
18620 W. Ten Mile Rd.
Southfield, MI 48075
248-424-9510

Structural Engineer:
Shymanski & Assoc.
33426 5 Mile Rd
48154 Livonia, Michigan
734-855-4810

Mech. / Elec. Engineer:
MA Engineering
400 S. Old Woodward Ave
Birmingham, MI 48009
248-258-1610

Drawing Index

Drawing Index

NOT FOR CONSTRUCTION

PARTNERS

Celebrating 15 YEARS

PARTNERS in Architecture, PLC

65 MARKET STREET
MOUNT CLEMENS, MI 48043
P 586.469.3600
F 586.469.3607

CONSULTANT

KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding / Construction 08/27/2020

DRAWN BY

AR

CHECKED BY

AM / JV

APPROVED BY

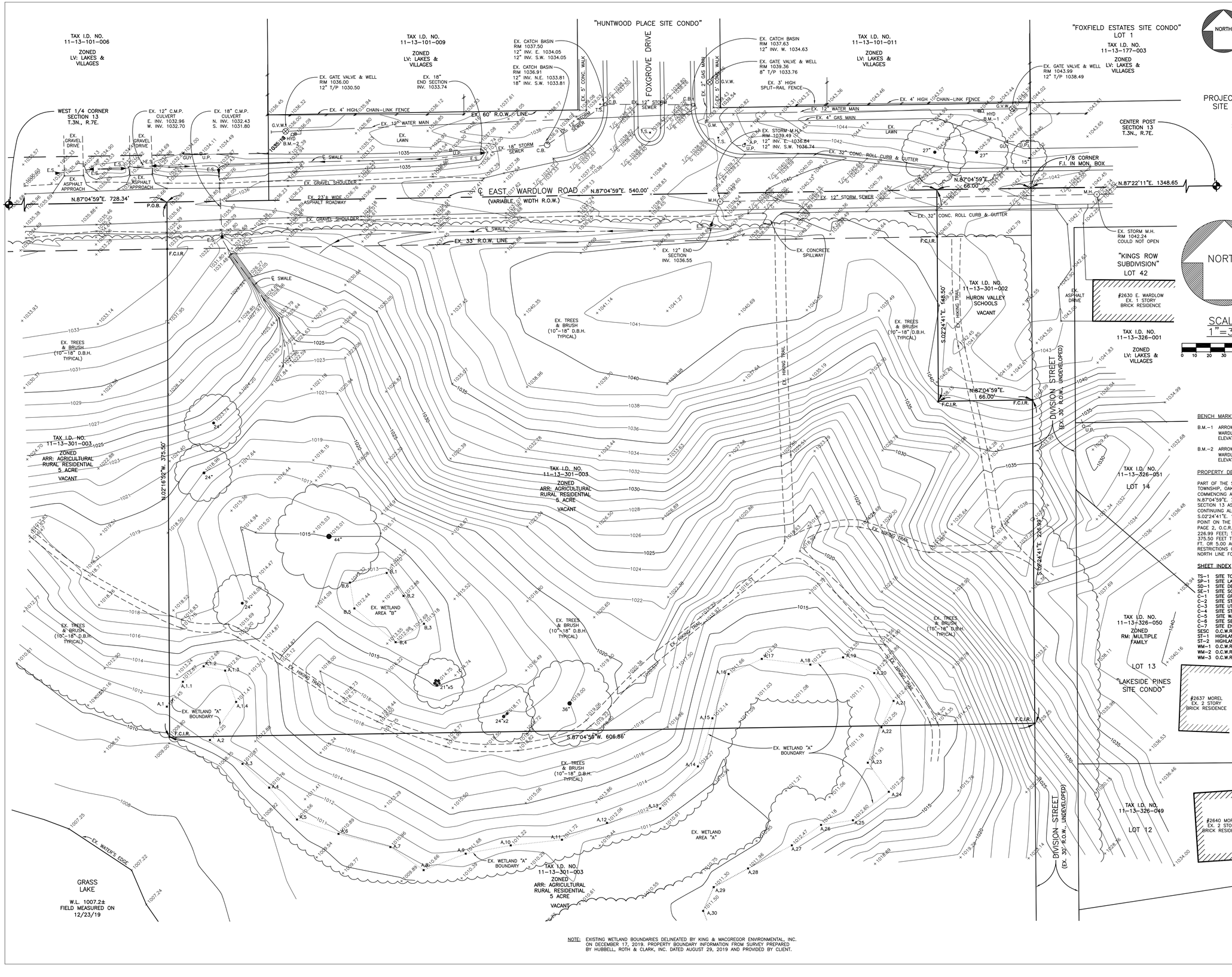
DWG

SHEET NAME

COVER SHEET

SHEET NO.

A0-00



NOTE: EXISTING WETLAND BOUNDARIES DELINEATED BY KING & MACGREGOR ENVIRONMENTAL, INC. ON DECEMBER 17, 2019. PROPERTY BOUNDARY INFORMATION FROM SURVEY PREPARED BY HUBBELL, ROTH & CLARK, INC. DATED AUGUST 29, 2019 AND PROVIDED BY CLIENT.

LEGEND

- 1025.00 – EXISTING ELEVATION
- + 25.00 – PROPOSED ELEVATION (ADD 1000 FEET)
- 1025 – EXISTING CONTOUR
- 25 – PROPOSED CONTOUR (ADD 1000 FEET)
- U.P. – UTILITY POLE
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BENCH MARKS

B.M.–1 ARROW ON HYDRANT LOCATED 55'± NORTH OF THE ℄ OF WARDLOW ROAD & 234'± EAST OF THE ℄ OF FOXGROVE DRIVE ELEVATION 1046.49 U.S.G.S. DATUM

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SHEET INDEX

STATE OF MICHIGAN – PAUL J. LEWSLEY – ENGINEER – No. 39874 – LICENSED PROFESSIONAL ENGINEER

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

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65 MARKET STREET
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18620 WEST TEN MILE ROAD
SOUTHFIELD, MICHIGAN 48075
PHONE: 248/424–9510
FAX: 248/424–2954
E–MAIL: pjlewsley@envengrs.com

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07/31/20 - 90% REVIEW
08/11/20 - 95% REVIEW
08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

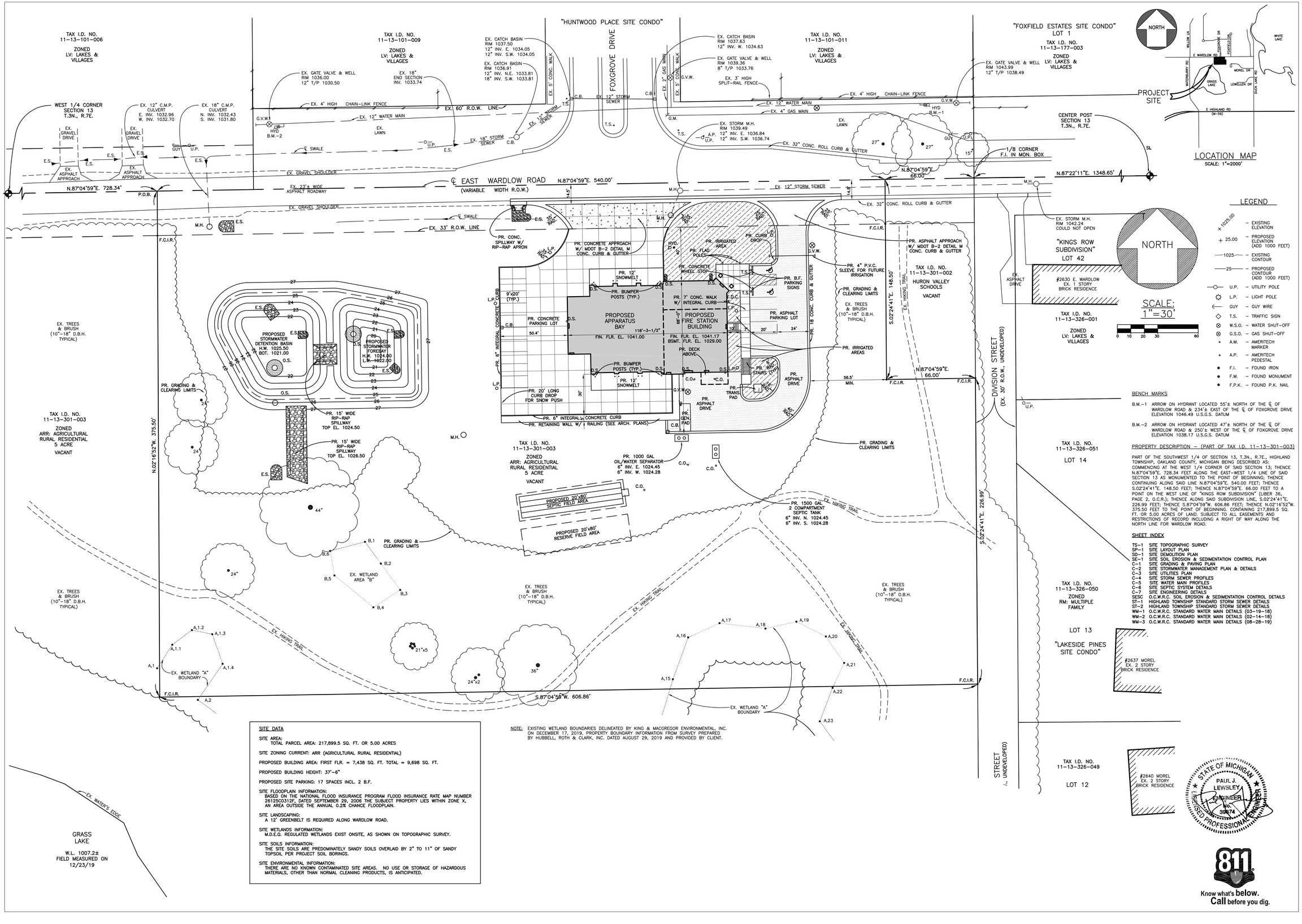
SHEET NAME

SITE TOPOGRAPHIC SURVEY

SHEET NO.

TS-1

EE # 1947



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SHEET INDEX

SITE DATA

SITE AREA:
TOTAL PARCEL AREA: 217,899.5 SQ. FT. OR 5.00 ACRES

SITE ZONING CURRENT: ARR (AGRICULTURAL RURAL RESIDENTIAL)

PROPOSED BUILDING AREA: FIRST FLR. = 7,438 SQ. FT. TOTAL = 9,698 SQ. FT.

PROPOSED BUILDING HEIGHT: 37'-6"

PROPOSED SITE PARKING: 17 SPACES INCL. 2 B.F.

SITE FLOODPLAIN INFORMATION:
BASED ON THE NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP NUMBER 26125C0312F, DATED SEPTEMBER 29, 2006 THE SUBJECT PROPERTY LIES WITHIN ZONE X, AN AREA OUTSIDE THE ANNUAL 0.2% CHANCE FLOODPLAIN.

SITE LANDSCAPING:
A 12' GREENBELT IS REQUIRED ALONG WARDLOW ROAD.

SITE WETLANDS INFORMATION:
M.D.E.Q. REGULATED WETLANDS EXIST ONSITE, AS SHOWN ON TOPOGRAPHIC SURVEY.

SITE SOILS INFORMATION:
THE SITE SOILS ARE PREDOMINATELY SANDY SOILS OVERLAID BY 2" TO 11" OF SANDY TOPSOIL PER PROJECT SOIL BORINGS.

SITE ENVIRONMENTAL INFORMATION:
THERE ARE NO KNOWN CONTAMINATED SITE AREAS. NO USE OR STORAGE OF HAZARDOUS MATERIALS, OTHER THAN NORMAL CLEANING PRODUCTS, IS ANTICIPATED.

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F 586.469.3607

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DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

SHEET NAME

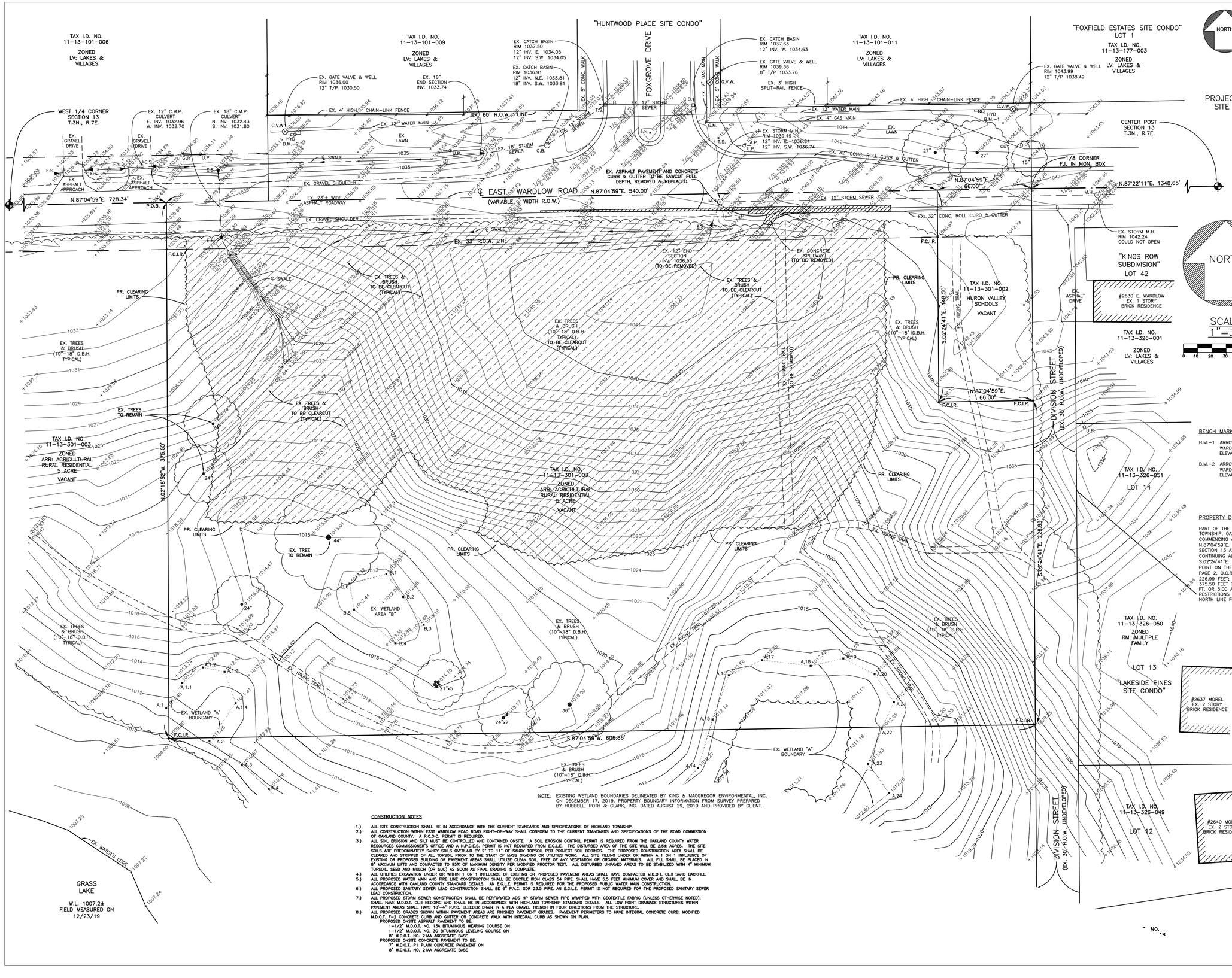
SITE LAYOUT PLAN

SHEET NO.

SP-1

EE # 1947

STATE OF MICHIGAN
PAUL J. LEWSLEY
ENGINEER
No. 39874
LICENSED PROFESSIONAL ENGINEER



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   1-1/2" M.D.O.T. NO. 3C BITUMINOUS LEVELING COURSE ON
   8" M.D.O.T. NO. 21AA AGGREGATE BASE
   PROPOSED ONSITE CONCRETE PAVEMENT TO BE:
   7" M.D.O.T. P1 PLAIN CONCRETE PAVEMENT ON
   8" M.D.O.T. NO. 21AA AGGREGATE BASE

STATE OF MICHIGAN PAUL J. LEWSLEY ENGINEER No. 39674 LICENSED PROFESSIONAL ENGINEER

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DRAWN BY

B.L.

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P.L.

APPROVED BY

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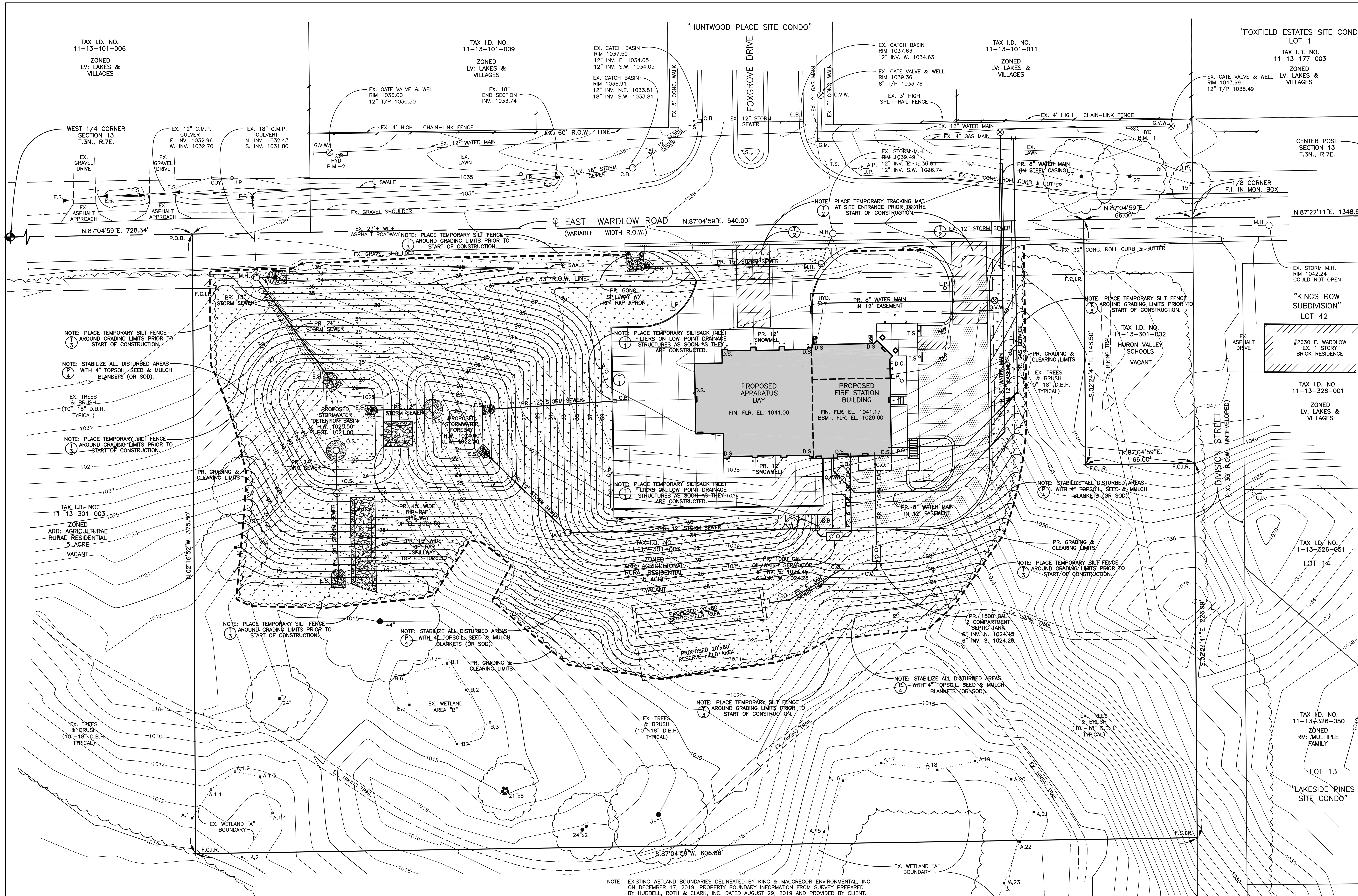
SHEET NAME

SITE DEMOLITION PLAN

SHEET NO.

SD-1

EE # 1947



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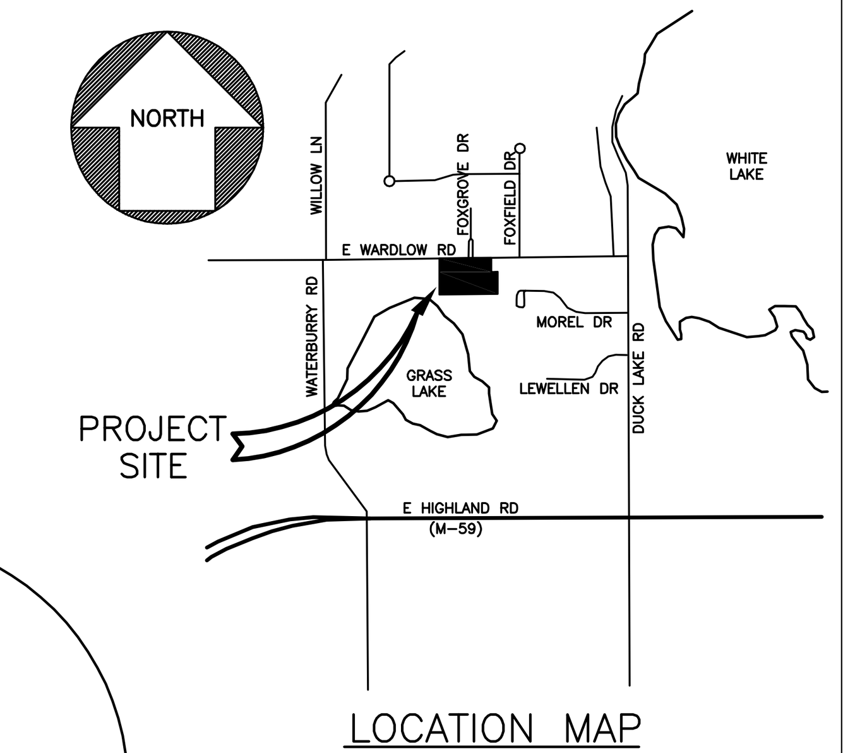

LOCATION MAP
SCALE: 1"=2000'

NORTH

SCALE: 1"=30'
0 10 20 30 60

LEGEND

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SOIL EROSION & SEDIMENTATION CONTROL SEQUENCE

09/01 – 09/30/20 INSTALL TEMPORARY SILT FENCE AROUND PERIMETER OF SITE CONSTRUCTION AREA AS SHOWN ON PLAN. INSTALL TEMPORARY STONE TRACKING MAT AT PROPOSED APPROACH WHERE SHOWN ON PLAN. CLEAR CONSTRUCTION AREA. STRIP AND STOCKPILE TOPSOIL. ROUGH GRADE SITE AND EXCAVATE DETENTION BASIN.
10/01 – 10/31/20 BEGIN BUILDING CONSTRUCTION. REMOVE ANY DIRT WHICH MAY BE TRACKED ONTO ADJACENT ROADWAY ON A DAILY BASIS. CONTROL DUST FROM SITE AT ALL TIMES BY WATERING AS NECESSARY. INSPECT ALL TEMPORARY EROSION CONTROL MEASURES ON A WEEKLY BASIS AND IMMEDIATELY AFTER EACH RAINFALL EVENT. ANY MAINTENANCE NEEDED TO KEEP THE MEASURES PERFORMING THEIR INTENDED PURPOSES, SHOULD BE DONE IMMEDIATELY AFTER THE SITE INSPECTION.
11/01 – 12/31/20 INSTALL SITE UTILITIES. PLACE TEMPORARY INLET FILTERS ON ALL NEW DRAINAGE STRUCTURES AS SOON AS THEY ARE CONSTRUCTED.
05/01 – 05/31/21 FINE GRADE PAVEMENT AREAS AND INSTALL PAVEMENT. REPAIR AND/OR REPLACE INLET FILTERS AS REQUIRED.
06/01 – 06/30/21 FINE GRADE ALL UNPAVED AREAS AND DISTRIBUTE 4" MIN. TOPSOIL. SEED AND MULCH (OR SOD) ALL DISTURBED PORTIONS OF SITE WHICH ARE UNPAVED WITHIN FIVE (5) DAYS OF FINAL GRADING.
07/01 – 07/31/21 COMPLETE BUILDING CONSTRUCTION. CLEAN SITE PAVEMENT AND STORM SEWERS REMOVING ANY ACCUMULATED SEDIMENT AND DEBRIS. REMOVE TEMPORARY EROSION CONTROL MEASURES WHEN ALL AREAS ARE STABILIZED.

NOTE: THE CONTRACTOR SHALL INSTALL, MONITOR AND MAINTAIN ALL TEMPORARY EROSION CONTROL DEVICES THROUGHOUT THE LIFE OF THE PROJECT. THE OWNER SHALL MONITOR AND MAINTAIN ALL PERMANENT EROSION CONTROL DEVICES UPON COMPLETION OF THE PROJECT.

SOIL EROSION & SEDIMENTATION CONTROL MEASURES INSPECTION & MAINTENANCE SCHEDULE

ALL TEMPORARY EROSION CONTROL MEASURES SHOULD BE CHECKED ON A WEEKLY BASIS AND IMMEDIATELY AFTER EACH RAINFALL EVENT. ANY MAINTENANCE NEEDED TO KEEP THE MEASURES PERFORMING THEIR INTENDED PURPOSE SHOULD BE DONE IMMEDIATELY AFTER THE SITE INSPECTION. EXAMPLES OF REQUIRED MAINTENANCE INCLUDE THE FOLLOWING:

1.) INLET FILTERS – SILTSACK INSERTS SHOULD BE CLEANED OUT PERIODICALLY SO AS NOT TO BECOME CLOGGED. ANY DAMAGED FILTERS SHALL BE REPLACED IMMEDIATELY.
2.) TRACKING MAT – CRUSHED CONCRETE SHOULD BE ADDED TO THE TRACKING MATS AS THEY BECOME COVERED WITH MUD. ADJACENT ROADWAYS SHOULD BE CLEANED ON A DAILY BASIS AS NECESSARY TO REMOVE ANY DIRT WHICH MAY BE TRACKED ONTO THEM.
3.) SILT FENCE – SOIL ACCUMULATED BEHIND THE SILT FENCE SHOULD BE REMOVED AFTER REACHING A 6" HEIGHT. ANY AREAS WHERE THE SILT FENCE HAS BEEN UNDERCUT SHALL BE REINSTALLED WITH THE REQUIRED 6" MINIMUM ANCHOR TRENCH. ANY DAMAGED SILT FENCE SHALL BE REPLACED IMMEDIATELY.
4.) SLOPE STABILIZATION BLANKETS – STRAW BLANKETS SHALL BE REPAIRED, REPLACED OR RESTAKED AS NECESSARY TO HOLD THE UNDERLYING TOPSOIL AND SEED IN PLACE UNTIL TURF IS ESTABLISHED.
5.) TOPSOIL, SEED, & MULCH – ALL GREENBELT AREAS SHOULD RECEIVE 4" TOPSOIL, SEED AND MULCH (OR HYDRO-SEED OR SOD) WITHIN FIVE (5) DAYS OF REACHING FINAL GRADE. ANY ERODED AREAS SHALL BE IMMEDIATELY REPAIRED BY REGRADING AND PLACING ADDITIONAL SEED & MULCH.

SITE SOIL EROSION & SEDIMENTATION CONTROL MEASURES LEGEND

T1	TEMPORARY SILT SACK INLET FILTERS	T3	TEMPORARY SILT FENCE
T2	TEMPORARY TRACKING MAT	P4	4" TOPSOIL, SEED & MULCH RESTORATION

PROPOSED SITE SOIL EROSION CONTROL QUANTITIES

2 EA. – TEMPORARY INLET FILTERS
1,250 L.F. – TEMPORY SILT FENCE
2 EA. – TEMPORARY TRACKING MAT
71,720 S.F. – 4" TOPSOIL, SEED & MUCLH BLANKET STABILIZATION

NOTE: CONTRACTOR TO VERIFY ALL PROJECT QUANTITIES.

STATE OF MICHIGAN ★ PAUL J. LEWSLEY ENGINEER No. 39674 LICENSED PROFESSIONAL ENGINEER ★

Know what's below. Call before you dig.

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KEY PLAN

OWNER
Highland Township Fire Department

PROJECT NAME
Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

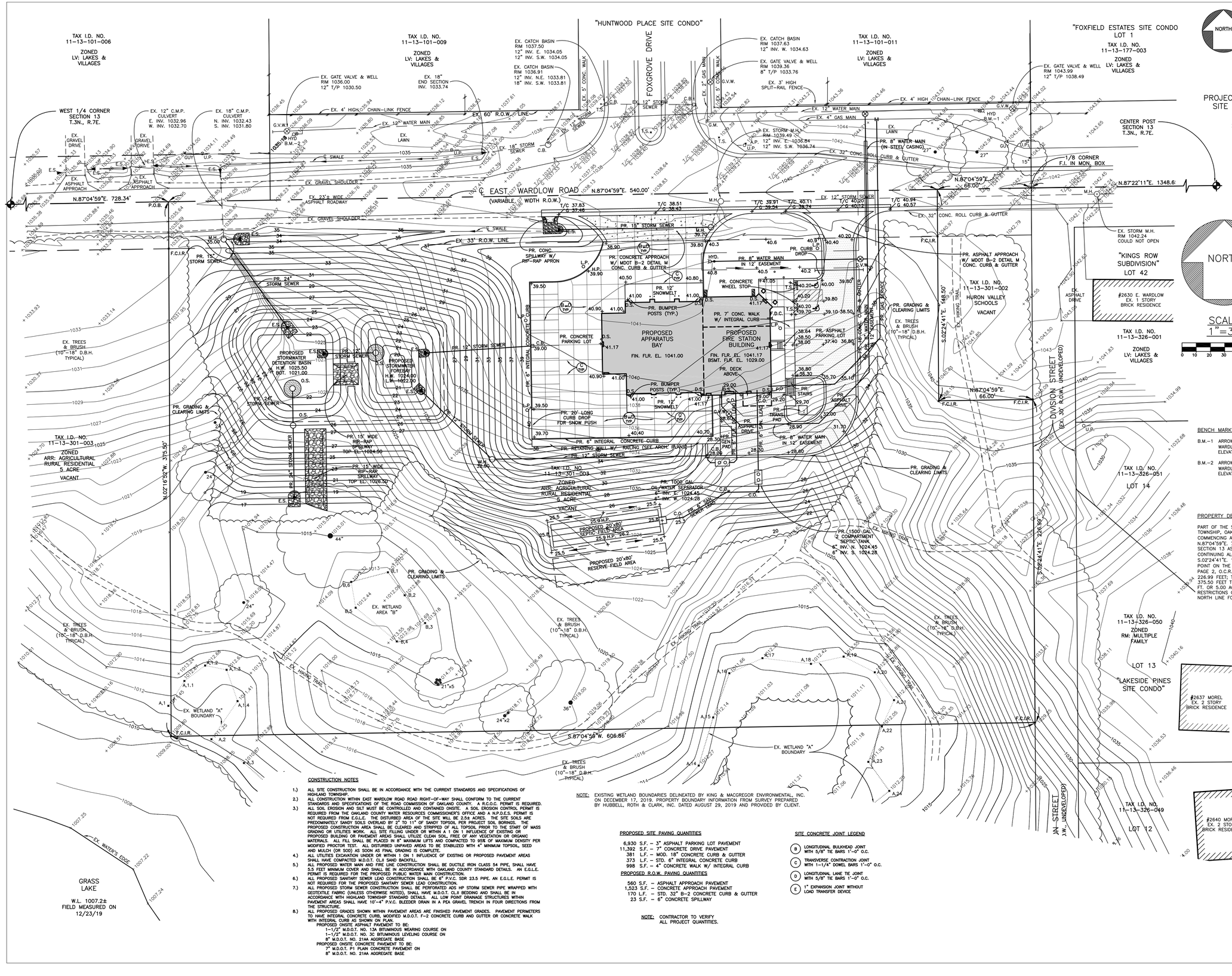
ISSUES / REVISIONS
07/31/20 - 90% REVIEW
08/11/20 - 95% REVIEW
08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY
B.L.
CHECKED BY
P.L.
APPROVED BY
P.L.

SHEET NAME
SITE SOIL EROSION & SEDIMENTATION CONTROL PLAN

SHEET NO.
SE-1

EE # 1947



NOTE: EXISTING WETLAND BOUNDARIES DELINEATED BY KING & MACGREGOR ENVIRONMENTAL, INC. ON DECEMBER 17, 2019. PROPERTY BOUNDARY INFORMATION FROM SURVEY PREPARED BY HUBBELL, ROTH & CLARK, INC. DATED AUGUST 29, 2019 AND PROVIDED BY CLIENT.

BENCH MARKS

B.M.–1 ARROW ON HYDRANT LOCATED 55'± NORTH OF THE ℄ OF WARDLOW ROAD & 234'± EAST OF THE ℄ OF FOXGROVE DRIVE ELEVATION 1046.49 U.S.G.S. DATUM

B.M.–2 ARROW ON HYDRANT LOCATED 47'± NORTH OF THE ℄ OF WARDLOW ROAD & 250'± WEST OF THE ℄ OF FOXGROVE DRIVE ELEVATION 1038.17 U.S.G.S. DATUM

PROPERTY DESCRIPTION – (PART OF TAX I.D. 11-13-301-003)

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T.3N., R.7E., HIGHLAND TOWNSHIP, OAKLAND COUNTY, MICHIGAN BEING DESCRIBED AS: COMMENCING AT THE WEST 1/4 CORNER OF SAID SECTION 13; THENCE N.87°04'59"E. 728.34 FEET ALONG THE EAST–WEST 1/4 LINE OF SAID SECTION 13 AS MONUMENTED TO THE POINT OF BEGINNING; THENCE CONTINUING ALONG SAID LINE N.87°04'59"E. 540.00 FEET; THENCE S.02°24'41"E. 148.50 FEET; THENCE N.87°04'59"E. 66.00 FEET TO A POINT ON THE WEST LINE OF "KINGS ROW SUBDIVISION" (LIBER 36, PAGE 2, O.C.R.); THENCE ALONG SAID SUBDIVISION LINE, S.02°24'41"E. 226.99 FEET; THENCE S.87°04'59"W. 606.86 FEET; THENCE N.02°16'52"W. 375.50 FEET TO THE POINT OF BEGINNING, CONTAINING 217,899.5 SQ. FT. OR 5.00 ACRES OF LAND, SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD INCLUDING A RIGHT OF WAY ALONG THE NORTH LINE FOR WARDLOW ROAD.

CONSTRUCTION NOTES

1.) ALL SITE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF HIGHLAND TOWNSHIP.
2.) ALL CONSTRUCTION WITHIN EAST WARDLOW ROAD ROAD RIGHT-OF-WAY SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE ROAD COMMISSION OF OAKLAND COUNTY. A R.C.O.C. PERMIT IS REQUIRED.
3.) ALL SOIL EROSION AND SILT MUST BE CONTROLLED AND CONTAINED ONSITE. A SOIL EROSION CONTROL PERMIT IS REQUIRED FROM THE OAKLAND COUNTY WATER RESOURCES COMMISSIONER'S OFFICE AND A N.P.D.E.S. PERMIT IS NOT REQUIRED FROM E.G.L.E. THE DISTURBED AREA OF THE SITE WILL BE 2.5± ACRES. THE SITE SOILS ARE PREDOMINANTLY SANDY SOILS OVERLAID BY 2" TO 11" OF SANDY TOPSOIL PER PROJECT SOIL BORINGS. THE PROPOSED CONSTRUCTION AREA SHALL BE CLEARED AND STRIPPED OF ALL TOPSOIL PRIOR TO THE START OF MASS GRADING OR UTILITIES WORK. ALL SITE FILLING UNDER OR WITHIN A 1 ON 1 INFLUENCE OF EXISTING OR PROPOSED BUILDING OR PAVEMENT AREAS SHALL UTILIZE CLEAN SOIL, FREE OF ANY VEGETATION OR ORGANIC MATERIALS. ALL FILL SHALL BE PLACED IN 8" MAXIMUM LIFTS AND COMPACTED TO 95% OF MAXIMUM DENSITY PER MODIFIED PROCTOR TEST. ALL DISTURBED UNPAVED AREAS TO BE STABILIZED WITH 4" MINIMUM TOPSOIL, SEED AND MULCH (OR SOD) AS SOON AS FINAL GRADING IS COMPLETE.
4.) ALL UTILITIES EXCAVATION UNDER OR WITHIN 1 ON 1 INFLUENCE OF EXISTING OR PROPOSED PAVEMENT AREAS SHALL HAVE COMPACTED M.D.O.T. CLII SAND BACKFILL.
5.) ALL PROPOSED WATER MAIN AND FIRE LINE CONSTRUCTION SHALL BE DUCTILE IRON CLASS 54 PIPE, SHALL HAVE 5.5 FEET MINIMUM COVER AND SHALL BE IN ACCORDANCE WITH OAKLAND COUNTY STANDARD DETAILS. AN E.G.L.E. PERMIT IS REQUIRED FOR THE PROPOSED PUBLIC WATER MAIN CONSTRUCTION.
6.) ALL PROPOSED SANITARY SEWER LEAD CONSTRUCTION SHALL BE 6" P.V.C. SDR 23.5 PIPE. AN E.G.L.E. PERMIT IS NOT REQUIRED FOR THE PROPOSED SANITARY SEWER LEAD CONSTRUCTION.
7.) ALL PROPOSED STORM SEWER CONSTRUCTION SHALL BE PERFORATED ADS HP STORM SEWER PIPE WRAPPED WITH GEOTEXTILE FABRIC (UNLESS OTHERWISE NOTED), SHALL HAVE M.D.O.T. CLII BEDDING AND SHALL BE IN ACCORDANCE WITH HIGHLAND TOWNSHIP STANDARD DETAILS. ALL LOW POINT DRAINAGE STRUCTURES WITHIN PAVEMENT AREAS SHALL HAVE 10"–4" P.V.C. BLEEDER DRAIN IN A PEA GRAVEL TRENCH IN FOUR DIRECTIONS FROM THE STRUCTURE.
8.) ALL PROPOSED GRADES SHOWN WITHIN PAVEMENT AREAS ARE FINISHED PAVEMENT GRADES. PAVEMENT PERIMETERS TO HAVE INTEGRAL CONCRETE CURB, MODIFIED M.D.O.T. F–2 CONCRETE CURB AND GUTTER OR CONCRETE WALK WITH INTEGRAL CURB AS SHOWN ON PLAN.
PROPOSED ONSITE ASPHALT PAVEMENT TO BE:
1–1/2" M.D.O.T. NO. 13A BITUMINOUS WEARING COURSE ON
1–1/2" M.D.O.T. NO. 3C BITUMINOUS LEVELING COURSE ON
8" M.D.O.T. NO. 21AA AGGREGATE BASE
PROPOSED ONSITE CONCRETE PAVEMENT TO BE:
7" M.D.O.T. P1 PLAIN CONCRETE PAVEMENT ON
8" M.D.O.T. NO. 21AA AGGREGATE BASE

PROPOSED SITE PAVING QUANTITIES

6,930 S.F. – 3" ASPHALT PARKING LOT PAVEMENT
11,392 S.F. – 7" CONCRETE DRIVE PAVEMENT
381 L.F. – MOD. 18" CONCRETE CURB & GUTTER
373 L.F. – STD. 6" INTEGRAL CONCRETE CURB
998 S.F. – 4" CONCRETE WALK W/ INTEGRAL CURB

PROPOSED R.O.W. PAVING QUANTITIES

560 S.F. – ASPHALT APPROACH PAVEMENT
1,523 S.F. – CONCRETE APPROACH PAVEMENT
170 L.F. – STD. 32" B–2 CONCRETE CURB & GUTTER
23 S.F. – 6" CONCRETE SPILLWAY

NOTE: CONTRACTOR TO VERIFY ALL PROJECT QUANTITIES.

SITE CONCRETE JOINT LEGEND

(B) LONGITUDINAL BULKHEAD JOINT WITH 5/8" TIE BARS 1'–0" O.C.
(C) TRANSVERSE CONTRACTION JOINT WITH 1–1/4" DOWEL BARS 1'–0" O.C.
(D) LONGITUDINAL LANE TIE JOINT WITH 5/8" TIE BARS 1'–0" O.C.
(E) 1" EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE

STATE OF MICHIGAN
PAUL J. LEWSLEY
ENGINEER
No. 39674
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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

07/31/20 - 90% REVIEW
08/11/20 - 95% REVIEW
08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

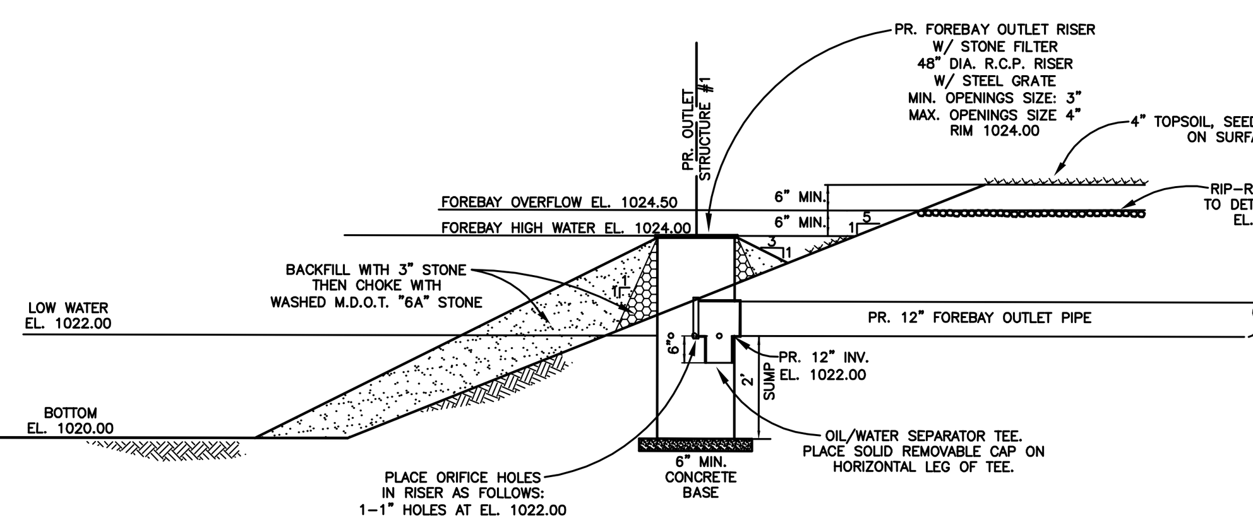
SHEET NAME

SITE PAVING & GRADING PLAN

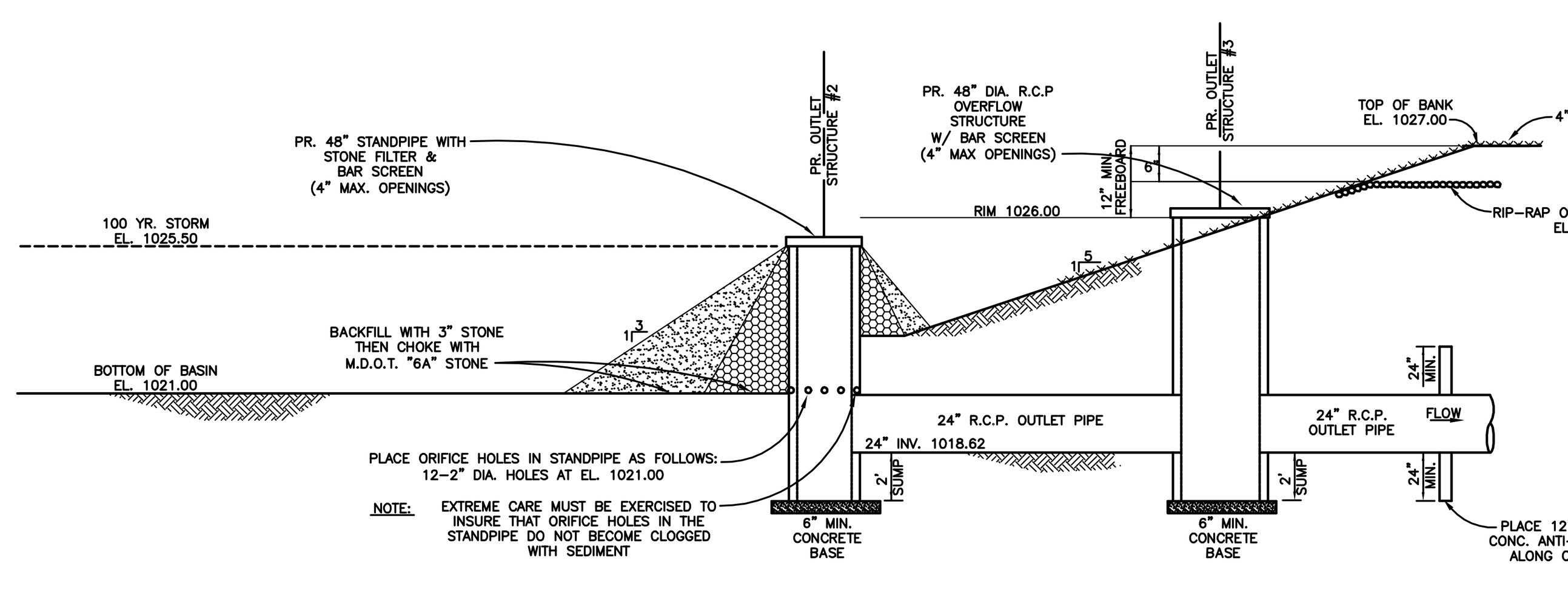
SHEET NO.

C-1

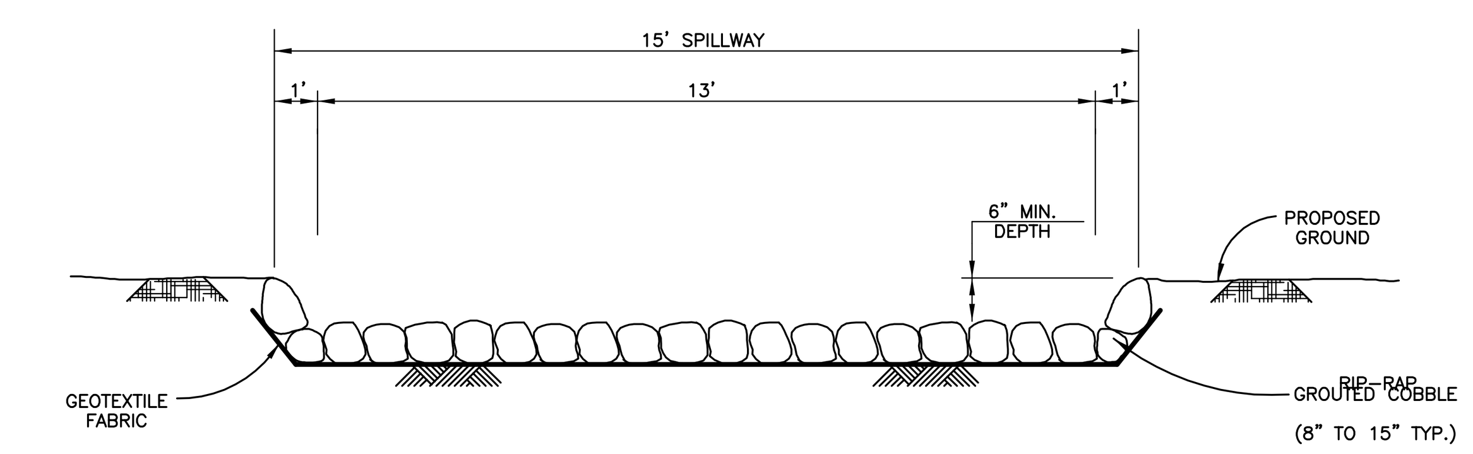
EE # 1947



PROPOSED FOREBAY OUTLET STRUCTURE DETAIL



PROPOSED DETENTION BASIN OUTLET STRUCTURE DETAIL



RIP-RAP OVERFLOW SPILLWAY SECTION

DRAINAGE STRUCTURE	TOTAL AREA (AC)	IMP. AREA (C=0.90)	PER. AREA (C=0.20)	WATER AREA (C=1.00)	WEIGHTED AVG. "C" VALUE
C.B.#1	0.37	0.28	0.09	0.00	0.73
C.B.#2	0.39	0.37	0.02	0.00	0.86
O.S.#1	0.39	0.00	0.32	0.07	0.34
O.S.#2	0.40	0.00	0.20	0.20	0.60
	1.55	0.65	0.63	0.27	0.63

Project HIGHLAND TOWNSHIP FIRE STATION NO.2

Project No. 1947

Date 04/29/20 By PAUL LEWSLEY

Rev. 07/16/20

Environmental engineers, Inc.

Design for Storm Sewer Systems

SHEET 1 OF 1

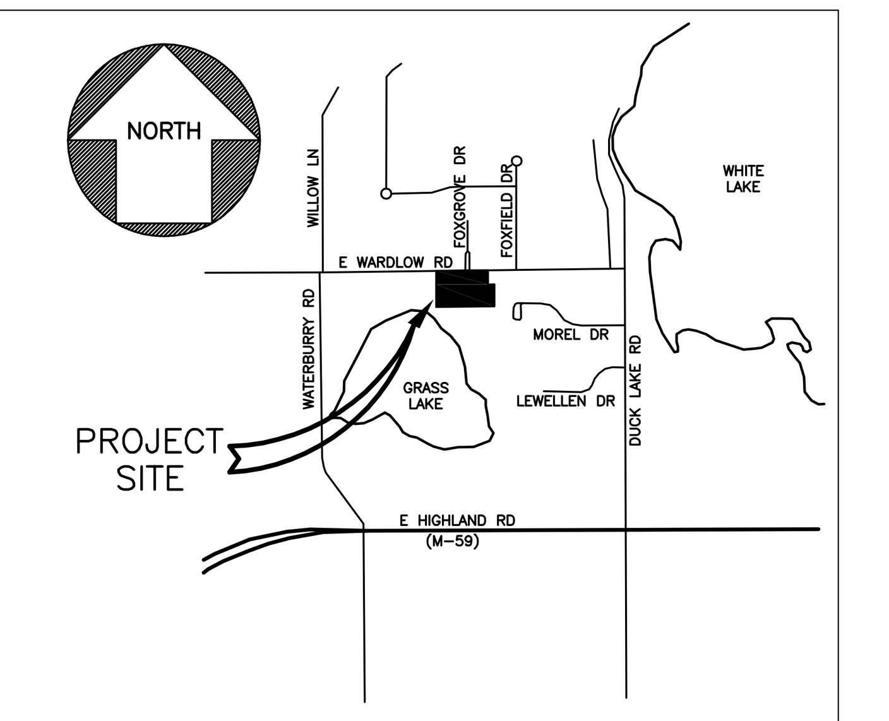
$Q = CIA$ $n = 0.013$

*$I = \frac{175}{T + 25}$

T initial = 15 Minutes Maximum

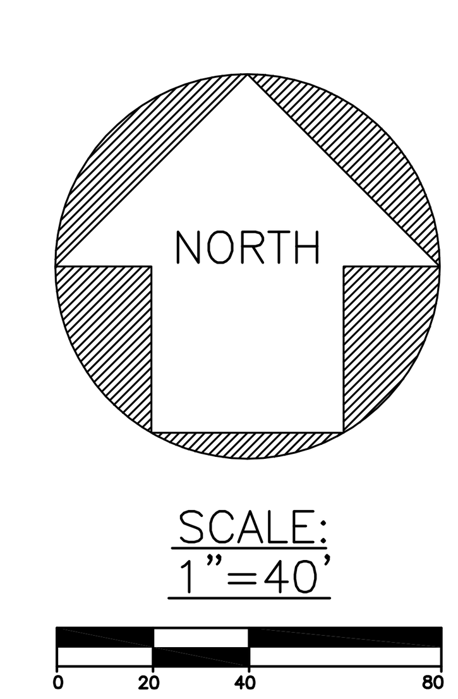
*Show formula

From M.H. or D.P.#	To M.H. OR D.P.#	Increment Acres "A"	"C"	Equivalent Area 100% Acres CA	Total Area 100% Acres CA	T. Time Min.	I. inches per hour	Q. c.f.s.	Diameter of pipe in.	Slope pipe ft./ft.	Slope H.G.	Length of line ft.	Velocity flow full ft./sec.	Time of flow min.	Capacity of sewer c.f.s.	H.G. elevation upper end	Ground Elevation Upper end	Ground Elevation Lower end	Invert Elevation Upper end	Invert Elevation Lower end
C.B. #1	M.H. #2	0.37	0.73	0.27	0.27	15.00	4.38	1.18	12"	0.0060	0.0011	152	3.5	0.72	2.76	1024.06	1028.00	1032.50	1024.00	1023.09
M.H. #2	E.S. #1	–	–	–	0.27	15.72	4.30	1.16	12"	0.0120	0.0011	70	5.0	0.23	3.90	1022.88	1032.50	–	1022.84	1022.00
C.B. #3	E.S. #2	0.39	0.86	0.34	0.34	15.00	4.38	1.49	12"	0.0120	0.0017	76	5.0	0.25	3.90	1023.92	1039.00	–	1023.91	1023.00
O.S. #1	E.S. #3	0.39	0.33	0.13	0.74	15.95	4.27	3.16	12"	0.0120	0.0079	37	5.0	0.12	3.90	1022.87	1024.00	–	1022.00	1021.58
EX. M.H.	M.H. #4	2.24	0.50	1.12	1.12	20.00	3.89	4.35	EX. 12"	0.0100	0.0149	19	4.5	0.07	3.56	1037.56	1039.49	1039.70	1036.74	1036.55
M.H. #4	E.S. #4	–	–	–	1.12	20.07	3.88	4.35	15"	0.0050	0.0045	107	3.7	0.48	4.57	1037.28	1039.70	–	1036.34	1035.80
E.S. #5	M.H. #5	0.63	0.50	0.32	1.44	21.50	3.76	5.42	15"	0.0300	0.0070	12	9.1	0.02	11.19	1034.00	–	1035.00	1033.00	1032.64
M.H. #5	E.S. #6	9.13	0.50	4.57	6.01	30.00	3.18	19.11	24"	0.0080	0.0071	77	6.4	0.20	20.23	1025.10	1035.00	–	1023.62	1023.00
O.S. #2	O.S #3	0.40	0.73	0.29	7.04	35.00	2.92	20.53	24"	0.0080	0.0082	26	6.4	0.07	20.23	1020.23	1025.50	1026.00	1018.62	1018.41
O.S. #3	E.S. #7	–	–	–	7.04	35.07	2.91	20.49	24"	0.0080	0.0082	51	6.4	0.13	20.23	1020.02	1026.00	–	1018.41	1018.00



LOCATION MAP

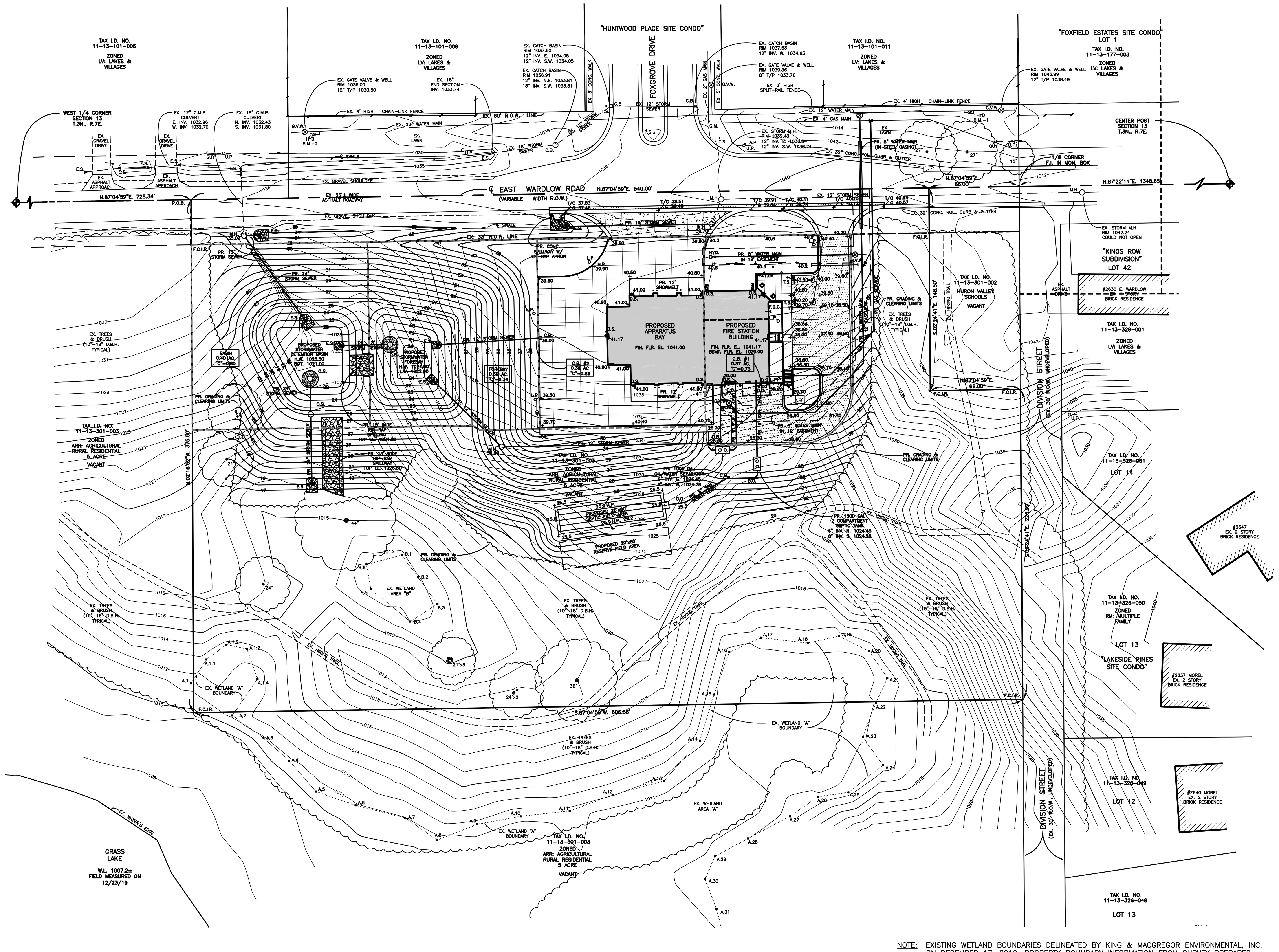
SCALE: 1"=2000'



SCALE: 1"=40'

LEGEND

Symbol		Description
× 1025.00		EXISTING ELEVATION
+ 25.00		PROPOSED ELEVATION (ADD 1000 FEET)
—1025—		EXISTING CONTOUR
—25—		PROPOSED CONTOUR (ADD 1000 FEET)
	U.P.	UTILITY POLE
	L.P.	LIGHT POLE
	GUY	GUY WIRE
	T.S.	TRAFFIC SIGN
	W.S.O.	WATER SHUT-OFF
	G.S.O.	GAS SHUT-OFF
	A.M.	AMERITECH MARKER
	A.P.	AMERITECH PEDESTAL
	F.I.	FOUND IRON
	F.M.	FOUND MONUMENT
	F.P.K.	FOUND P.K. NAIL



NOTE: EXISTING WETLAND BOUNDARIES DELINEATED BY KING & MACGREGOR ENVIRONMENTAL, INC. ON DECEMBER 17, 2019. PROPERTY BOUNDARY INFORMATION FROM SURVEY PREPARED BY HUBBELL, ROTH & CLARK, INC. DATED AUGUST 29, 2019 AND PROVIDED BY CLIENT.

PROPOSED STORMWATER DETENTION BASIN DESIGN CALCULATIONS

USE O.C.W.R.C. METHOD TO DETERMINE REQUIRED SITE DETENTION VOLUME BASED ON 100 YEAR FREQUENCY STORM. THE TRIBUTARY AREA FOR THE PROPOSED DETENTIION BASIN IS 1.55 ACRES. THE AVERAGE SITE RUNOFF COEFFICIENT "C" IS 0.63 AS CALCULATED ABOVE AND THE ALLOWABLE DISCHARGE RATE IS 0.20 CFS/ACRE PER O.C.W.R.C. REQUIREMENTS.

100 YR. FREQUENCY STORM DETENTION VOLUME REQUIRED

$$Q_o = \frac{QA}{(A)(C)}$$

$$Q_o = \frac{(1.55\ AC.)(0.20\ CFS/AC.)}{(1.55\ AC.)(0.63)} = 0.317$$

$$T_{100} = -25 + \sqrt{\frac{10{,}312.5}{Q_o}}$$

$$T_{100} = -25 + \sqrt{\frac{10{,}312.5}{0.317}} = 155.37\ MIN.$$

$$V_{S100} = \frac{16{,}500(T)}{T + 25} - 40(Q_o)(T)$$

$$V_{S100} = \frac{16{,}500(155.37)}{155.37 + 25} - 40(0.317)(155.37) = 12{,}243\ C.F.$$

$$V_{T100} = V_{S100}(A)(C)$$

$V_{T100} = (12{,}243)(1.55)(0.63) =$ 11,955 CU. FT. REQUIRED FOR 100 YR. STORM

USE O.C.W.R.C. METHOD TO DETERMINE REQUIRED SITE FOREBAY VOLUME BASED ON 1 YEAR FREQUENCY STORM. THE TRIBUTARY AREA FOR THE PROPOSED FOREBAY IS 1.15 ACRES. THE AVERAGE SITE RUNOFF COEFFICIENT "C" IS 0.63 AS CALCULATED ABOVE. THE REQUIRED FOREBAY VOLUME IS TO BE DISCHARGED OVER A 48 HOUR PERIOD.

1 YR. FREQUENCY STORM FOREBAY VOLUME REQUIRED

4320(A)(C)

EAST 4320(1.15)(0.63) = 3,130 CU. FT. REQUIRED FOR 1 YR. STORM

PROPOSED FOREBAY VOLUME PROVIDED

CONTOUR	AREA BELOW CONTOUR	AVERAGE AREA × DEPTH INTERVAL =	VOLUME BETWEEN CONTOURS	CUMULATIVE VOLUME
1022 (L.W.)	1,149 S.F.			
		1,539 S.F. x 1.00 FT. =	1,539 CU. FT.	1,539 CU. FT.
1023	1,928 S.F.			
		2,404 S.F. x 1.00 FT. =	2,404 CU. FT.	3,943 CU. FT.
1024 (H.W.)	2,879 S.F.			
PROPOSED FOREBAY VOLUME PROVIDED =			3,943 CU. FT.	

1 YR. STORM VOLUME 3,130 C.F. AT EL. 1023.66

PROPOSED DETENTION BASIN VOLUME PROVIDED

CONTOUR	AREA BELOW CONTOUR	AVERAGE AREA × DEPTH INTERVAL =	VOLUME BETWEEN CONTOURS	CUMULATIVE VOLUME
1021 (BOT.)	10 S.F.			
		878 S.F. x 1.00 FT. =	878 CU. FT.	878 CU. FT.
1022	1,745 S.F.			
		2,192 S.F. x 1.00 FT. =	2,192 CU. FT.	3,070 CU. FT.
1023	2,639 S.F.			
		3,159 S.F. x 1.00 FT. =	3,159 CU. FT.	6,229 CU. FT.
1024	3,678 S.F.			
1024	6,557 S.F.			
		7,762 S.F. x 1.00 FT. =	7,762 CU. FT.	13,991 CU. FT.
1025	8,966 S.F.			
		9,762 S.F. x 0.50 FT. =	4,881 CU. FT.	18,872 CU. FT.
1025.50 (H.W.)	10,558 S.F.			
PROPOSED DETENTION BASIN VOLUME PROVIDED =			18,872 CU. FT.	

100 YR. STORM VOLUME 11,955 C.F. AT EL. 1024.74

COMBINED PROPOSED FOREBAY & DETENTION BASIN VOLUME PROVIDED = 3,943 CU. FT. + 18,872 CU. FT. = 22,815 CU. FT.

FOREBAY OUTLET RESTRICTOR SIZING CALCULATIONS

$Q_{AVG} = V_{T\ FF} / ((48)(60)(60)SEC.)$

$Q_{AVG} = 3{,}130/172{,}800 = 0.018\ CFS$

$h_{OUT} = 0.667(Z_{FF} - Z_{OUT})$

$h_{OUT} = 0.667(1024.00 - 1022.00)$

$h_{OUT} = 1.33\ FT.$

$A_O = Q_{AVG\ FF}/(0.62 \times \sqrt{2 \times g \times h_{AVG}})$

$A = 0.018/(0.62 \times \sqrt{2x(32.2)x(1.33)})$

$A = 0.00314\ FT^2$

A = AREA OF A 1" DIA. HOLE ($0.00545\ FT^2$)

REQUIRED NUMBER OF 1-INCH HOLES = 0.00314/0.00545 = 0.58

USE 1-1" HOLES AT EL. 1022.00

DETENTION BASIN RESTRICTOR SIZING CALCULATIONS

Q_A = 1.55 AC. ONSITE + 12.00 AC. OFFSITE X 0.20 CFS/AC.

$Q_A = 13.55(0.20) = 2.71\ CFS$

h = 1025.50 H.W. EL. – 1021.00 OUTLET EL.

$h = 4.50\ FT.$

$A_{OUT} = Q_A/(0.62 \times \sqrt{2gh})$

$A_{OUT} = 2.71/(0.62 \times \sqrt{2x(32.2)x(4.50)})$

$A_{OUT} = 0.2568\ FT^2$

A_O = AREA OF A 2" DIA. HOLE ($0.02182\ FT^2$)

REQUIRED NUMBER OF 2" HOLES = 0.2568/0.02182 = 12

USE 12-2" HOLES AT EL. 1021.00

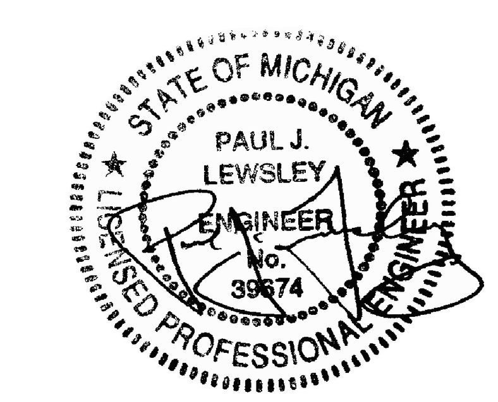
BENCH MARKS

B.M.-1 ARROW ON HYDRANT LOCATED 55'± NORTH OF THE ℄ OF WARDLOW ROAD & 234'± EAST OF THE ℄ OF FOXGROVE DRIVE ELEVATION 1046.49 U.S.G.S. DATUM

B.M.-2 ARROW ON HYDRANT LOCATED 47'± NORTH OF THE ℄ OF WARDLOW ROAD & 250'± WEST OF THE ℄ OF FOXGROVE DRIVE ELEVATION 1038.17 U.S.G.S. DATUM

PROPERTY DESCRIPTION – (PART OF TAX I.D. 11-13-301-003)

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T.3N., R.7E., HIGHLAND TOWNSHIP, OAKLAND COUNTY, MICHIGAN BEING DESCRIBED AS: COMMENCING AT THE WEST 1/4 CORNER OF SAID SECTION 13; THENCE N.87°04'59"E. 728.34 FEET ALONG THE EAST-WEST 1/4 LINE OF SAID SECTION 13 AS MONUMENTED TO THE POINT OF BEGINNING; THENCE CONTINUING ALONG SAID LINE N.87°04'59"E. 540.00 FEET; THENCE S.02°24'41"E. 148.50 FEET; THENCE N.87°04'59"E. 66.00 FEET TO A POINT ON THE WEST LINE OF "KINGS ROW SUBDIVISION" (LIBER 36, PAGE 2, O.C.R.); THENCE ALONG SAID SUBDIVISION LINE, S.02°24'41"E. 226.99 FEET; THENCE S.87°04'59"W. 606.86 FEET; THENCE N.02°16'52"W. 375.50 FEET TO THE POINT OF BEGINNING. CONTAINING 217,899.5 SQ. FT. OR 5.00 ACRES OF LAND. SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD INCLUDING A RIGHT OF WAY ALONG THE NORTH LINE FOR WARDLOW ROAD.



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F 586.469.3607

CONSULTANT

ENVIRONMENTAL ENGINEERS, INC.
18620 WEST TEN MILE ROAD
SOUTHFIELD, MICHIGAN 48075
PHONE: 248/424-9510
FAX: 248/424-2954
E-MAIL: pjlewsley@envengrs.com

KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

07/31/20 - 90% REVIEW

08/11/20 - 95% REVIEW

08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

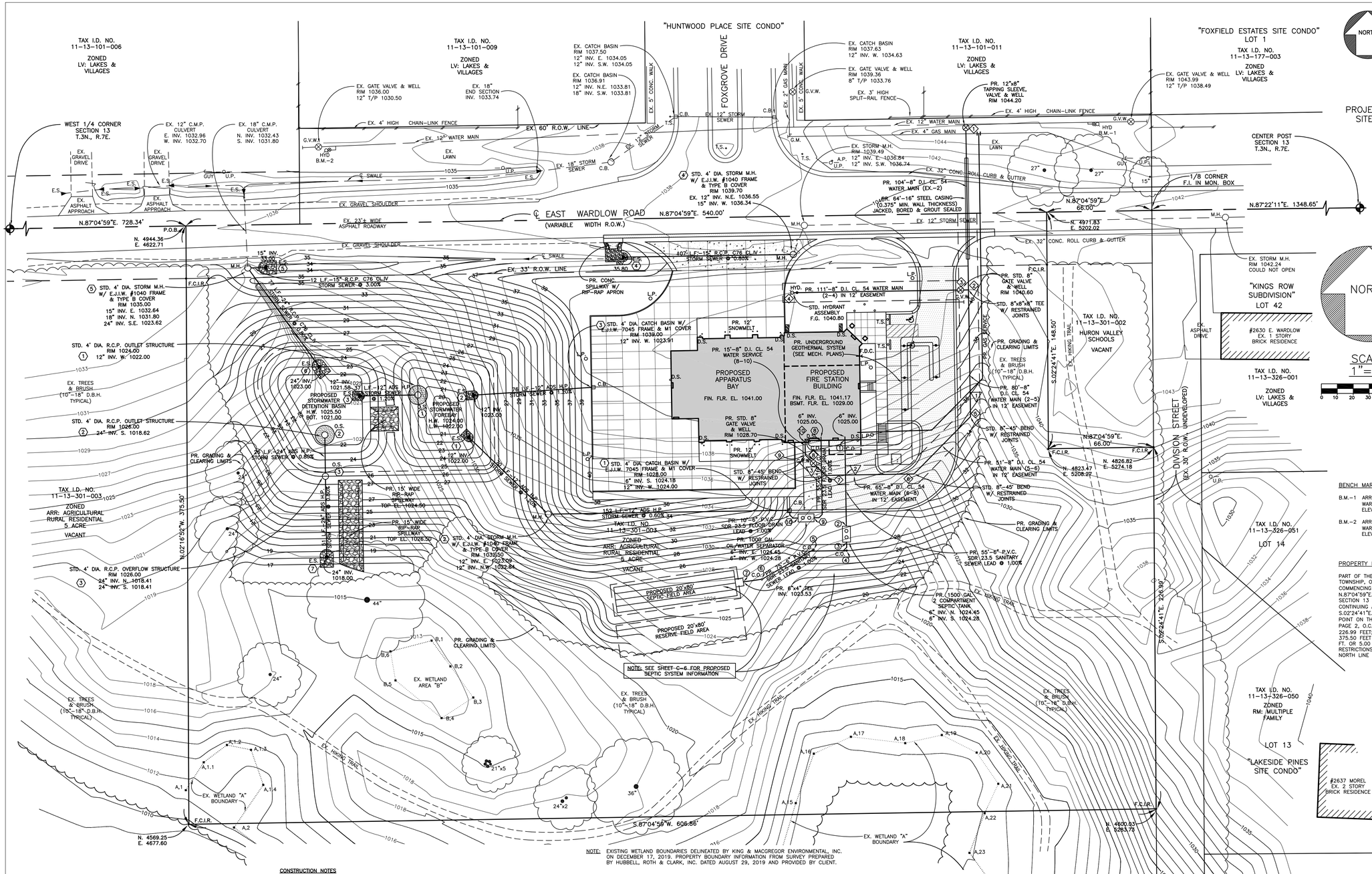
SHEET NAME

SITE STORMWATER MANAGEMENT PLAN & DETAILS

SHEET NO.

C-2

EE # 1947



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08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY

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P.L.

APPROVED BY

P.L.

SHEET NAME

SITE UTILITIES PLAN

SHEET NO.

C-3

EE # 1947

STATE OF MICHIGAN PAUL J. LEWSLEY ENGINEER No. 39674 REGISTERED PROFESSIONAL ENGINEER

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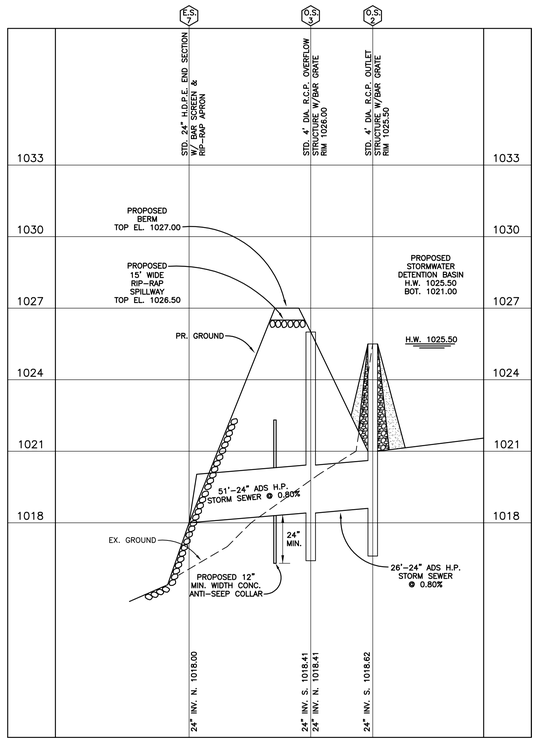
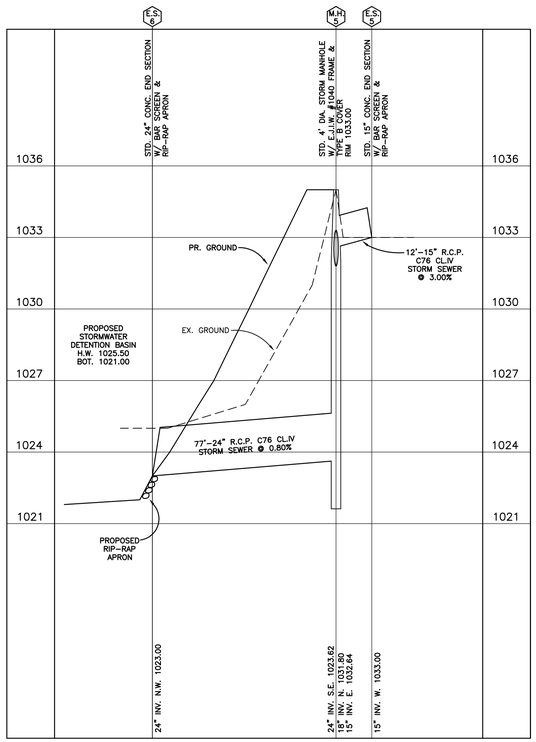
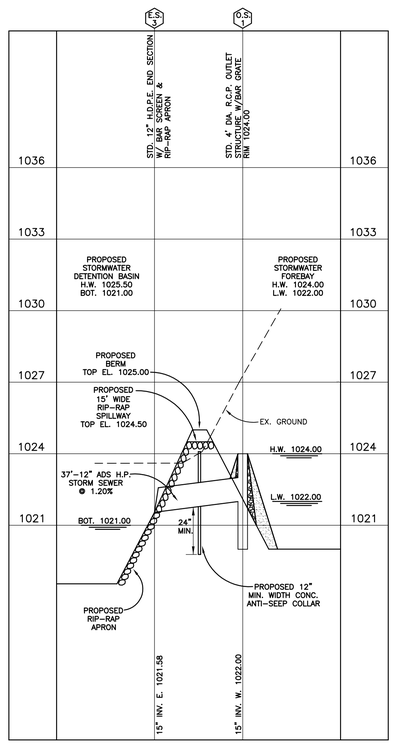


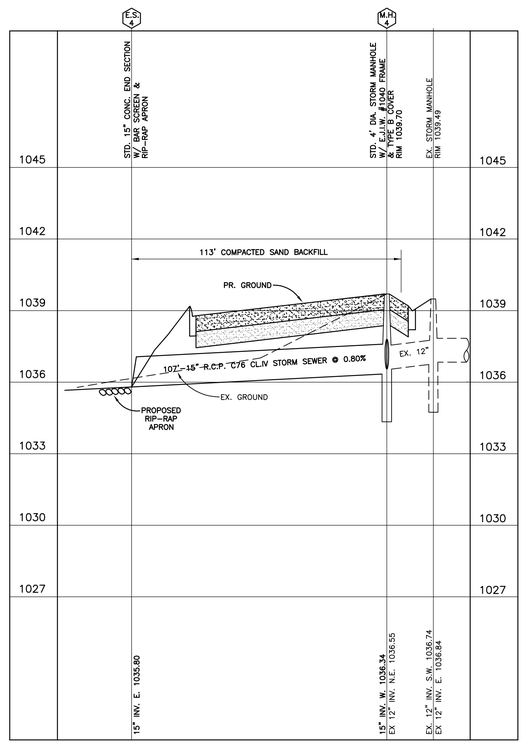
DETENTION BASIN OUTLET STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



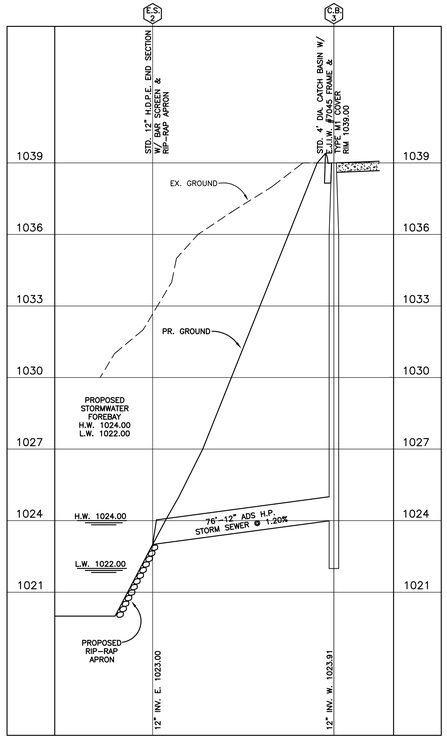
WARDLOW ROAD OUTLET STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



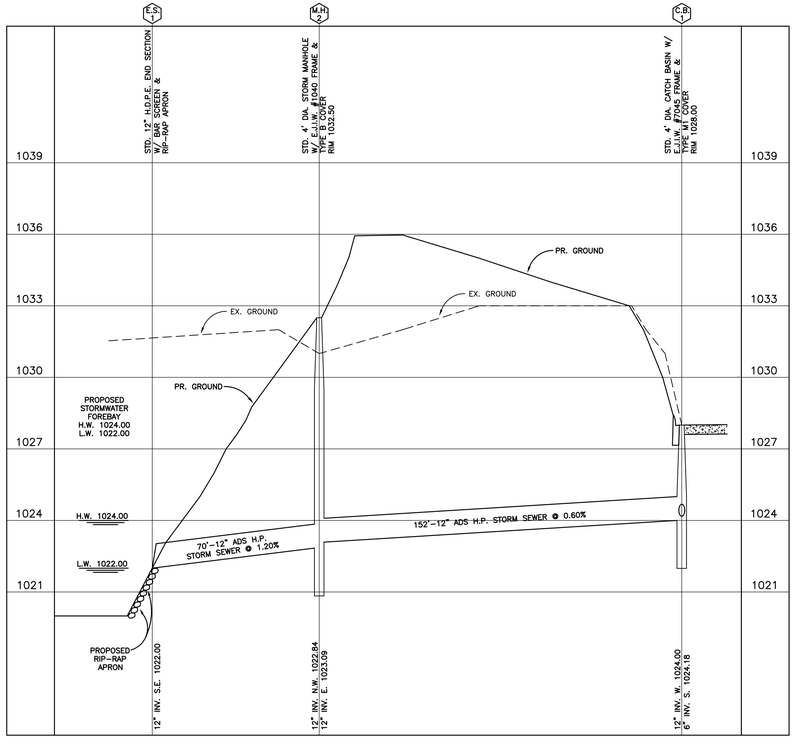
FOREBAY OUTLET STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



WARDLOW ROAD STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



WESTERLY SITE STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



SOUTHERLY SITE STORM SEWER PROFILE
SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL

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DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

SHEET NAME

SITE STORM SEWER PROFILES

SHEET NO.

C-4

EE # 1947

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PAUL J. LEWSLEY
ENGINEER
No. 39474
LICENSED PROFESSIONAL ENGINEER

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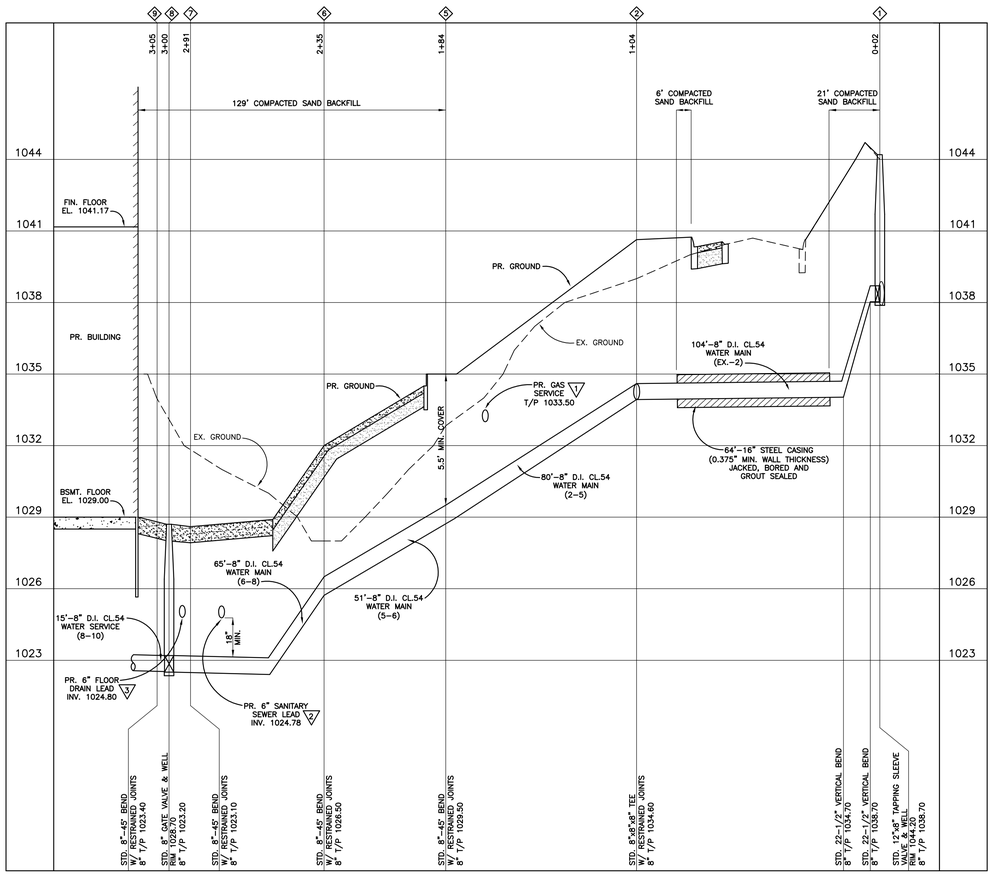
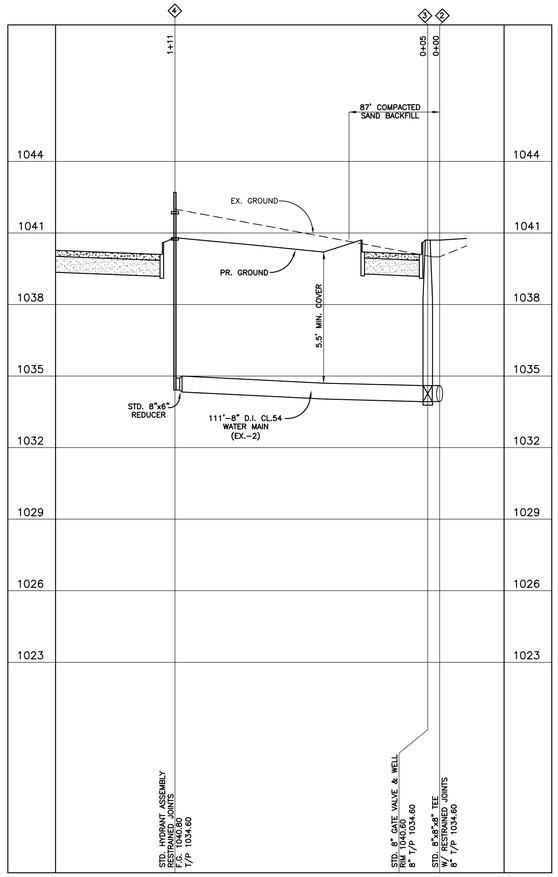


EASTERLY SITE WATER MAIN PROFILE

SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL



NORTHERLY SITE WATER MAIN PROFILE

SCALE: 1"=30' HORIZONTAL
1"=3' VERTICAL

STATE OF MICHIGAN
PAUL J. LEWSLEY
ENGINEER
No. 39674
LICENSED PROFESSIONAL ENGINEER

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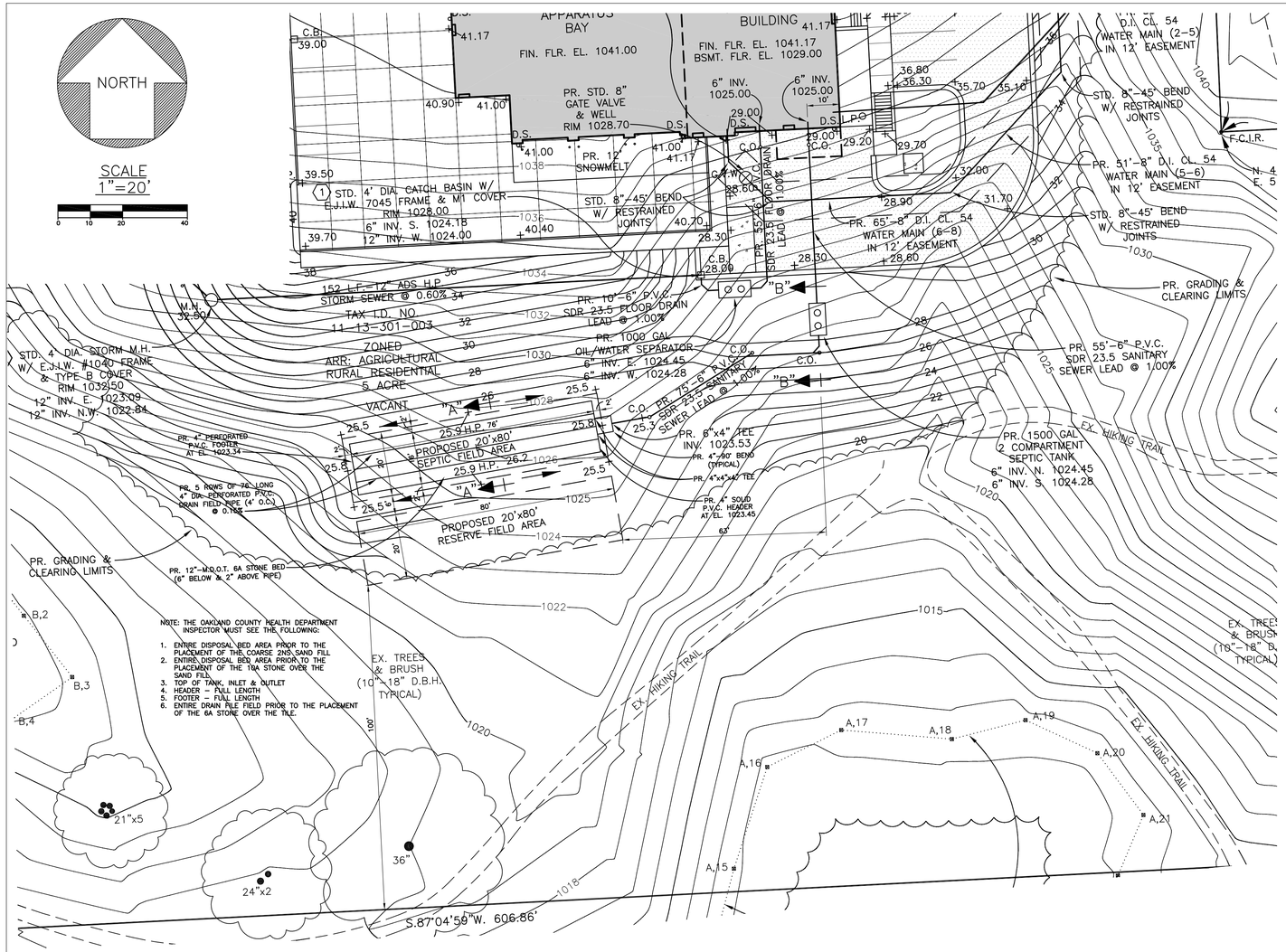
SHEET NAME

SITE WATER MAIN PROFILES

SHEET NO.

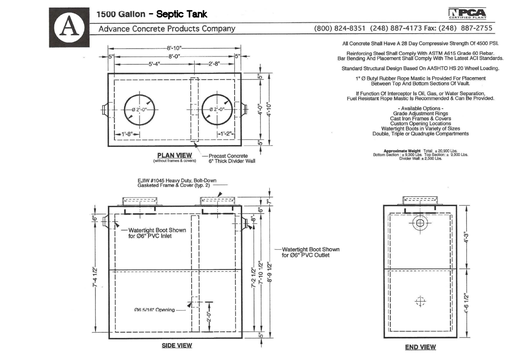
C-5

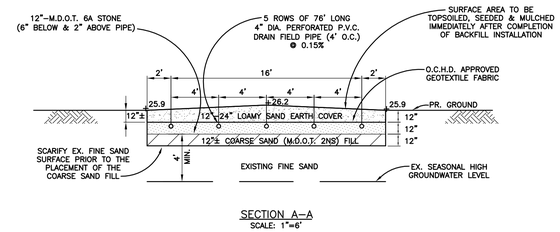
EE # 1947



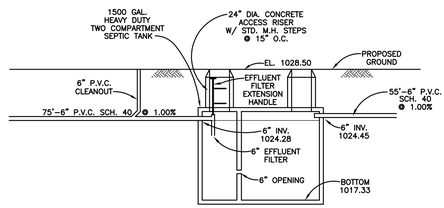
NOTE: THE OAKLAND COUNTY HEALTH DEPARTMENT INSPECTOR MUST SEE THE FOLLOWING:

1. ENTIRE DISPOSAL BED AREA PRIOR TO THE PLACEMENT OF THE COARSE 2NS SAND FILL
2. ENTIRE DISPOSAL BED AREA PRIOR TO THE PLACEMENT OF THE 10A STONE OVER THE SAND FILL
3. TOP OF TANK, INLET & OUTLET
4. HEADER – FULL LENGTH
5. FOOTER – FULL LENGTH
6. ENTIRE DRAIN PILE FIELD PRIOR TO THE PLACEMENT OF THE 6A STONE OVER THE TILE.





SECTION A–A
SCALE: 1"=6'



SECTION B–B
SCALE: 1"=6'

SEPTIC SYSTEM BASIS OF DESIGN

BUILDING OCCUPANCY:
5 FULL TIME RESIDENT EMPLOYEES: 5x100 GPD = 500 GPD

SITE SOILS:
MEDIUM SAND SUBSOILS PER PROJECT SOILS REPORT THEREFORE USE 0.35 GAL./S.F. APPLICATION RATE TO BE CONSERVATIVE.
500 GAL./0.35 GAL./S.F. = 1,429 S.F. MINIMUM BED SIZE.
USE 1,600 S.F. BED SIZE FOR 12% ADD'L FACTOR OF SAFETY.

SYSTEM TANK CAPACITY:
PROVIDE REQUIRED MINIMUM 1,500 GAL. TWO COMPARTMENT TANK

SEPTIC SYSTEM CONSTRUCTION NOTES

1.) ALL WORK SHALL BE IN ACCORDANCE WITH THE OAKLAND COUNTY HEALTH DIVISION STANDARDS AND SPECIFICATIONS. AN O.C.H.D. PERMIT IS REQUIRED.
2.) THE SEPTIC TANK SHALL BE WATERTIGHT HEAVY DUTY REINFORCED CONCRETE WITH RUBBER BOOTS AS MANUFACTURED BY ADVANCE CONCRETE PRODUCTS CO, OR APPROVED EQUAL. AN EFFLUENT FILTER WITH EXTENSION HANDLE SHALL BE INSTALLED ON THE 6" OUTLET OF THE 1500 GAL. TWO COMPARTMENT SEPTIC TANK. THE FILTER SHALL BE ZABEL MODEL A100–8x26 OR APPROVED EQUAL. A 24" DIAMETER CONCRETE RISER EXTENDED UP TO FINISHED GRADE SHALL BE INSTALLED ON THE SEPTIC TANK ACCESS OPENINGS. STANDARD MANHOLE STEPS SHALL BE INSTALLED 15" ON CENTER IN THE 24" RISERS OVER THE EFFLUENT FILTER & EFFLUENT PUMP. ALL CONCRETE RISERS SHALL HAVE AN E.J.I.W. #1000A FRAME & COVER (OR APPROVED EQUAL) WITH A GASKET SEAL.

STATE OF MICHIGAN
PAUL J. LEWSLEY
ENGINEER
No. 39674
LICENSED PROFESSIONAL ENGINEER

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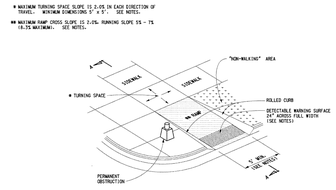
SHEET NAME

SITE SEPTIC SYSTEM DETAILS

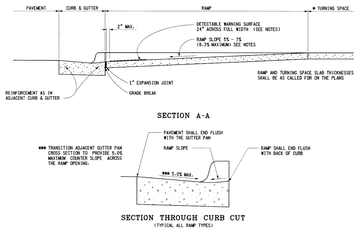
SHEET NO.

C-6

EE # 1947



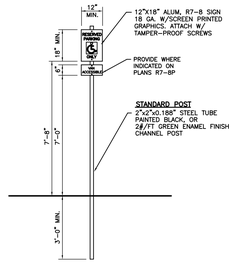
SIDEWALK RAMP TYPE R
(VALLEY SIDES)



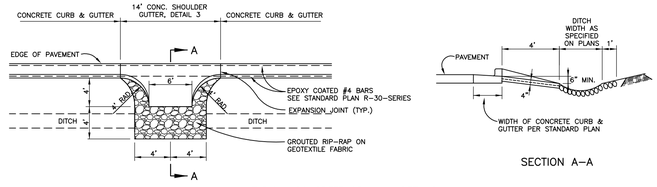
SECTION A-A

SECTION THROUGH CURB CUT
(TYPICAL ALL RAMP TYPES)

STANDARD BARRIER FREE RAMP DETAILS

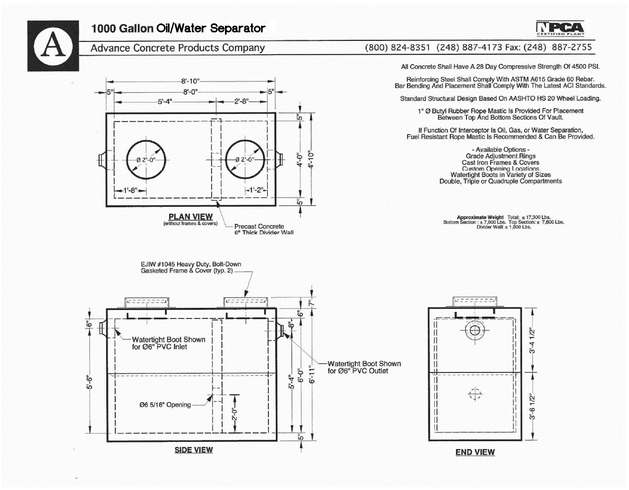


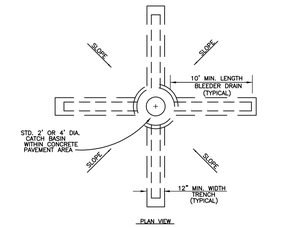
TYPICAL BARRIER FREE PARKING SIGNS



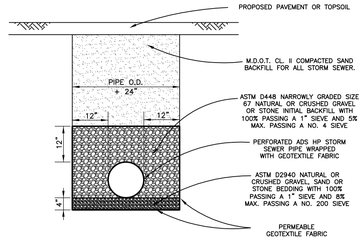
SECTION A-A

TYPICAL CONCRETE SPILLWAY DETAILS

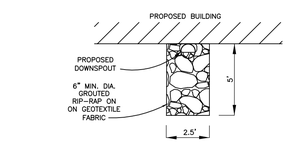


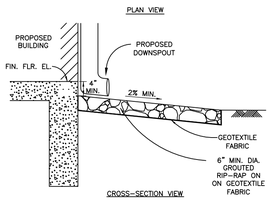


TYPICAL CATCH BASIN
BLEEDER DRAIN DETAIL

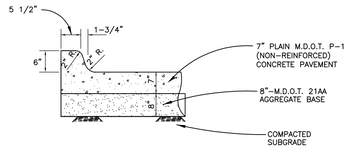


TYPICAL PERFORATED
STORM SEWER
TRENCH DETAIL

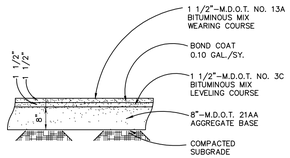




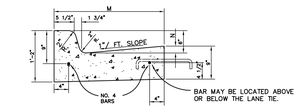
TYPICAL
DOWNSPOUT
SPLASH APRON



TYPICAL ONSITE
CONCRETE DRIVE PAVEMENT WITH
INTEGRAL CURB SECTION

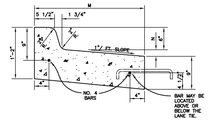


TYPICAL ONSITE
ASPHALT PAVEMENT SECTION



DETAIL	DIMENSIONS M	DIMENSIONS N	LANE TIES	CONCRETE CU. YD.	CONCRETE LIN. FT.
F1	1'-6"	7/8"	AS SHOWN	0.0484	
F2	1'-6"	7/8"	OMITTED	0.0484	
F3	2'-0"	1 3/8"	AS SHOWN	0.0610	
F4	2'-0"	1 3/8"	OMITTED	0.0610	
F5	2'-6"	1 7/8"	AS SHOWN	0.0737	
F6	2'-6"	1 7/8"	OMITTED	0.0737	

STANDARD F
CONCRETE
CURB &
GUTTER



DETAIL	DIMENSIONS M	DIMENSIONS N	LANE TIES	CONCRETE CU. YD.	CONCRETE LIN. FT.
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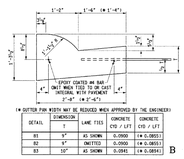
F2	1'-6"	7/8"	OMITTED	0.0484	
F3	2'-0"	1 3/8"	AS SHOWN	0.0610	
F4	2'-0"	1 3/8"	OMITTED	0.0610	
F5	2'-6"	1 7/8"	AS SHOWN	0.0737	
F6	2'-6"	1 7/8"	OMITTED	0.0737	

MODIFIED F
CONCRETE
CURB &
GUTTER

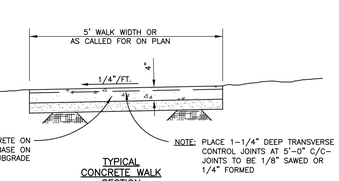


* BOTTOM PAN WIDTH MAY BE REDUCED WHEN APPROVED BY THE ENGINEER!

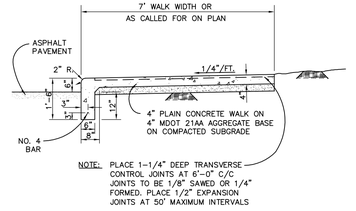
DETAIL	DIMENSIONS T	LANE TIES	CONCRETE CYS / LFT	CONCRETE CYS / LFT
B1	5"	AS SHOWN	0.0930	(* 0.0931)
B2	5"	OMITTED	0.0930	(* 0.0931)
B3	10"	AS SHOWN	0.1845	(* 0.1847)

B

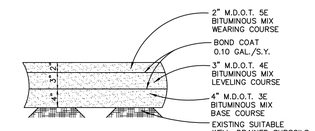
STANDARD B CONCRETE
CURB & GUTTER
DETAIL



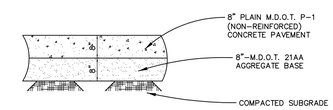
TYPICAL
CONCRETE WALK
SECTION



TYPICAL
CONCRETE WALK WITH
INTEGRAL CURB SECTION



TYPICAL WARDLOW ROAD
ASPHALT DRIVEWAY APPROACH
PAVEMENT SECTION



TYPICAL WARDLOW ROAD
CONCRETE DRIVEWAY APPROACH
PAVEMENT SECTION

STATE OF MICHIGAN
PAUL J. LEWSLEY
ENGINEER
No. 39074
LICENSED PROFESSIONAL ENGINEER

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SOUTHFIELD, MICHIGAN 48075
PHONE: 248/424-9510
FAX: 248/424-2954
E-MAIL: pjlewsley@envengrs.com

KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

07/31/20 - 90% REVIEW
08/11/20 - 95% REVIEW
08/27/20 - BIDDING & CONSTRUCTION

DRAWN BY

B.L.

CHECKED BY

P.L.

APPROVED BY

P.L.

SHEET NAME

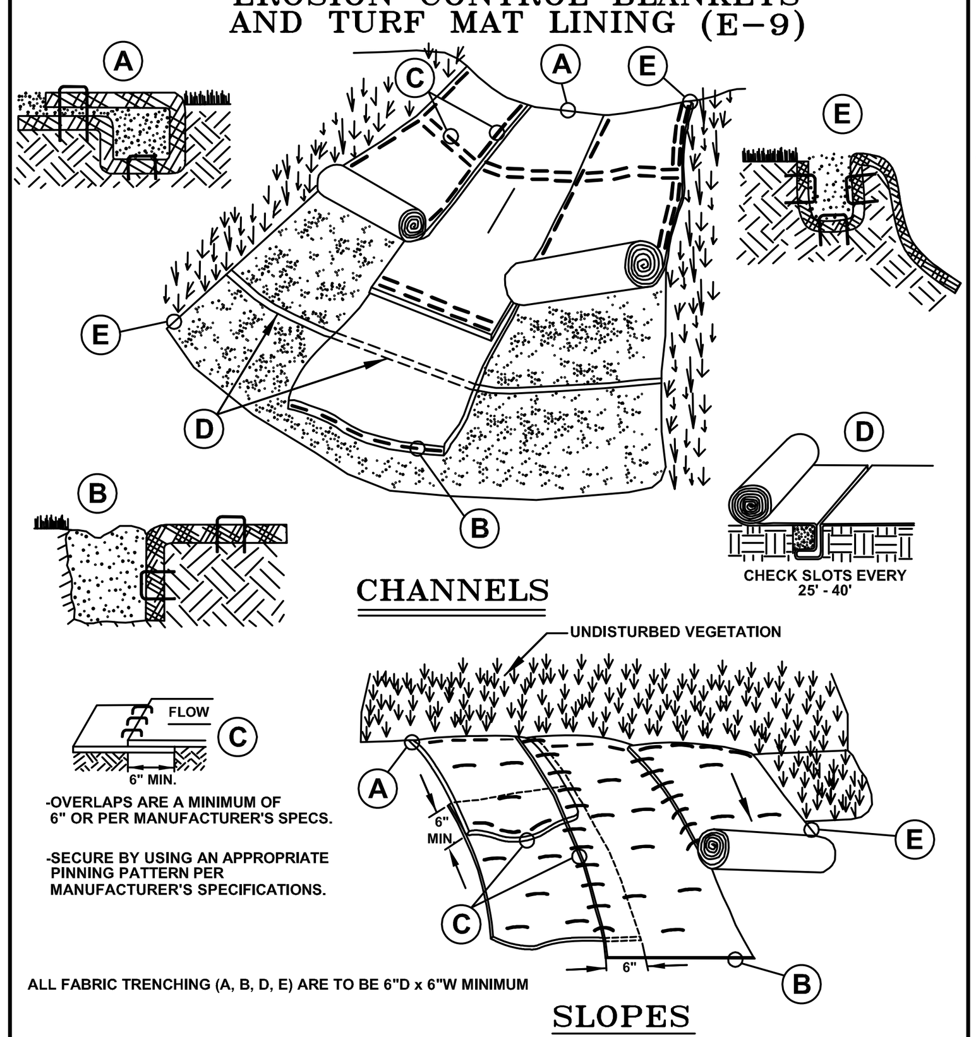
SITE ENGINEERING DETAILS

SHEET NO.

C-7

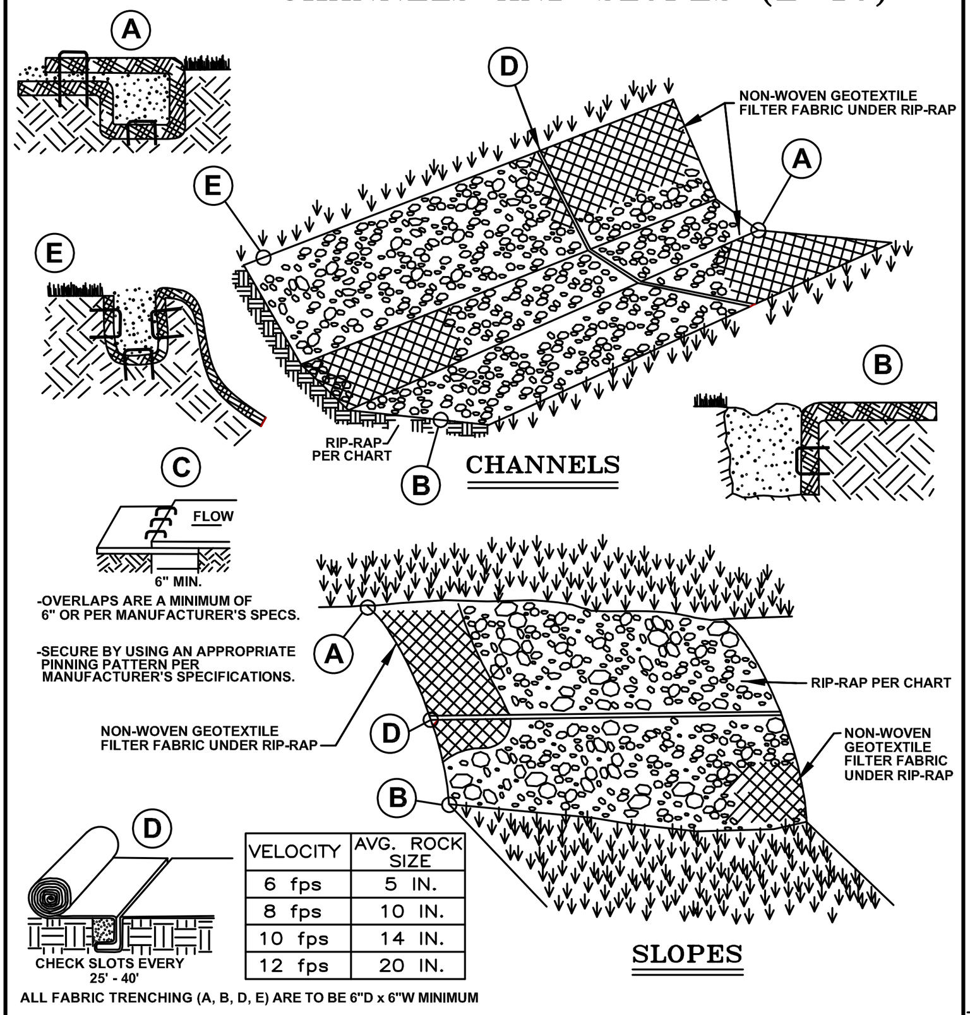
EE # 1947

EROSION CONTROL BLANKETS AND TURF MAT LINING (E-9)



DEPENDING ON THE VELOCITY, SLOPE, SOILS, USE PROPER BLANKET OR TURF MAT LINING PER MANUFACTURER'S SPECIFICATIONS TO HANDLE THE SHEER STRESSES OF THE SLOPE/CHANNEL.

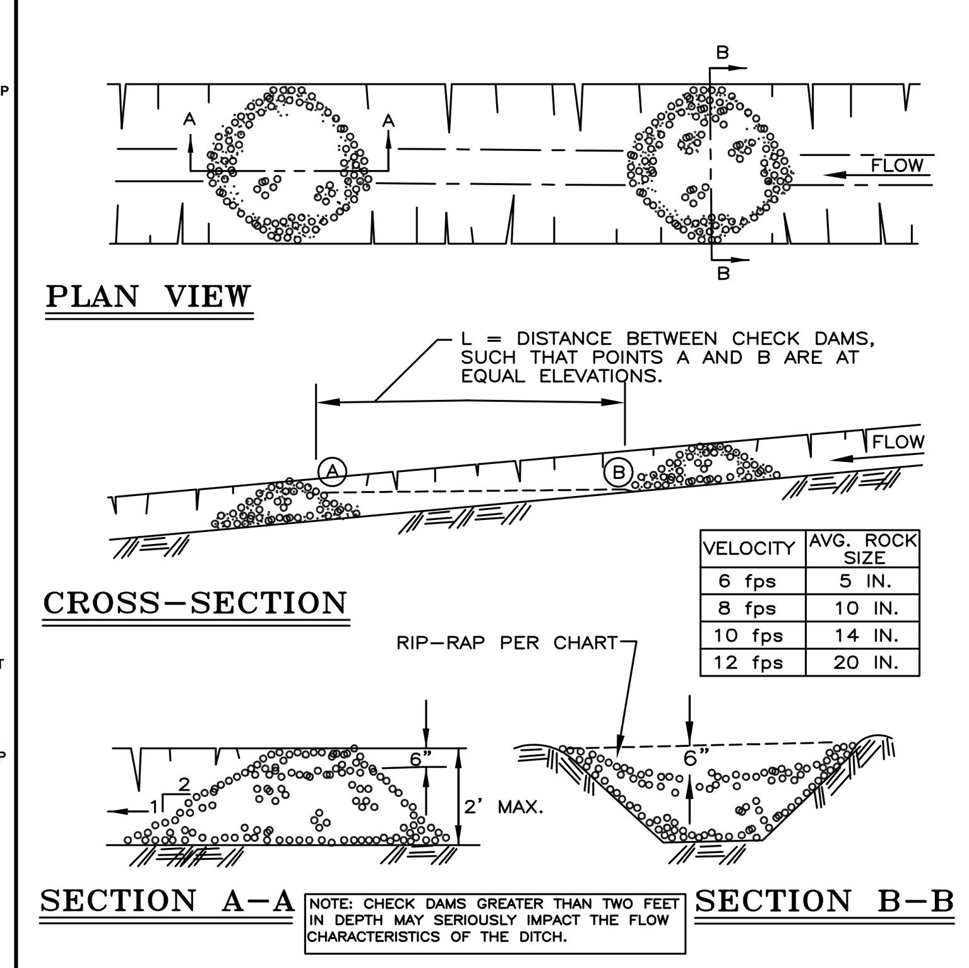
RIP-RAP: CHANNELS AND SLOPES (E-10)



VELOCITY	AVG. ROCK SIZE
6 fps	5 IN.
8 fps	10 IN.
10 fps	14 IN.
12 fps	20 IN.

DEPENDING ON THE VELOCITY, SLOPE AND SOILS, USE THE PROPER SIZED RIP-RAP AND NON-WOVEN GEOTEXTILE FABRIC TO HANDLE THE SHEER STRESS OF THE SLOPE/CHANNEL.

CHECK DAMS (E-3)

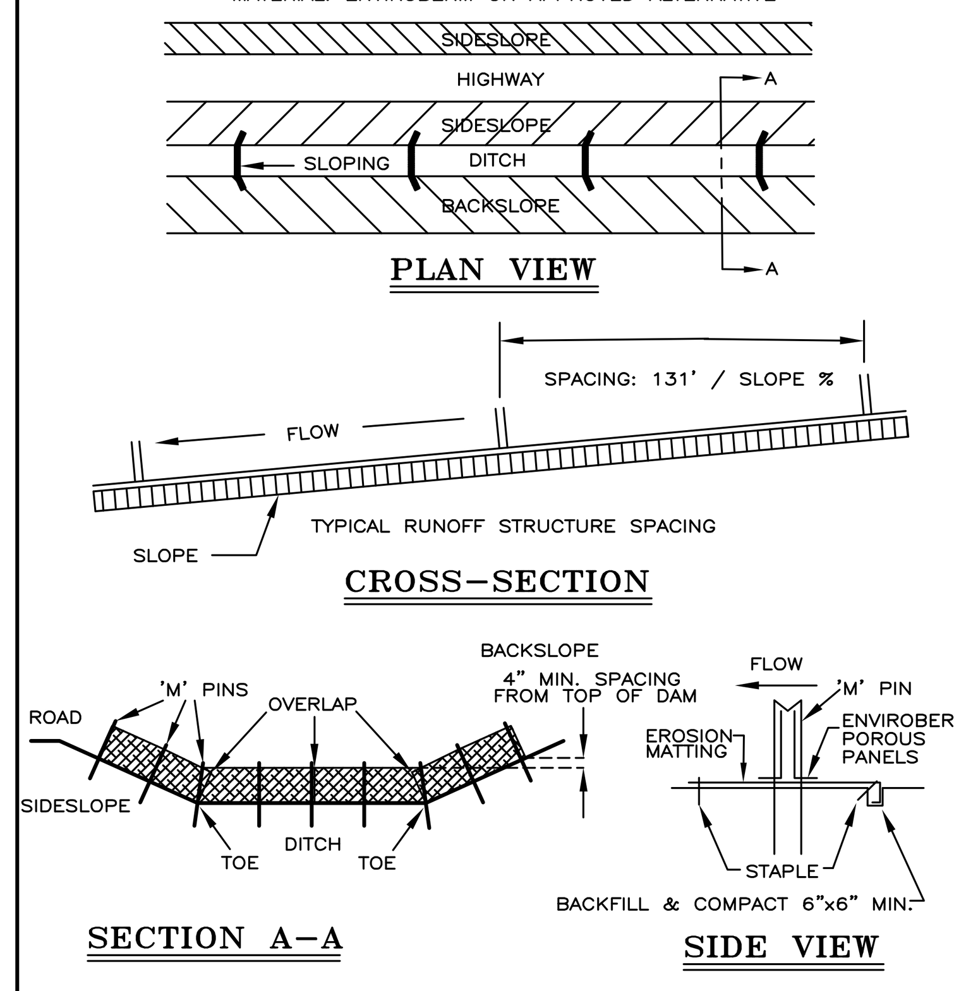


VELOCITY	AVG. ROCK SIZE
6 fps	5 IN.
8 fps	10 IN.
10 fps	14 IN.
12 fps	20 IN.

-DEPENDING ON THE VELOCITY, SLOPE AND SOILS, USE THE PROPER SIZED RIP-RAP TO HANDLE THE SHEER STRESS OF THE SLOPE/CHANNEL.
-FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THIS SHEET OR IN THE WRC SOIL EROSION MANUAL.

CHECK DAMS ALTERNATIVE "A" (E-3A)

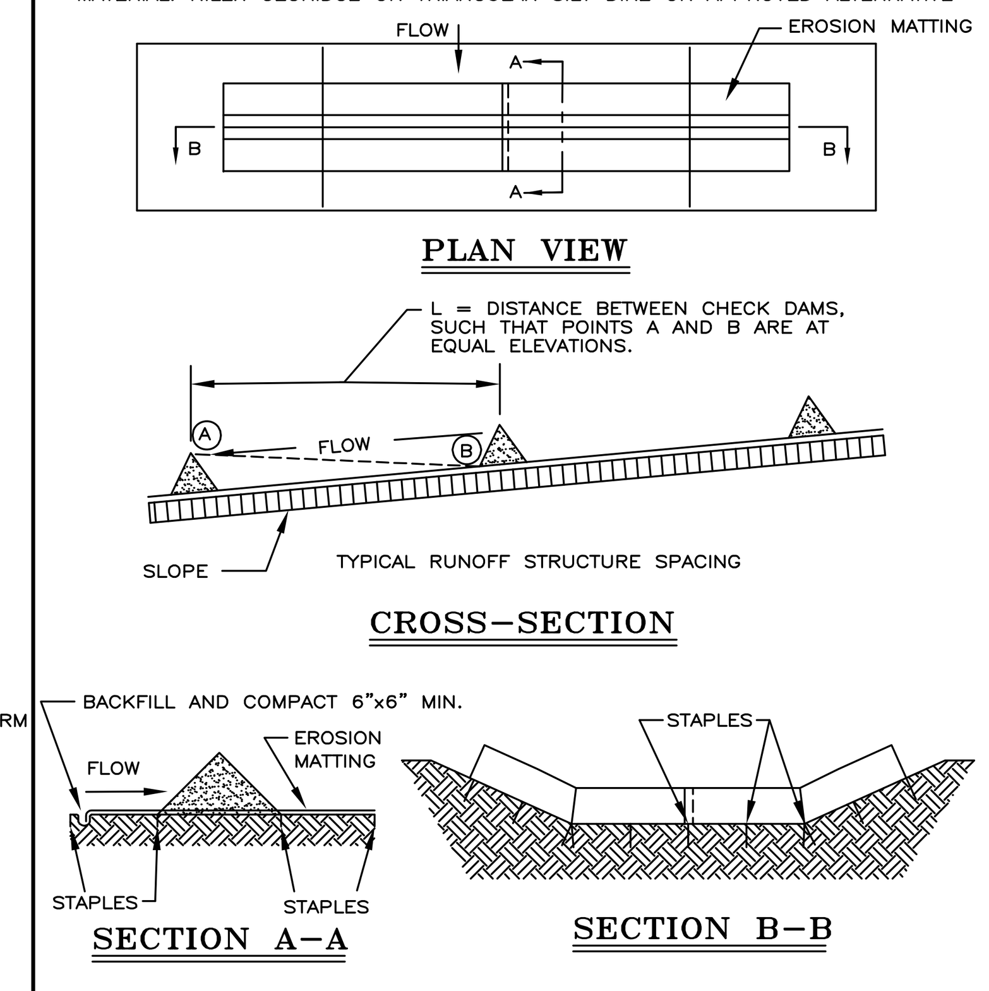
MATERIAL: ENVIROBERM OR APPROVED ALTERNATIVE



-FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THIS SHEET OR IN THE WRC SOIL EROSION MANUAL.

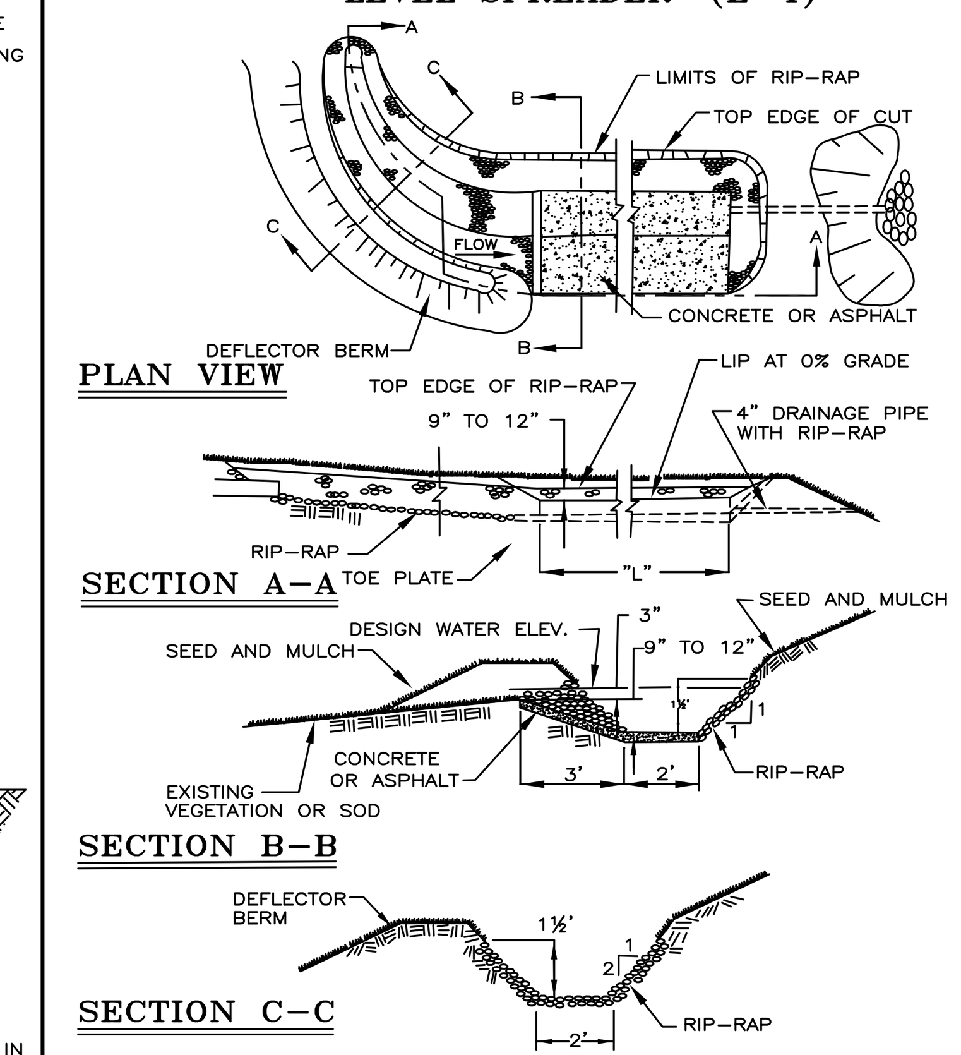
CHECK DAMS ALTERNATIVE "B" (E-3B)

MATERIAL: NILEX GEORIDGE OR TRIANGULAR SILT DIKE OR APPROVED ALTERNATIVE

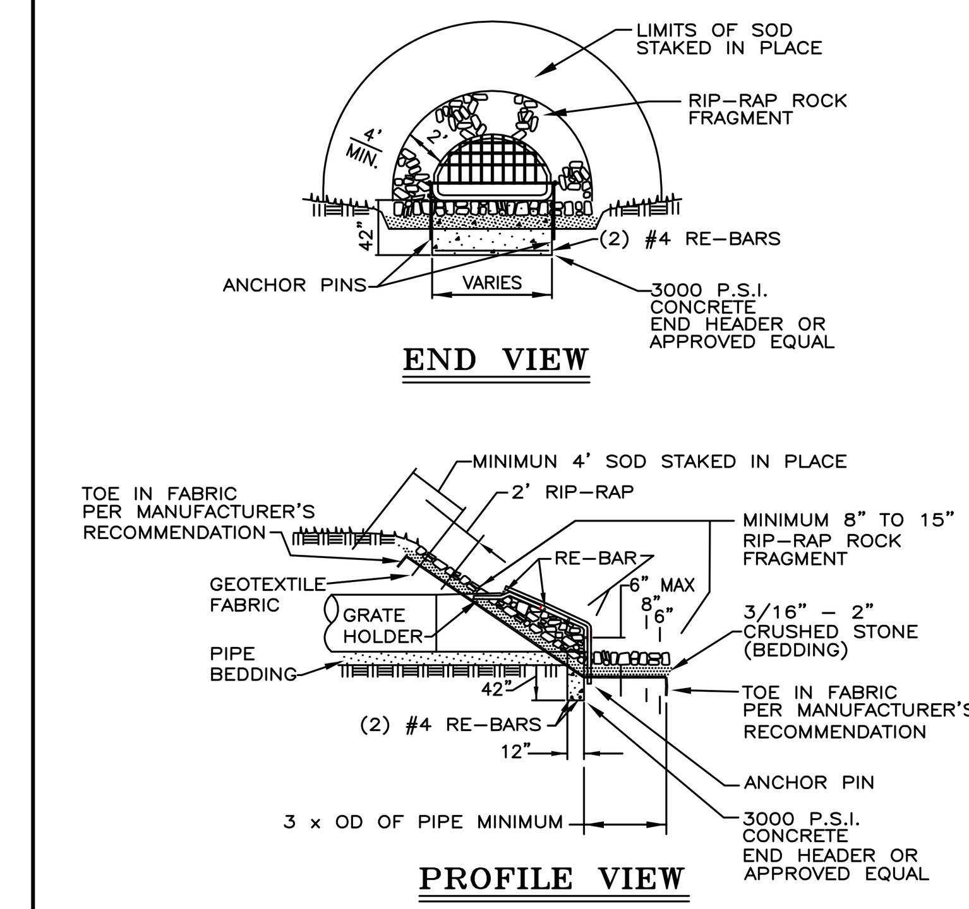


-FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THIS SHEET OR IN THE WRC SOIL EROSION MANUAL.

LEVEL SPREADER (E-4)



RIP-RAP, END SECTION AND BAR SCREEN DETAIL (E-7)

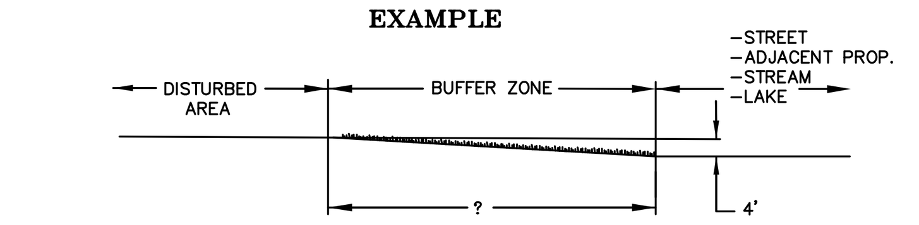


NOTE:
-BAR SCREEN DETAILS PER MDOT ROAD & BRIDGE STANDARD PLANS, STEEL GRATES FOR END SECTIONS. BARS ARE TO BE CUT OFF AT EDGE OF END SECTION.
-FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THIS SHEET OR IN THE WRC SOIL EROSION MANUAL.

VEGETATIVE BUFFER ZONE (SP-1)

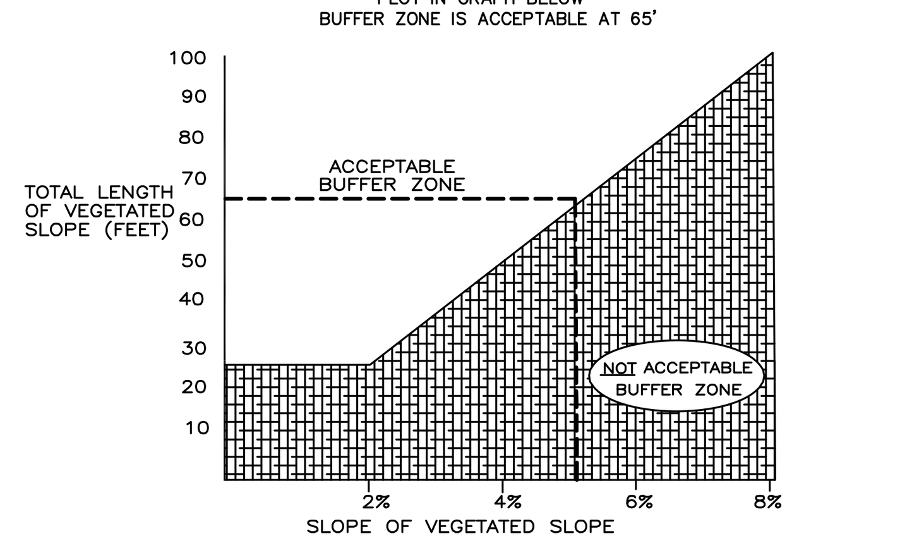
THE GRAPH SHOWN BELOW IS USED TO DETERMINE THE ADEQUACY OF AN EXISTING VEGETATIVE BUFFER ZONE FOR USE AS A SEDIMENT FILTER. THIS GRAPH IS ONLY APPLICABLE IF THE VEGETATION IS 90% DENSE AND AT LEAST 1" IN LENGTH OVER EVERY SQUARE FOOT OF DISTURBED SOIL. AN AREA COVERED WITH WEEDS, OR BUSHES AND TREES WITHOUT A GOOD GROUND COVER IS NOT ACCEPTABLE.

EXAMPLE



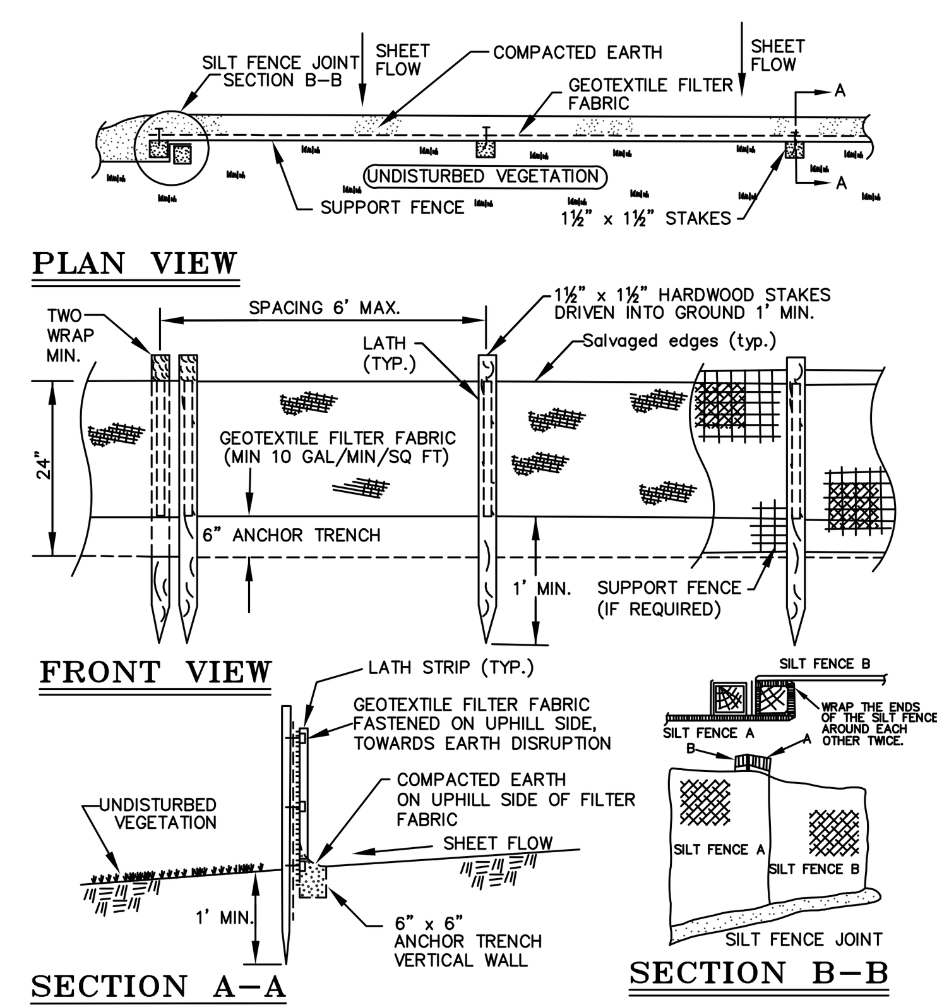
LENGTH OF BUFFER ZONE ?
% OF SLOPE OF BUFFER ZONE = 5%
WHAT IS THE ACCEPTABLE LENGTH OF THE BUFFER ZONE?

PLOT IN GRAPH BELOW
BUFFER ZONE IS ACCEPTABLE AT 65'



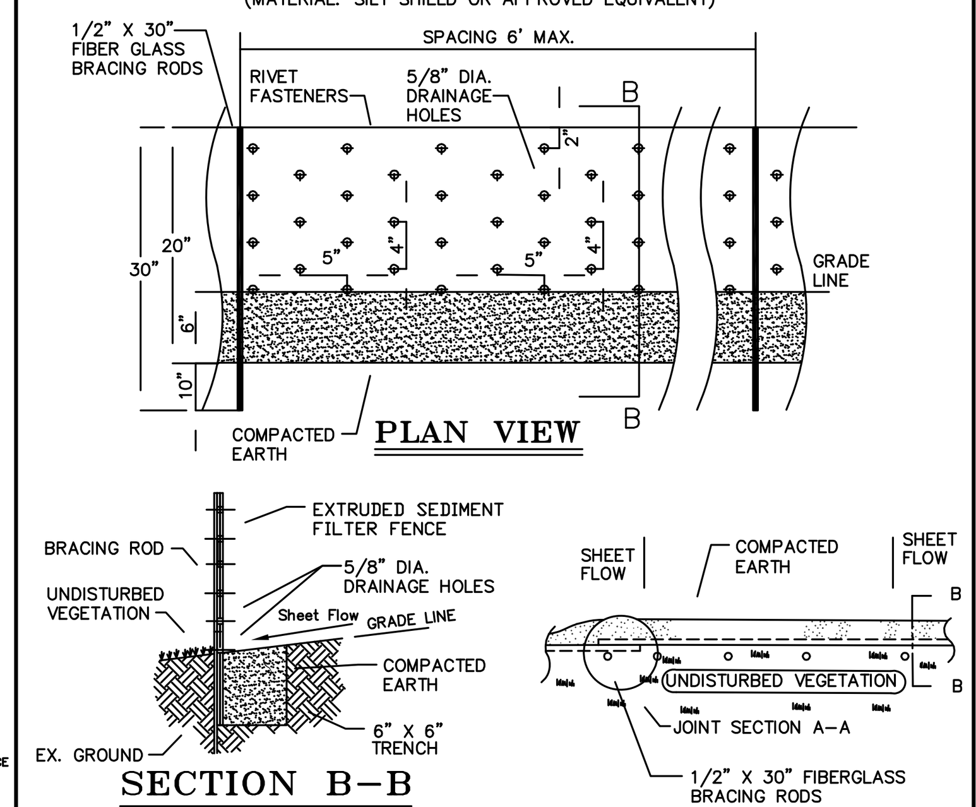
SILT FENCE (SP-2)

(MATERIAL: AMOCO PRO PEX 2130 OR APPROVED EQUIVALENT)

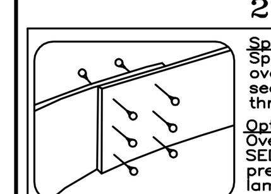


SILT FENCE ALTERNATIVE "A" (SP-2A)

(MATERIAL: SILT SHIELD OR APPROVED EQUIVALENT)



2% GRADE MAXIMUM SLOPE

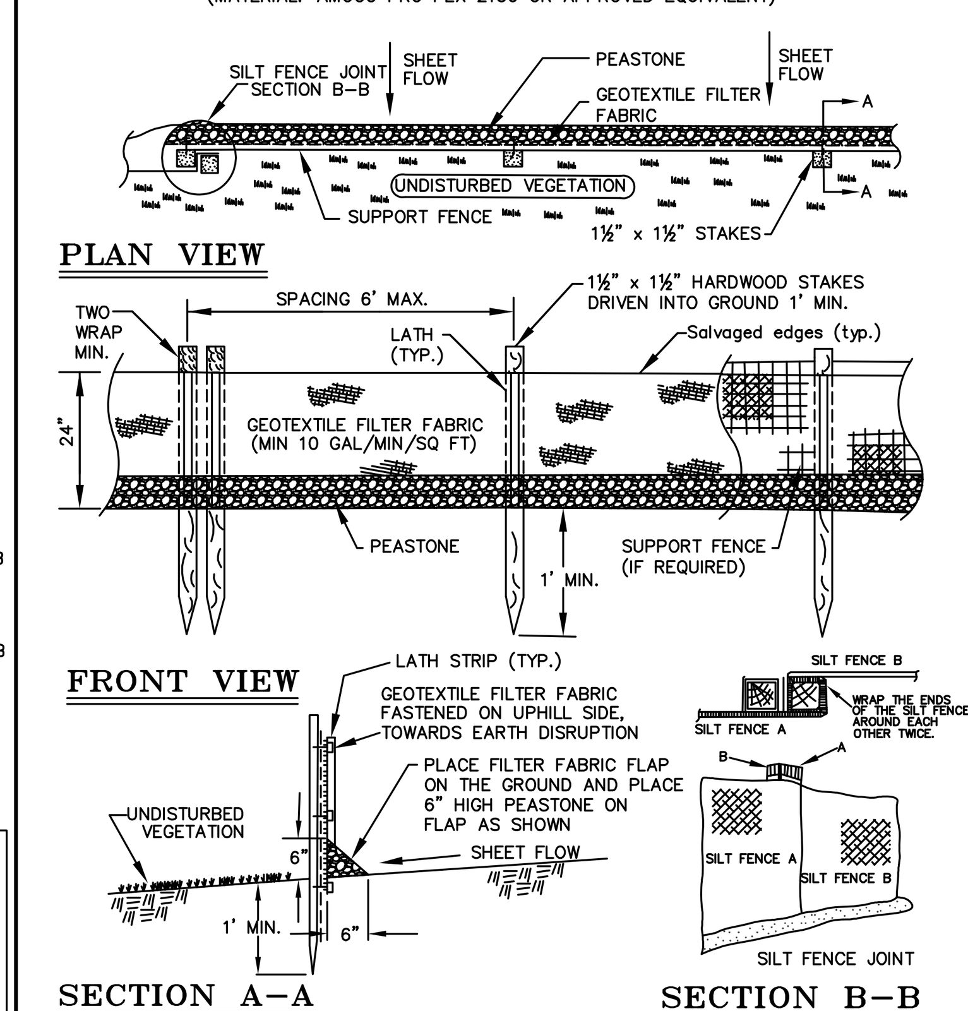


Splicing Procedure:
Splicing EXTRUDED SEDIMENT FILTER FENCE is achieved beginning with an overlap of a min. of 8" of the EXTRUDED SEDIMENT FILTER FENCE ends secured with six of our plastic retchet rivet push-in fasteners. Locate three, evenly spaced, vertically, at least 2" from each edge of the splice.

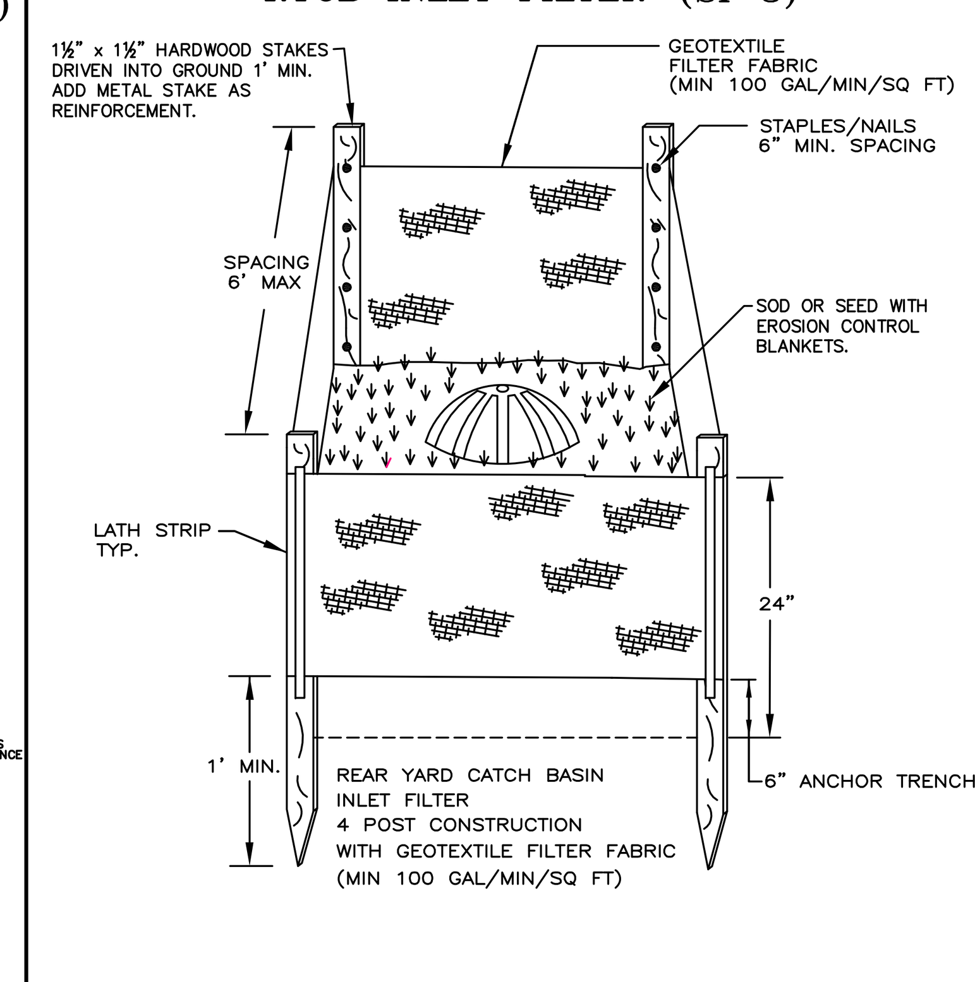
Optional Heat Splicing:
Overlap a minimum of eight inches. Melt a thin layer of EXTRUDED SEDIMENT FILTER FENCE with torch from top to bottom. Immediately press both layers together for a minimum of 5 second. Check for total lamination from top to bottom of material. (Do not apply heat to filter)

WINTER/FROZEN GROUND SILT FENCE (SP-2W)

(MATERIAL: AMOCO PRO PEX 2130 OR APPROVED EQUIVALENT)

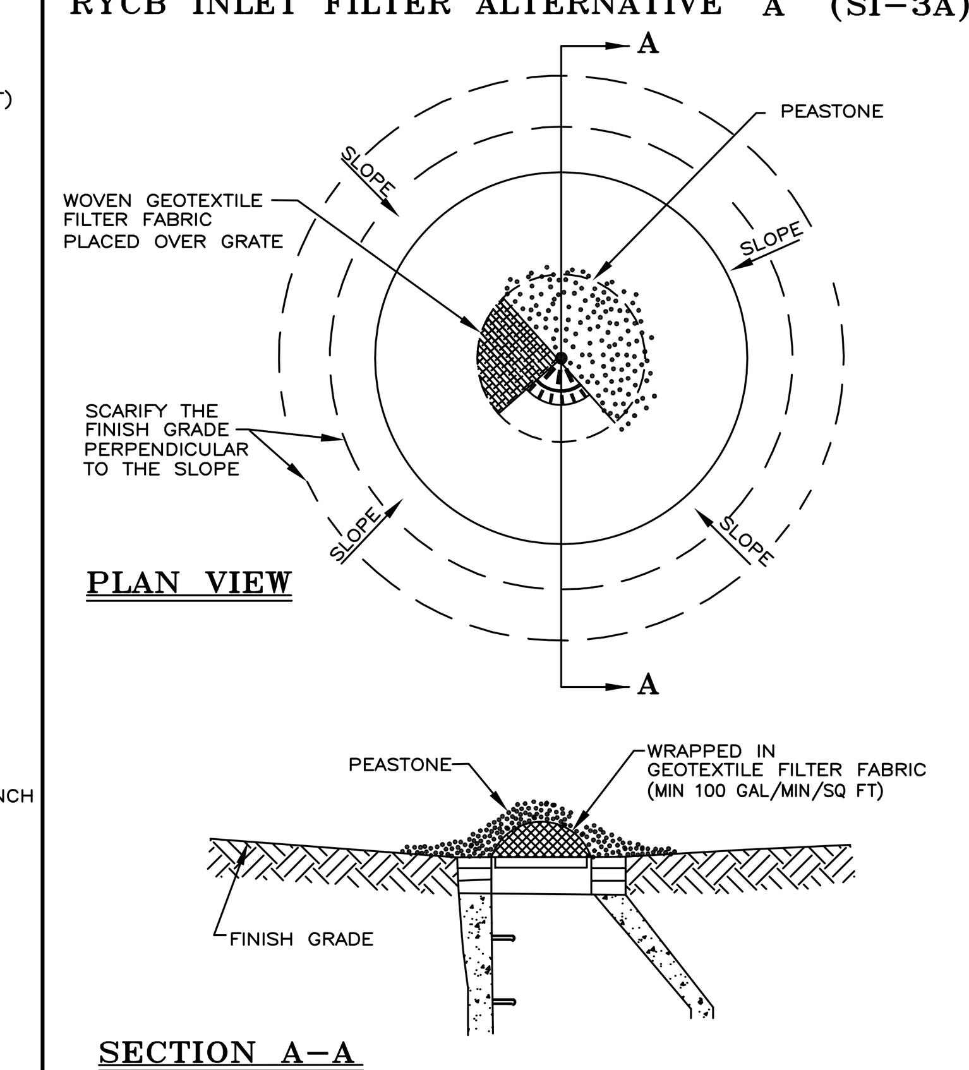


RYCB INLET FILTER (SI-3)



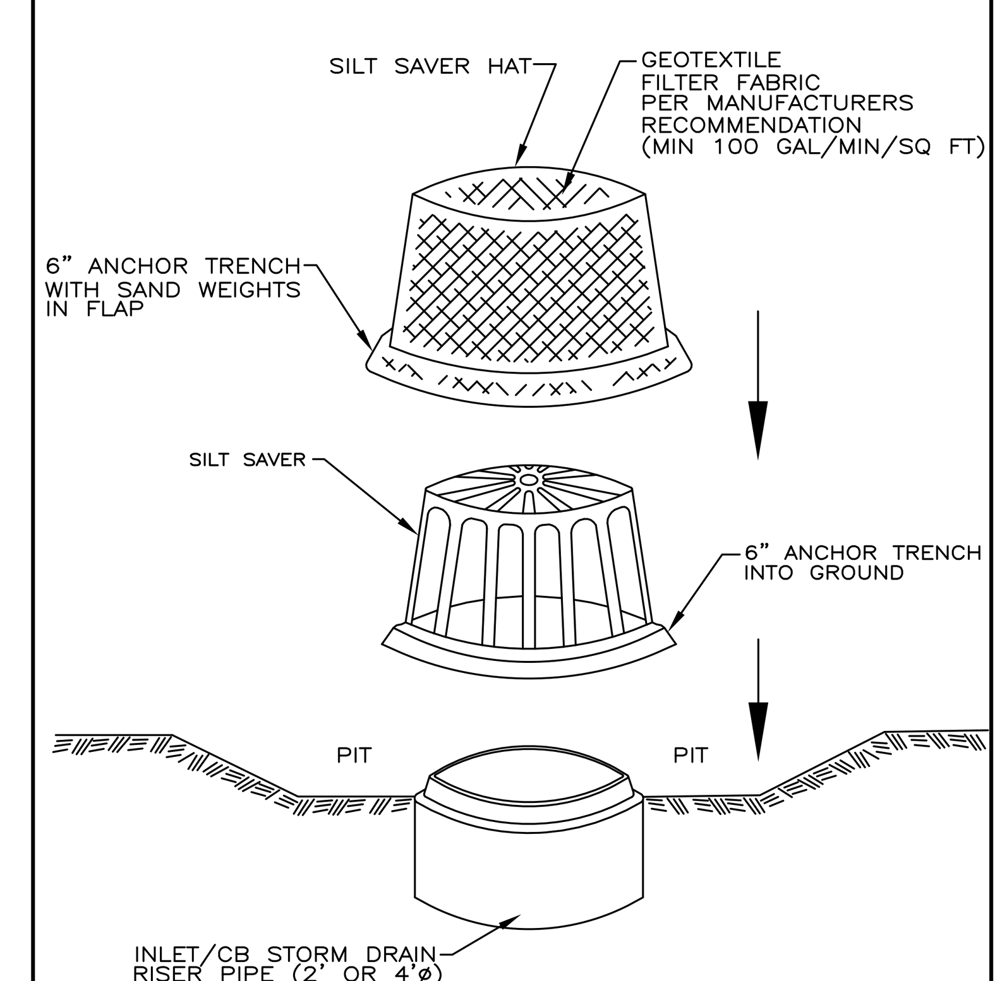
NOTE: MATERIAL IS NOT SILT FENCE MATERIAL

RYCB INLET FILTER ALTERNATIVE "A" (SI-3A)



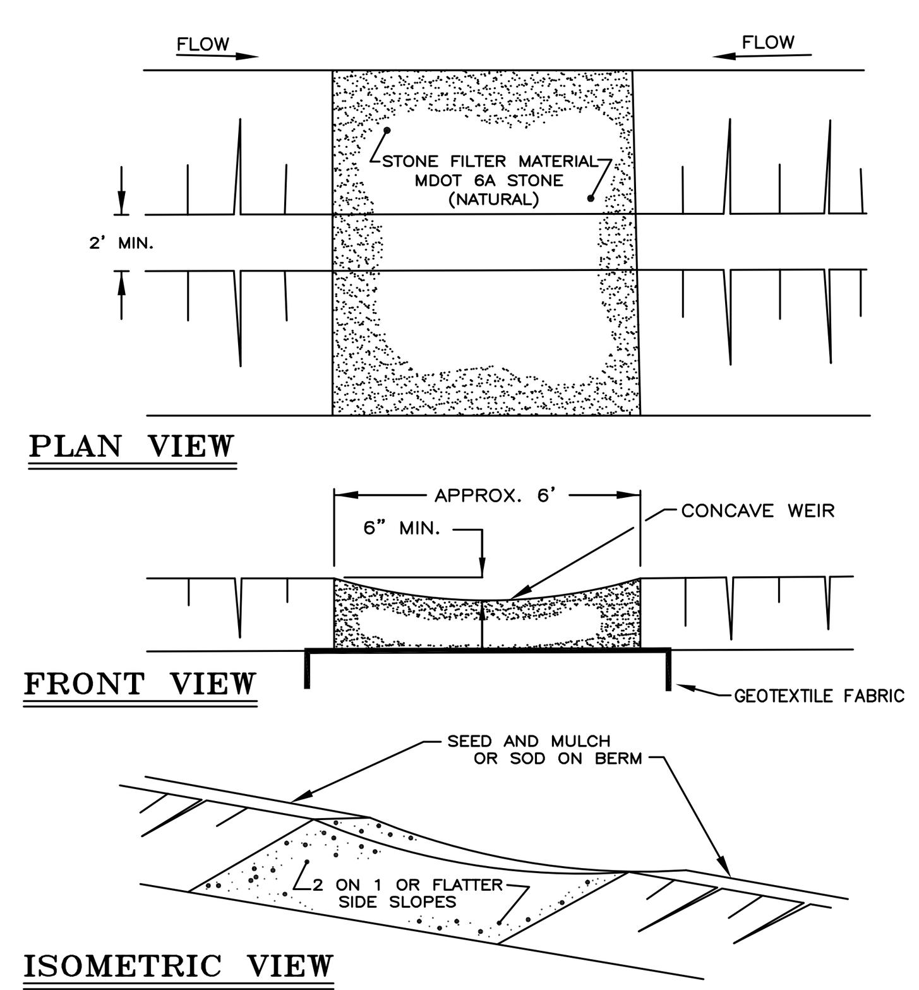
RYCB INLET FILTER ALTERNATIVE "B" (SI-3B)

MATERIAL: SILT SAVER OR APPROVED ALTERNATIVE



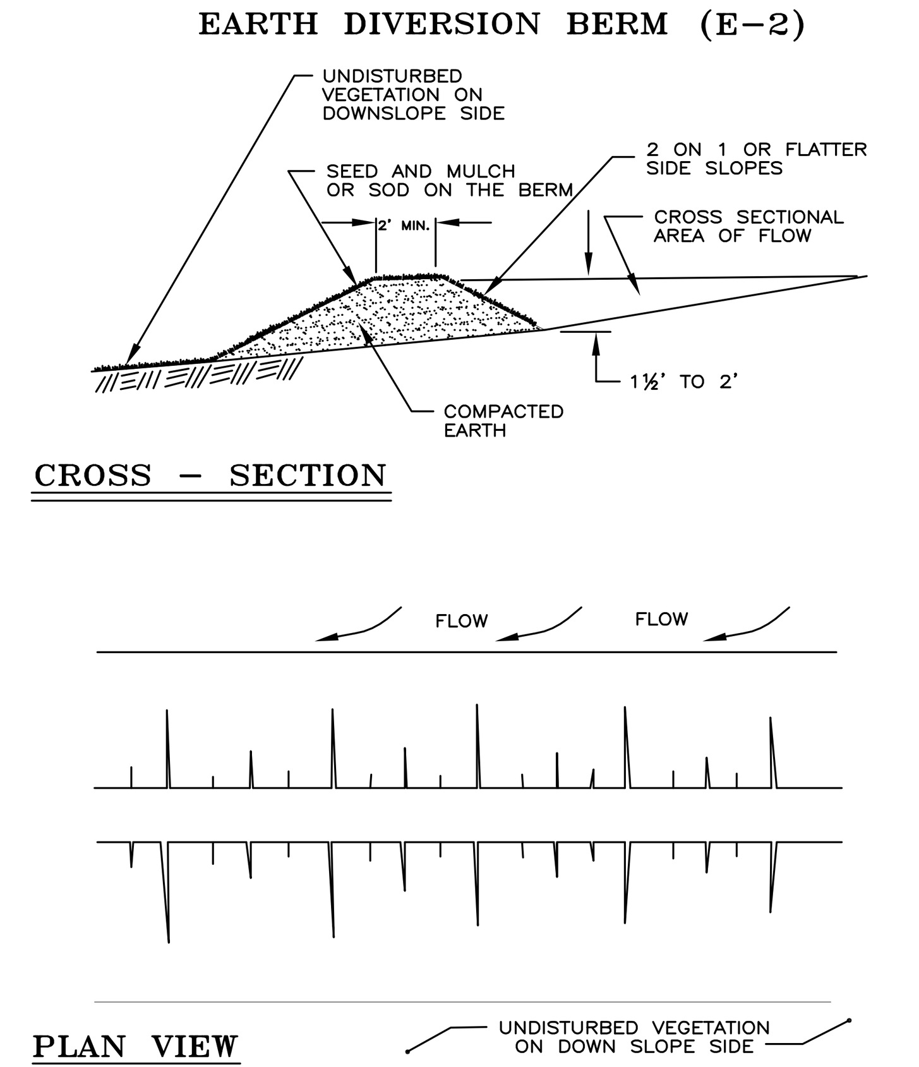
(NOTE: NO PIT REQUIRED WHEN FRAME AND COVER OR GRATE AND COVER ARE IN PLACE.)

EARTH DIVERSION BERM WITH STONE OUTLET FILTER (SP-4)

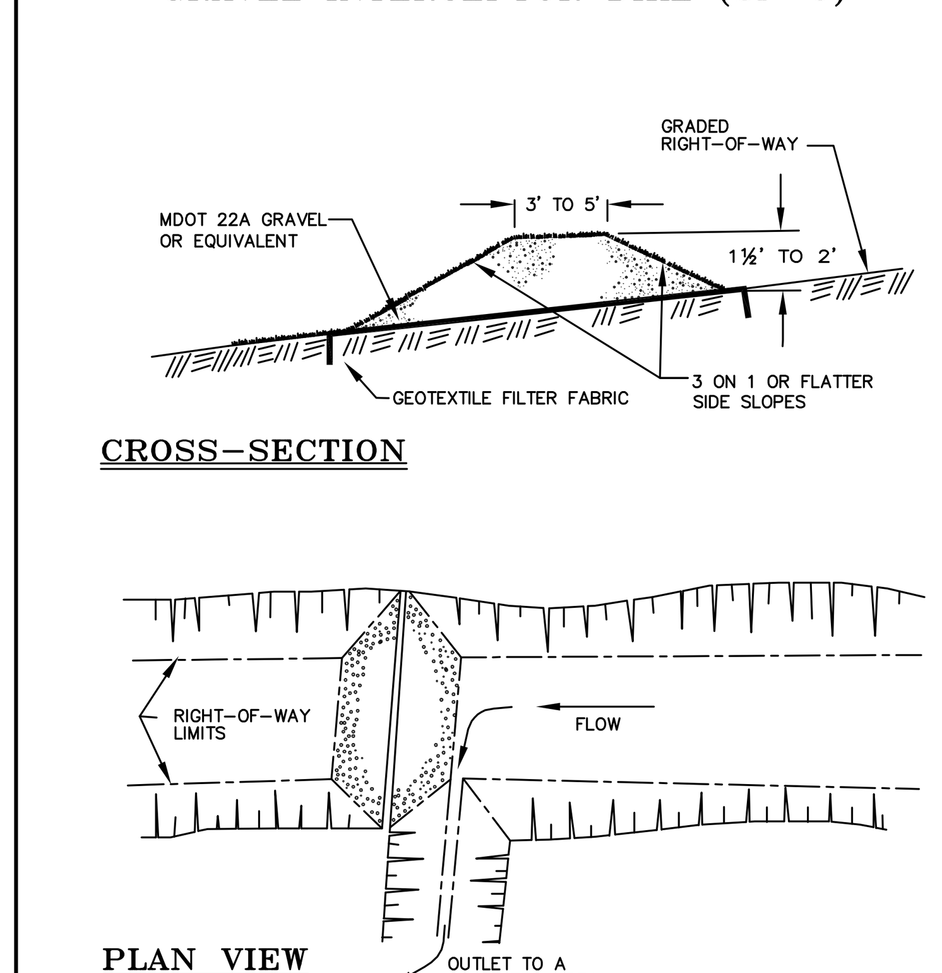


-PLACE GEOTEXTILE FABRIC UNDER STONE WITH 6 INCH MIN. OVERLAP AND TRENCHED IN 6 INCH MIN.

EARTH DIVERSION BERM (E-2)



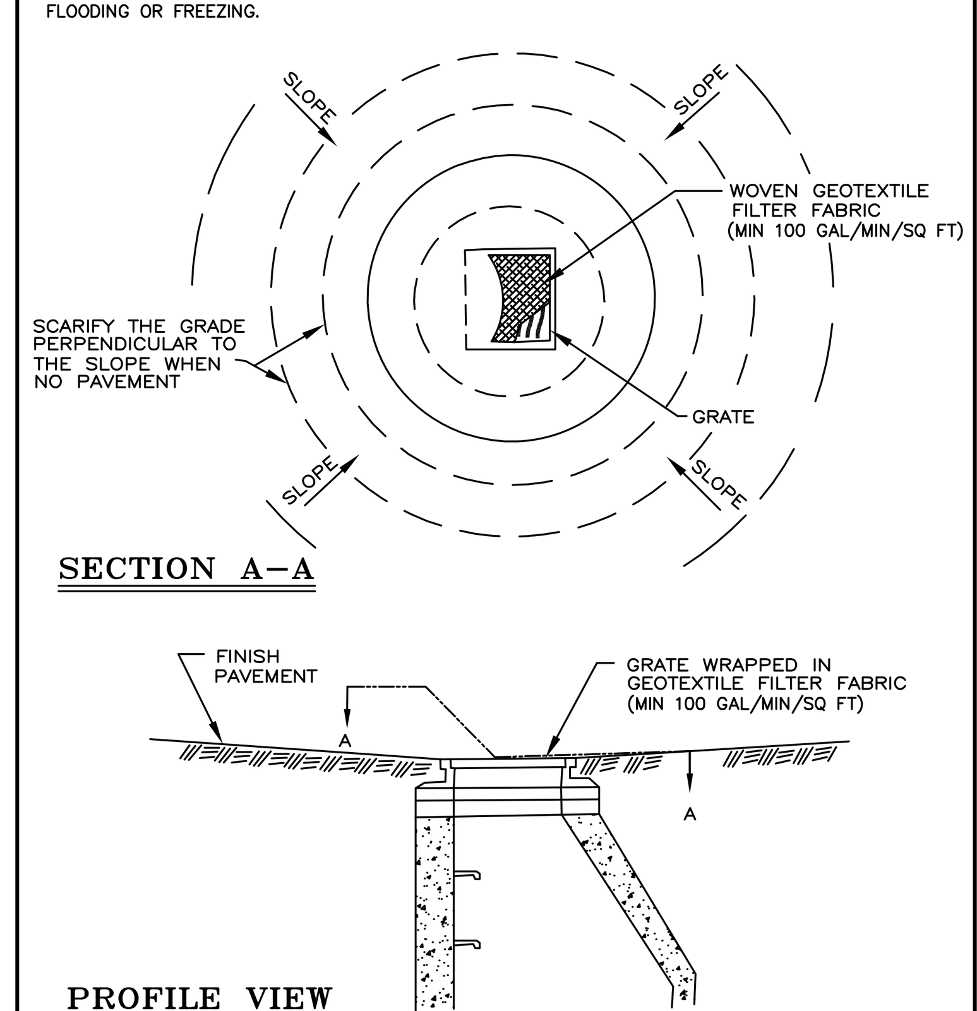
GRAVEL INTERCEPTOR DIKE (SP-6)



-PLACE GEOTEXTILE FABRIC UNDER STONE WITH 6 INCH MIN. OVERLAP AND TRENCHED IN 6 INCH MIN.
-FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THIS SHEET OR IN THE WRC SOIL EROSION MANUAL.

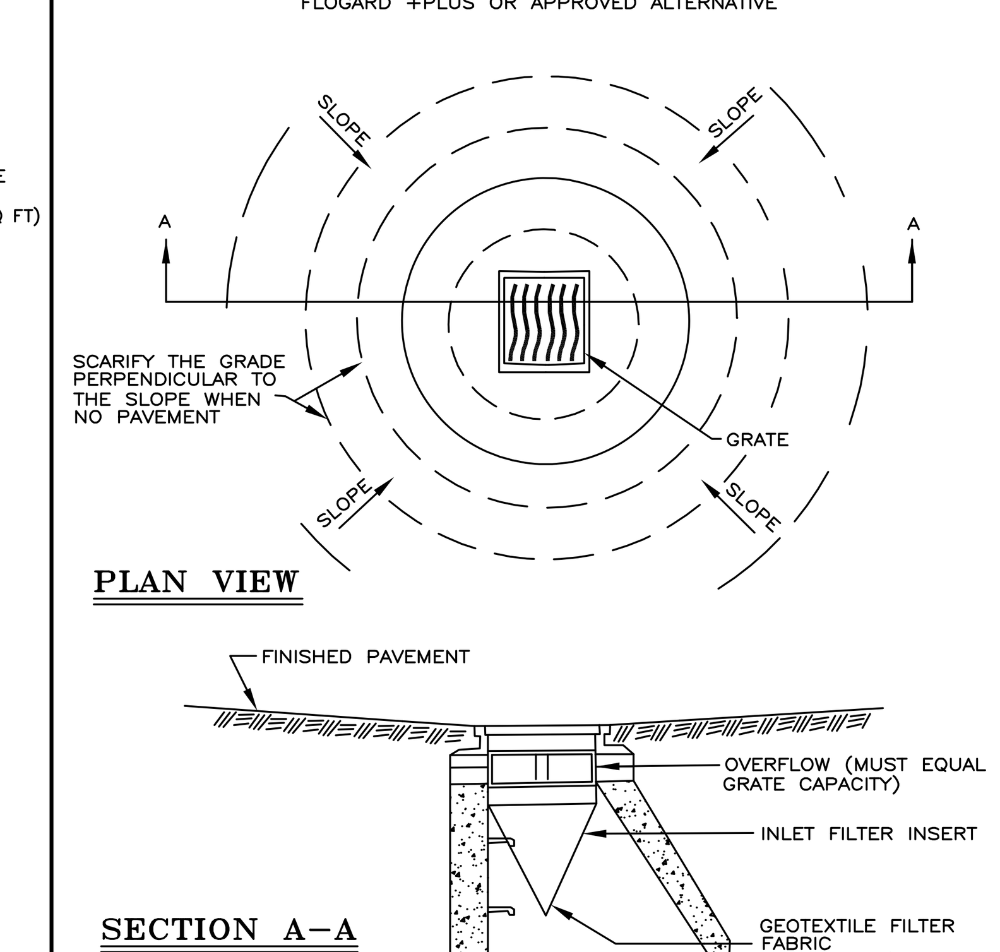
LOW POINT INLET FILTER (SI-2)

ALTERNATIVE INLET FILTER MUST BE USED IN AREAS THAT MAY BECOME A SAFETY HAZARD DUE TO FLOODING OR FREEZING.

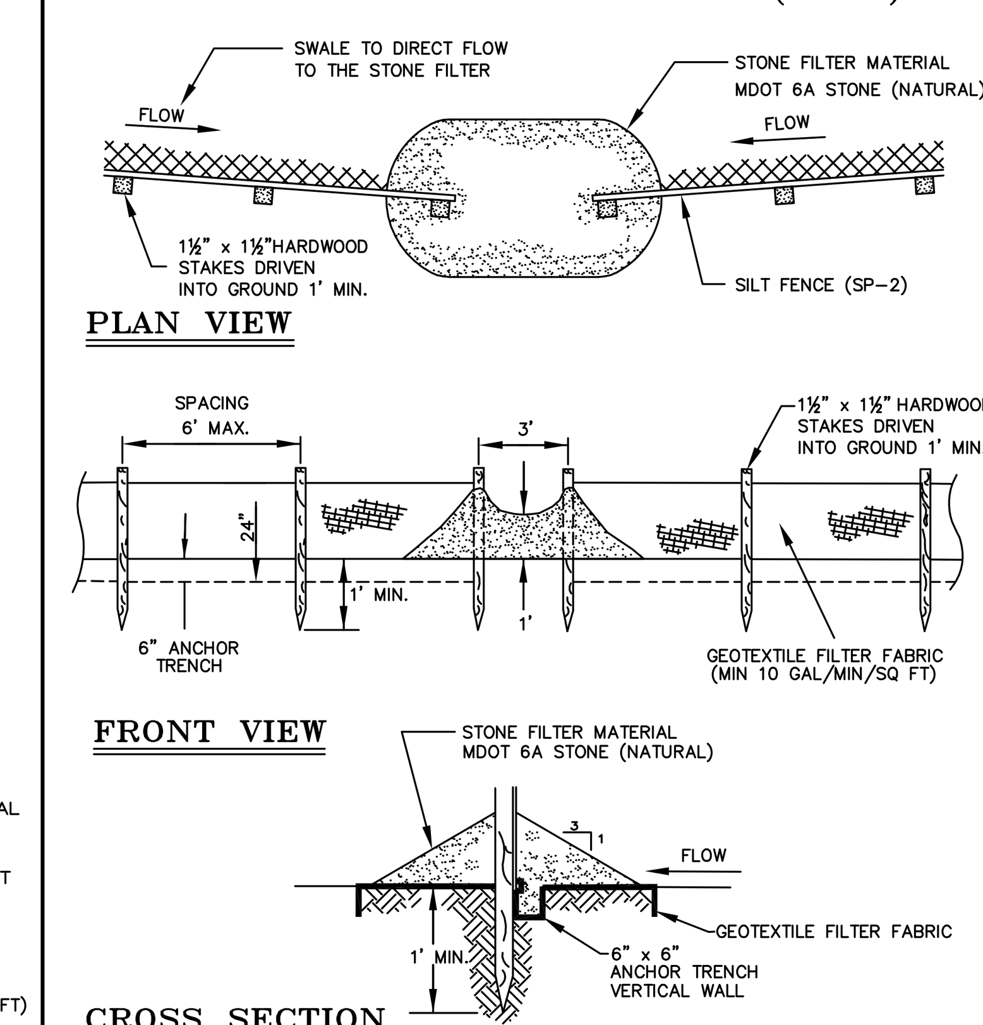


LOW POINT INLET FILTER ALT. "A" (SI-2A)

MATERIAL: CATCH-ALL, ULTRA-URBAN FILTERS, FLOGARD +PLUS OR APPROVED ALTERNATIVE

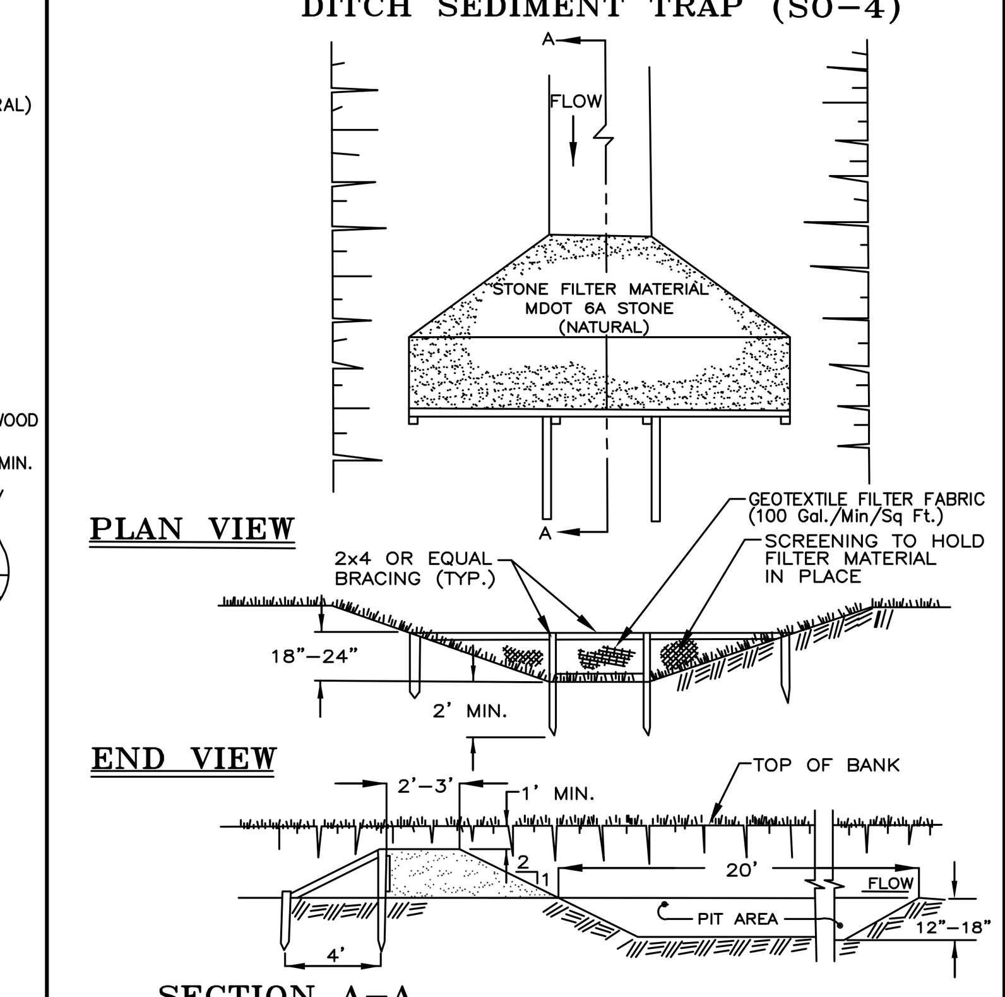


SILT FENCE GRAVEL FILTER (SP-3)



-PLACE GEOTEXTILE FABRIC UNDER STONE WITH 6 INCH MIN. OVERLAP AND TRENCHED IN 6 INCH MIN.

DITCH SEDIMENT TRAP (SO-4)

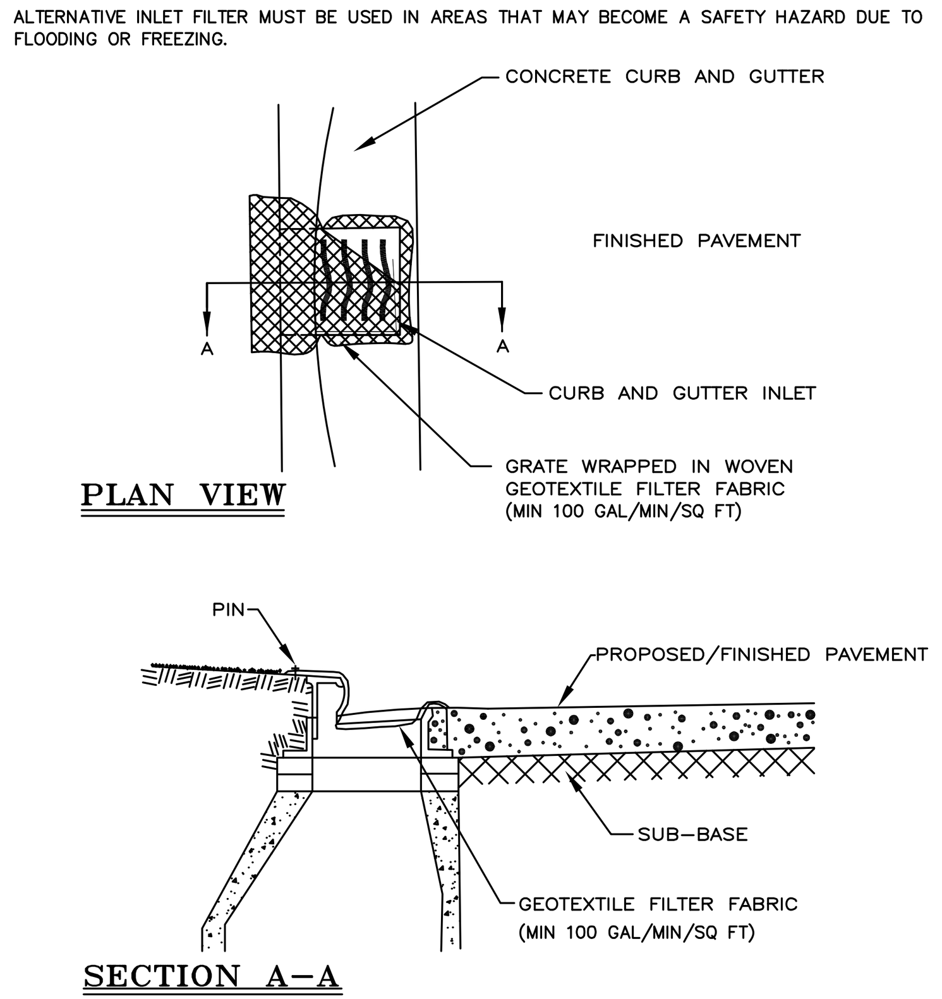


NOTE:
FOR SLOPE AND/OR CHANNEL PROTECTION SEE OTHER BMP'S ON THE SHEET OR IN THE WRC SOIL EROSION MANUAL.

CURB AND GUTTER INLET FILTER (SI-4)

(BEFORE AND AFTER PAVING)

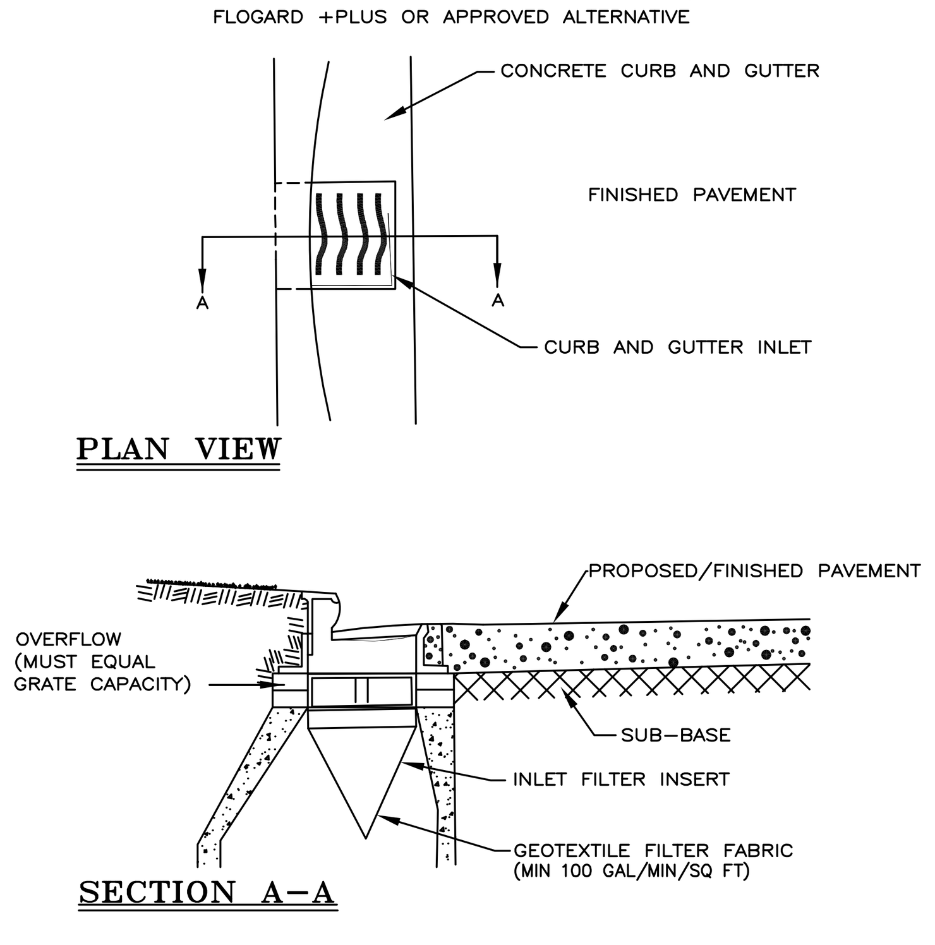
ALTERNATIVE INLET FILTER MUST BE USED IN AREAS THAT MAY BECOME A SAFETY HAZARD DUE TO FLOODING OR FREEZING.



CURB AND GUTTER INLET FILTER ALTERNATIVE "A" (SI-4A)

(BEFORE AND AFTER PAVING)

MATERIAL: CATCH-ALL, ULTRA-URBAN FILTERS, FLOGARD +PLUS OR APPROVED ALTERNATIVE

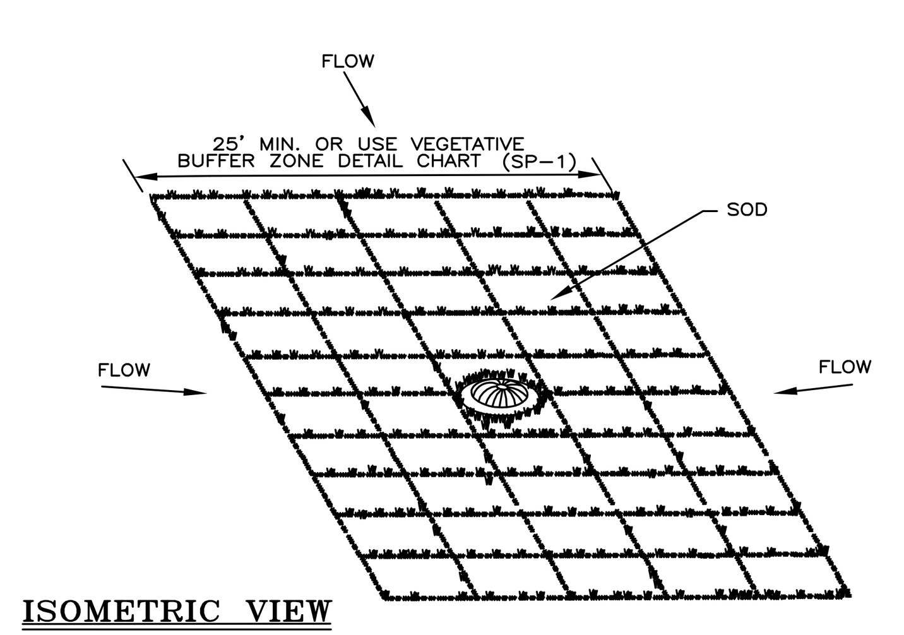


SOD INLET FILTER (SI-1)

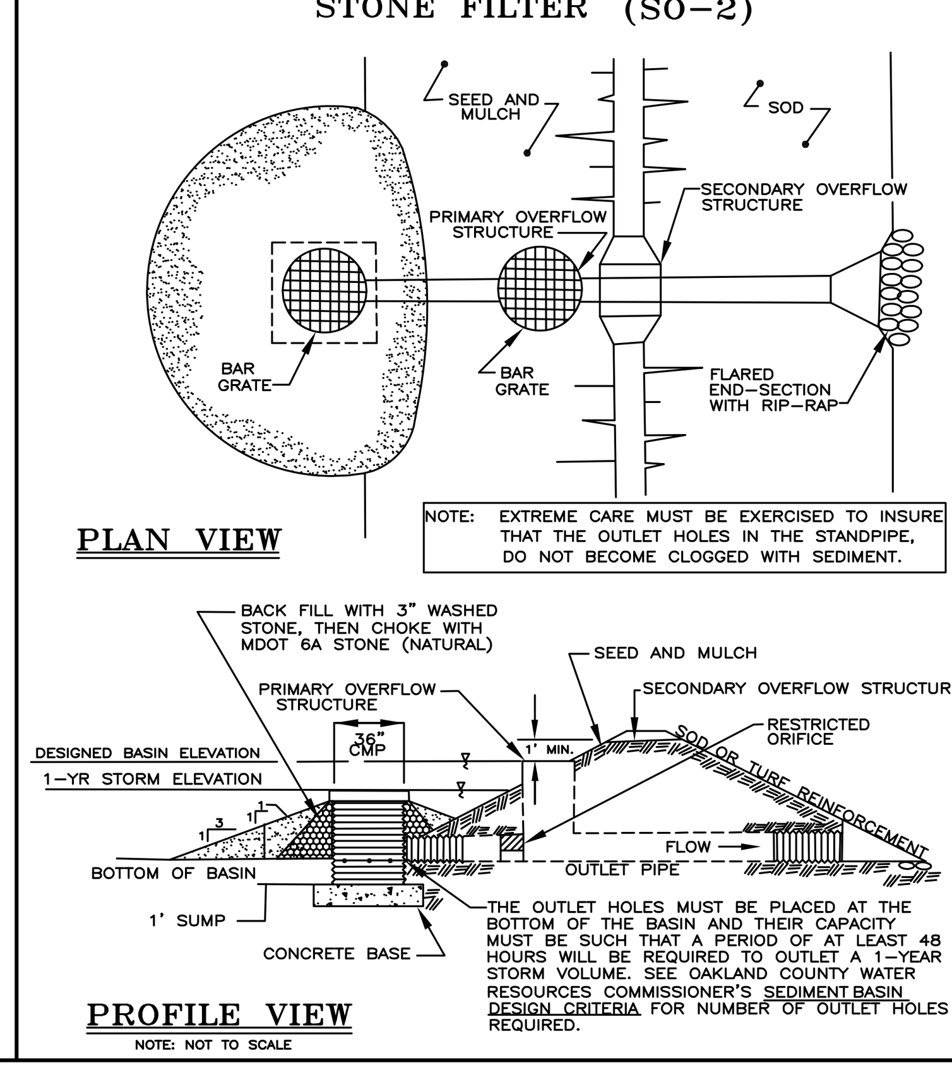
DEFINITION — SOD INLET FILTERS ARE PADS OF SOD PLACED AROUND A STORM DRAIN INLET OR CATCH BASIN.

PURPOSE — SOD INLET FILTERS ARE INSTALLED TO SLOW THE FLOW OF WATER INTO AN INLET OR CATCH BASIN AND TO FILTER OUT SEDIMENT IN THE PROCESS.

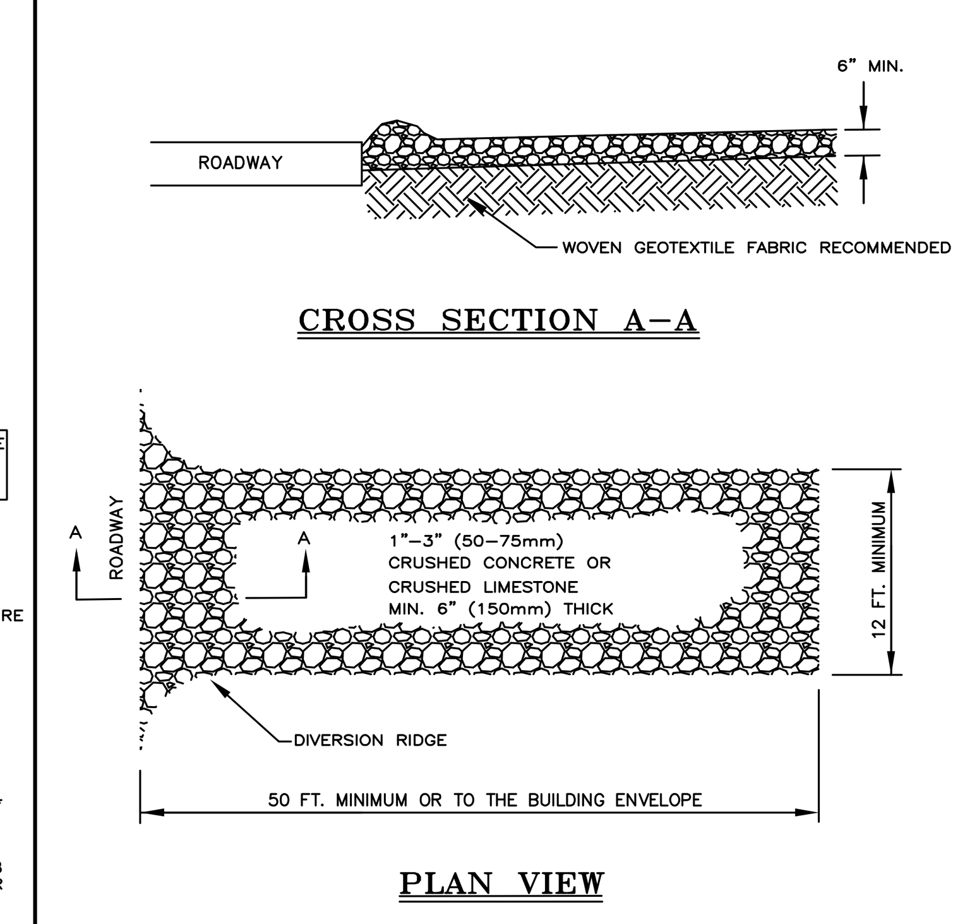
WHERE APPLICABLE — SOD INLET FILTERS SHOULD ONLY BE USED TO HANDLE LIGHT CONCENTRATIONS OF SEDIMENT. THEY ARE BEST USED AFTER FINAL GRADING IS COMPLETE AND DURING THE ESTABLISHMENT OF A VEGETATIVE COVER.



TEMPORARY DETENTION BASIN OUTLET STONE FILTER (SO-2)

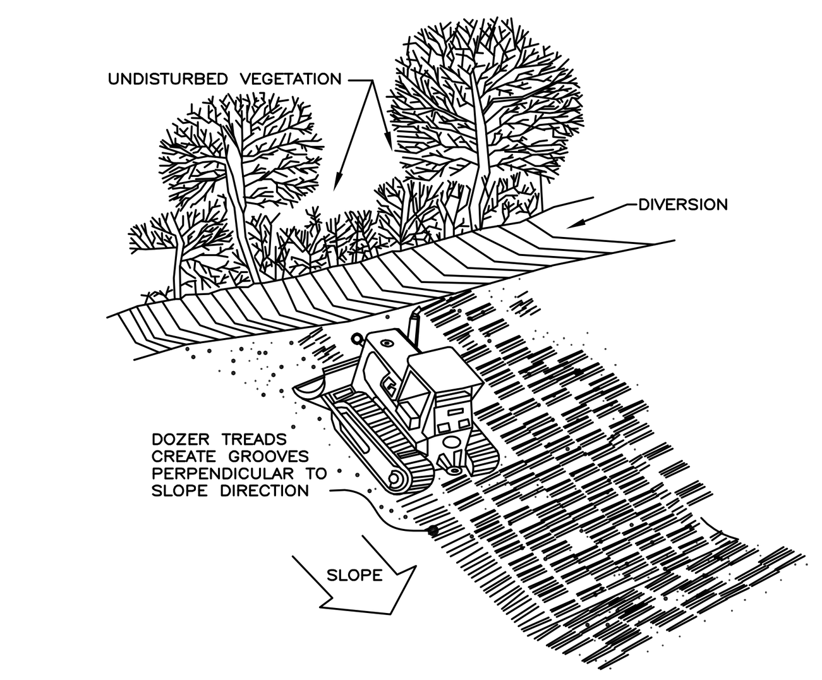


TEMPORARY STONE ACCESS DRIVE (SP-9)



SURFACE ROUGHENING AND SCARIFICATION (E-8)

THIS IS AN EASY AND ECONOMICAL WAY TO REDUCE SOIL EROSION. IT IS SIMPLY THE PLACING OF HORIZONTAL GROOVES IN A SLOPE PERPENDICULAR TO THE FLOW OF RUNOFF. THIS CAN BE DONE BY EITHER DISC HARROWING, BACK BLADING OR JUST RUNNING THE TREADS OF A CRAWLER TRACTOR PERPENDICULAR TO THE SLOPE AS SHOWN BELOW.



UNVEGETATED SLOPE SHOULD BE TEMPORARILY SCARIFIED TO MINIMIZE RUNOFF VELOCITIES

NOTE:

WHILE PERFORMING WORK INVOLVING GROUNDS MAINTENANCE AND/OR THE CONSTRUCTION/MAINTENANCE OF ANY INFRASTRUCTURE, INCLUDING ROADS, WATER MAINS, SANITARY SEWERS, STORM DRAINS AND STORM WATER BEST MANAGEMENT PRACTICES (BMPS), CONTRACTORS SHALL MINIMIZE POLLUTION FROM STORM WATER RUNOFF THAT CAN AFFECT WATER QUALITY RELATED TO WORK ACTIVITIES. POLLUTANTS THAT COULD IMPAIR WATER QUALITY MAY INCLUDE FUEL, GREASE AND OIL, NUTRIENTS, BACTERIA AND PATHOGENS, LITTER AND DEBRIS, AND SOIL EROSION AND SEDIMENTATION. APPLICABLE BMPS SHALL BE IMPLEMENTED BY THE CONTRACTOR TO THE MAXIMUM EXTENT PRACTICABLE TO PROTECT WATER QUALITY AND WILDLIFE HABITAT.

SOIL EROSION AND SEDIMENTATION CONTROL DETAILS

REVISION BLOCK

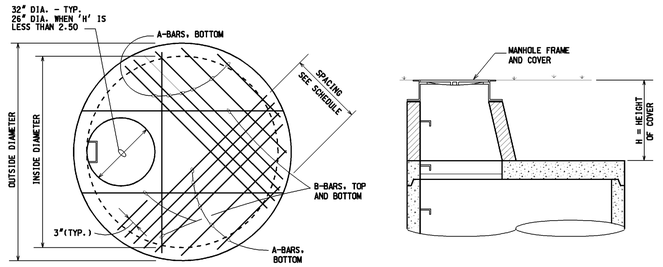
Data Source / Source Date: N/A

Rev. No.:	Rev. By:	Rev. Date:	Description:
1	lz	3-22-07	PROPOSED DETAIL EDITS
2	lz	2-26-09	STANDARDS COMMITTEE APPROVAL / NAME CHANGES
3	DS	3-25-11	SILT FENCE ALTERNATIVE "A" DETAIL (SP-2A) ADDED
4	DS	4-16-13	STANDARDS COMMITTEE APPROVAL / NOTE CHANGES

ORIG. DATE:	01/01/01
SCALE:	NONE
DESIGNED BY:	WRC
DRAWN BY:	Mapping

WRC WATER RESOURCES COMMISSIONER Jim Nash
ONE PUBLIC WORKS DRIVE, BLDG 95 WEST
WATERFORD, MICHIGAN
48328-1907

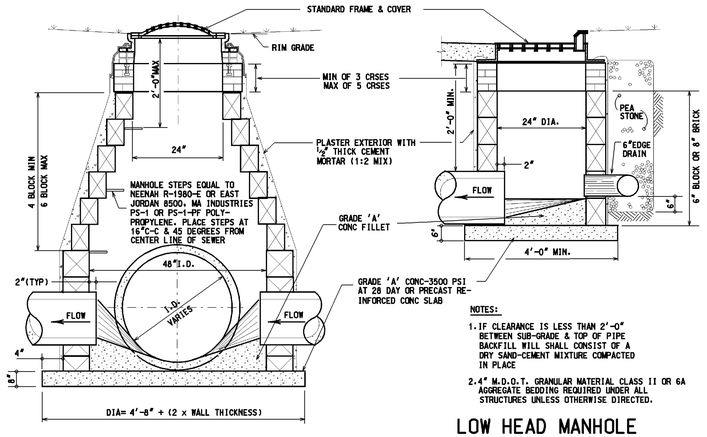
SHEET NO.: 1 of 1



PLAN

SECTION

INSIDE DIA.	SLAB THICKNESS	MAX. HEIGHT OF COVER	REINFORCEMENT		
			A-BARS EA. SIDE		B-BARS TOP & BOTTOM
			NO. SIZE	SPACING	
4'-0"	8"	8'-0"	(4)-#5	3 @ 3"	(3)-#5
5'-0"	8"	8'-0"	(6)-#5	3 @ 3" 2 @ 6"	(3)-#5
6'-0"	8"	8'-0"	(5)-#6	4 @ 8"	(3)-#5
7'-0"	8"	8'-0"	(7)-#6	6 @ 6"	(3)-#5
8'-0"	8"	8'-0"	(9)-#6	8 @ 6"	(3)-#5
9'-0"	10"	8'-0"	(11)-#6	10 @ 6"	(3)-#5
10'-0"	10"	8'-0"	(13)-#7	12 @ 6"	(3)-#5

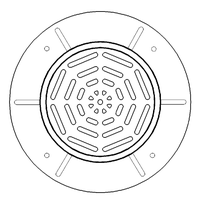


TYPE A-N INLET

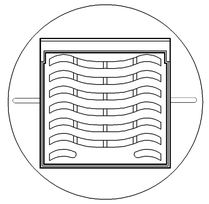
NOTES:

1. IF CLEARANCE IS LESS THAN 2'-0" BETWEEN SUB-GRADE & TOP OF PIPE BACKFILL WILL SHALL CONSIST OF A DRY SAND-CEMENT MIXTURE COMPACTED IN PLACE
2. 4" M.D.O.T. GRANULAR MATERIAL CLASS II OR 6A AGGREGATE BEDDING REQUIRED UNDER ALL STRUCTURES UNLESS OTHERWISE DIRECTED.

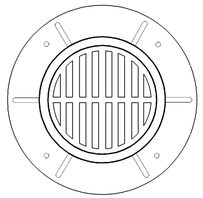
LOW HEAD MANHOLE
TYPE C INLET



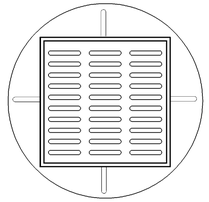
CATCH BASINS AND INLETS WITHIN PAVED DRIVING AREAS
FRAME & COVER EJIW #1040 WITH TYPE 'M-1' GRATE



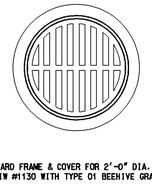
CURBED PAVEMENT SECTION
FRAME & COVER EJIW #7045 WITH TYPE 'M-1'
FOR 6" HIGH BACK CURB



BEEHIVE FRAME & COVER EJIW #1040
WITH TYPE 02 GRATE



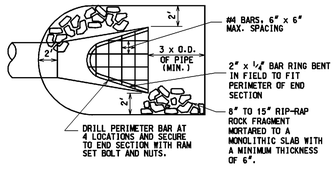
CURBED PAVEMENT SECTION
FRAME & COVER EJIW #7300 WITH TYPE "M"
FOR 4" MOUNTABLE CURB



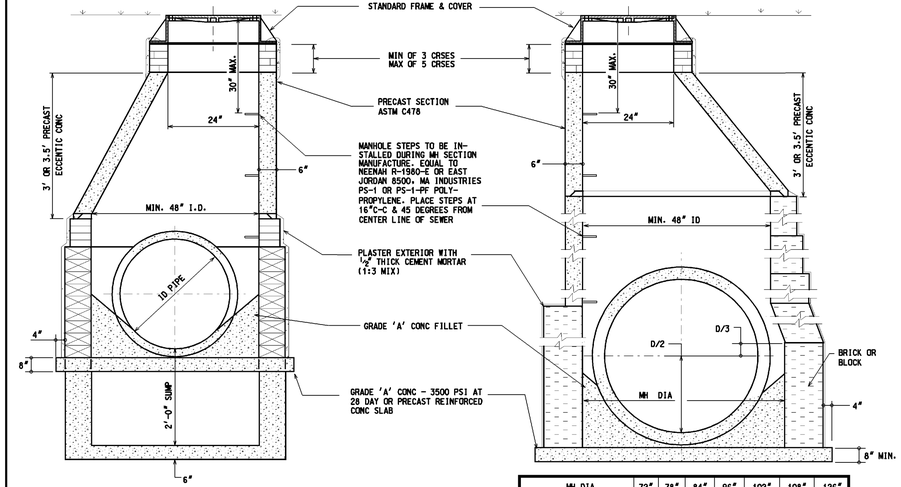
REAR YARD FRAME & COVER FOR 2'-0" DIA. INLET
EJIW #1130 WITH TYPE 01 BEEHIVE GRATE

STORM SEWER FRAME & COVER EJIW #1040
WITH TYPE 'B' COVER

FRAMES AND COVERS



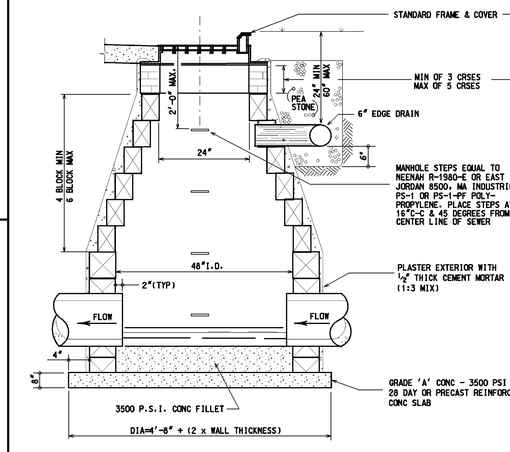
END SECTION AND BAR SCREEN DETAIL
INCLUDING RIP-RAP



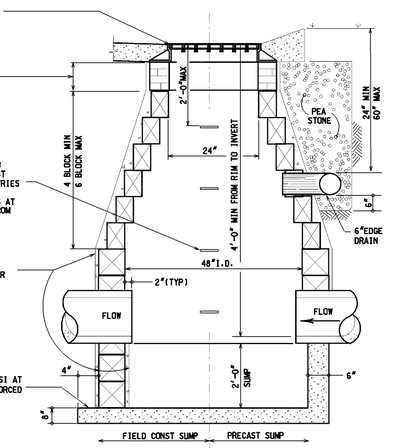
MH DIA	72"	78"	84"	96"	102"	108"	126"
D=SEWER PIPE ID SIZE	48"	54"	60"	66"	72"	84"	96"

STORM MANHOLE
FOR 42" PIPE AND SMALLER

STORM MANHOLE
FOR 48" PIPE AND LARGER



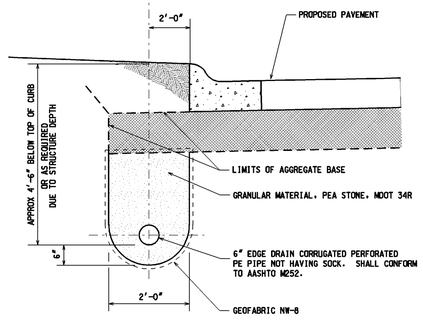
TYPE "A" INLET



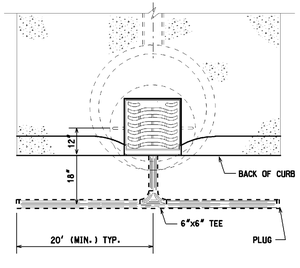
TYPE "B" CATCH BASIN

NOTES:

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT ENGINEERING DESIGN STANDARDS AND SPECIFICATIONS OF HIGHLAND TOWNSHIP.
2. IT SHALL BE THE OWNER'S ENGINEER AND CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES.
3. ALL SEWER TRENCHES UNDER THE 45 DEGREE ZONE OF INFLUENCE LINE OF EXISTING OR PROPOSED PAVEMENTS, BIKE PATHS, SIDEWALKS OR DRIVE APPROACHES SHALL BE BACKFILLED WITH MDOT CLASS II SAND COMPACTED TO AT LEAST 95% OF MAXIMUM UNIT WEIGHT.
4. ALL STORM SEWER SHALL BE INSTALLED ON CLASS "B" BEDDING OR BETTER.
5. JOINTS FOR STORM SEWER SHALL BE PREMIUM JOINTS (TONGUE AND GROOVE WITH RUBBER GASKETS).
6. LEAD MATERIAL SHALL BE 4" DIA. (MIN.) PVC SCHEDULE 40 OR SDR 23.5. LEAD CONNECTIONS MAY ONLY BE AT STRUCTURES.
7. CONTACT THE TOWNSHIP ENGINEER 48 HOURS PRIOR TO STORM SEWER INSTALLATION TO SCHEDULE OBSERVATION. FULL TIME OBSERVATION IS REQUIRED FOR ALL UNDERGROUND STORM SEWER AND LEACHING SYSTEM CONSTRUCTION. CONTACT MICHAEL DARGA WITH HUBBELL, ROTH & CLARK, INC. 248-454-6532.
8. BEFORE YOU DIG CALL MISS DIG AT 1-800-482-7171.
9. ALL MORTAR AND CONCRETE WORK SHALL BE PROTECTED FROM FREEZING (40° F. AND FALLING) FOR A MINIMUM OF 48 HOURS.
10. PIPE FOR STORM SEWERS WITHIN THE PUBLIC ROAD RIGHT-OF-WAY OR PRIVATE ROAD EASEMENT SHALL BE RCP, C-76, CLASS IV OR V RCP.
11. DOUBLE WALLED HDPE MEETING THE REQUIREMENTS OF ASTM F2306.



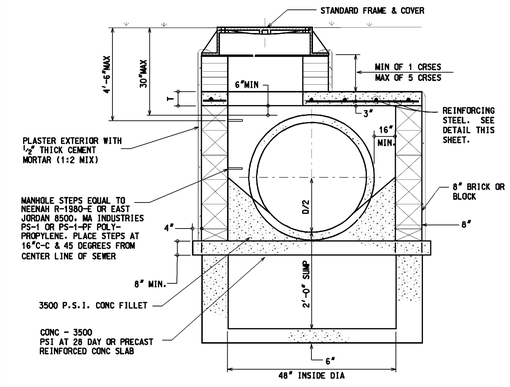
EDGE DRAIN DETAIL



NOTES:

1. LENGTH OF 6" EDGE DRAIN TO BE DETERMINED BY THE TOWNSHIP.
2. EDGE DRAIN SHALL BE INSTALLED AT ALL CATCH BASINS & INLETS WITHIN LIMITS OF PAVEMENT OF A ROADWAY. 20' (MIN.) IN EACH DIRECTION.

6" EDGE DRAIN

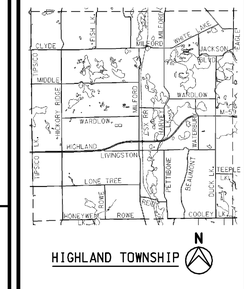


LOW-HEAD STORM
SEWER STRUCTURE

HRC
Hubbell, Roth & Clark, Inc.
CONSULTING ENGINEERS
105 W. GRAND RIVER AVE.
HOWELL, MICHIGAN 48843
PHONE: (248) 454-6300
DIRECT PHONE: (517) 552-9199
FAX: (517) 552-6099
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
DESIGNED	M.P.D.
DRAWN	T.E.W.
CHECKED	J.B.
APPROVED	G.E.H.

V:\20050\20050368\C\dstormsewersht1_V8.dgn

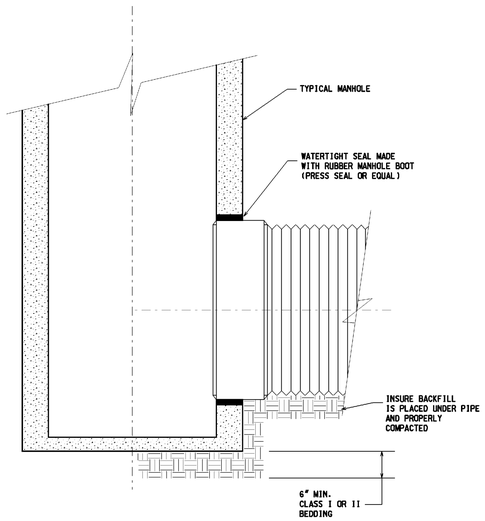


HIGHLAND TOWNSHIP

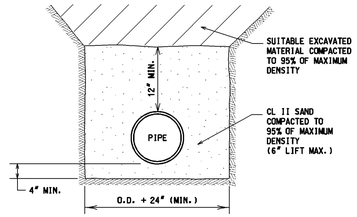
HIGHLAND TOWNSHIP DESIGN STANDARDS

STORM SEWER DETAILS

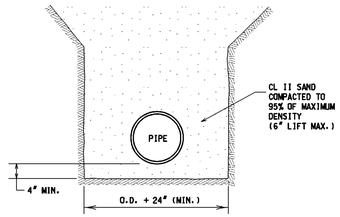
HRC JOB NO.	SCALE
20050368	NONE
DATE	SHEET NO.
SEPTEMBER 2005	1 OF 2



WATERTIGHT MANHOLE CONNECTION HDPE TO CONCRETE DETAIL

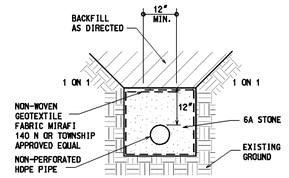


BEDDING DETAIL – TRENCH B

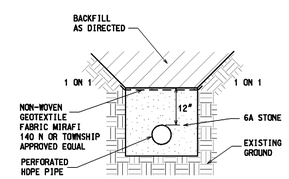


BEDDING DETAIL – TRENCH A

(REQUIRED FOR INSTALLATION UNDER PAVEMENT OR WITHIN THE INFLUENCE OF ROAD BED.)



HDPE PIPE TRENCH DETAIL FOR DETENTION SYSTEMS WITHOUT GROUNDWATER RECHARGE



HDPE PIPE TRENCH DETAIL FOR DETENTION/RETENTION SYSTEMS WITH GROUNDWATER RECHARGE

NOTES:

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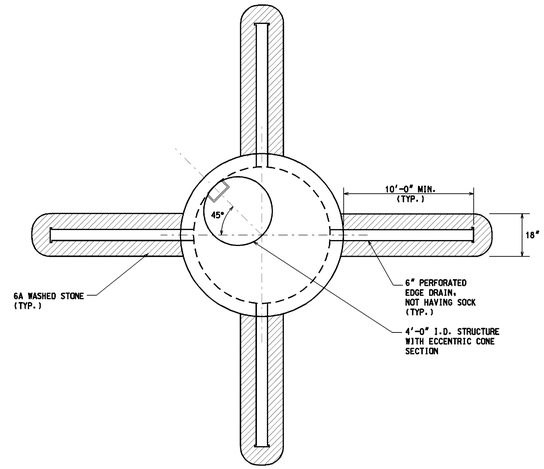
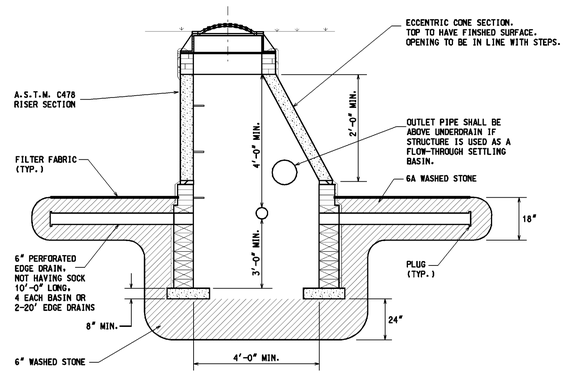
11. DOUBLE WALLED HDPE MEETING THE REQUIREMENTS OF ASTM F2306.

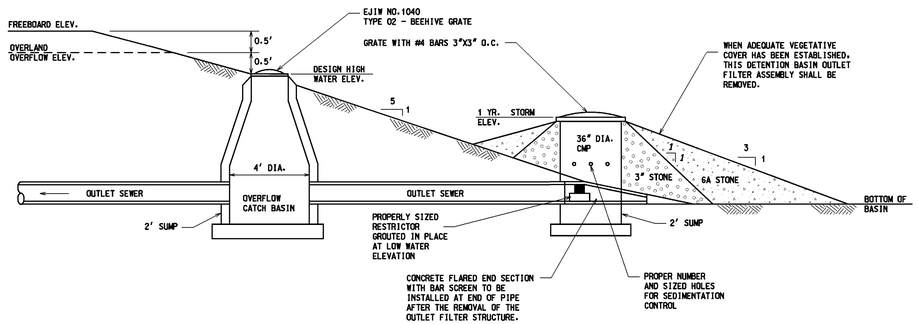


PLAN VIEW



SECTION

STANDARD LEACHING BASIN

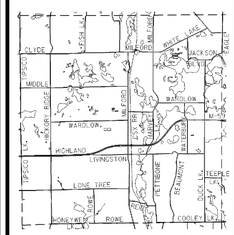


DETENTION POND OUTLET STRUCTURE DETAIL

HRC
Hubbell, Roth & Clark, Inc.
CONSULTING ENGINEERS
105 W. GRAND RIVER AVE.
HOWELL, MICHIGAN 48843
PHONE: (248) 454-6300
DIRECT PHONE: (517) 552-9199
FAX: (517) 552-6099
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
DESIGNED	M.P.D.
DRAWN	T.E.W.
CHECKED	J.B.
APPROVED	G.E.H.

V:\20050\20050368\C\dstormsewersht2_V8.dgn

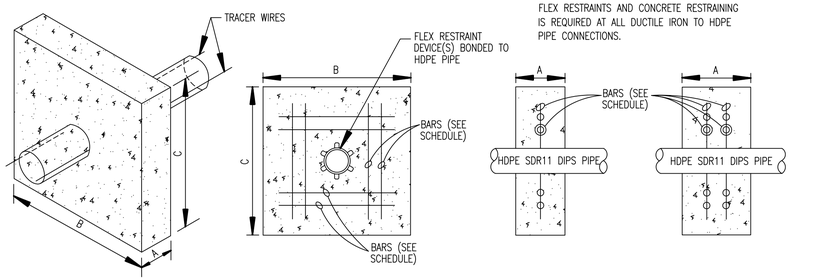


HIGHLAND TOWNSHIP

HIGHLAND TOWNSHIP DESIGN STANDARDS

STORM SEWER DETAILS

HRC JOB NO.	SCALE
20050368	NONE
DATE	SHEET NO.
SEPTEMBER 2005	2 OF 2

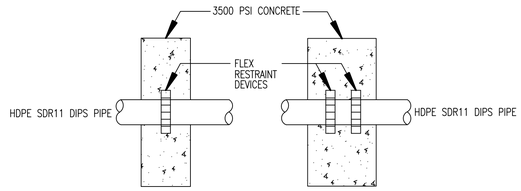


RESTRAINING BLOCK DIMENSIONS

SINGLE FACE RESTEEL Ⓢ DOUBLE FACE RESTEEL Ⓓ

HDPE RESTRAINING RESTEEL

NOT TO SCALE

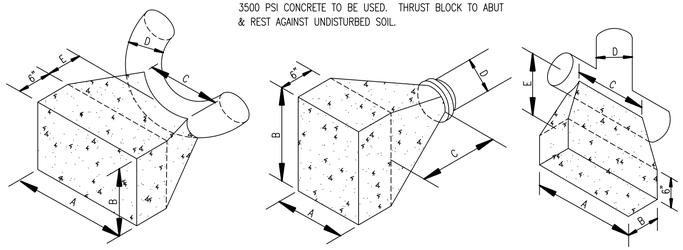


SINGLE Ⓢ DOUBLE Ⓓ

HDPE RESTRAINING BLOCK RESTRAINTS

NOT TO SCALE

NOTE:
3500 PSI CONCRETE TO BE USED. THRUST BLOCK TO ABUT & REST AGAINST UNDISTURBED SOIL.



FOR 90° BENDS OR SMALLER

D	A	B	C	E MIN
20"	8'	6.5'	3.5'	2.5'
16"	6'	4'	2.5'	2'
12"	4'	3'	2'	1.75'
10"	3'	3'	2'	1.75'
8"	3'	2'	2'	1.5'
6"	2'	1.5'	2'	1.25'

FOR PLUGS

D	A	B	C MIN
20"	7'	5'	2.5"
16"	4.8'	4.8'	2"
12"	4.3'	3'	1.75"
10"	3'	2'	1.5
8"	2.8'	2.5'	1.5"
6"	1.5'	1.5'	0.25'

FOR TEES

D	A	B	C	E MIN
20"	6.5'	4.5'	3.5'	3'
16"	4.7'	4.7'	2.5'	2.75'
12"	4'	3'	2.5'	2.5'
10"	3'	2'	2'	2.25'
8"	2.7'	2'	2'	2.25'
6"	2'	2'	2'	2.25'

HDPE THRUST BLOCK DETAILS

NOT TO SCALE

HDPE SDR11 DIPS RESTRAINING BLOCK SCHEDULE

HDPE SDR11 DIPS SIZE	A	B	C	EFFECTIVE AREA	# RESTRAINTS	REINFORCING
4"	1 FT	2 FT	2 FT	4.0 S.F.	1	4 #6 Ⓢ
6"	1 FT	3 FT	3 FT	9.0 S.F.	2	4 #6 Ⓢ
8"	1 FT	3.75 FT	3.75 FT	14.0 S.F.	2	4 #6 Ⓢ
10"	1 FT	4.75 FT	4.75 FT	22.6 S.F.	3	8 #4 Ⓢ
12"	1.5 FT	5.5 FT	5.5 FT	30.3 S.F.	4	8 #6 Ⓢ
14"	1.5 FT	6.33 FT	6.33 FT	40.0 S.F.	5	8 #6 Ⓢ
16"	2 FT	7.25 FT	7.25 FT	52.6 S.F.	6	16 #6 Ⓓ
18"	2 FT	8.1 FT	8.1 FT	65.6 S.F.	7	16 #6 Ⓓ
20"	2 FT	9 FT	9 FT	81.0 S.F.	9	16 #6 Ⓓ
24"	2 FT	10.75 FT	10.75 FT	115.6 S.F.	14 Ⓓ	16 #6 Ⓓ
30"	2.5 FT	13.25 FT	13.25 FT	175.6 S.F.	19 Ⓓ	16 #6 Ⓓ
36"	2.5 FT	15.9 FT	15.9 FT	252.8 S.F.	28 Ⓓ	16 #6 Ⓓ

1. Restraining blocks shall have a minimum of 3.0' of cover.
2. Restraining block dimensions "B" and "C" may be changed due to depth of cover limitations provided the effective area is maintained.

HDPE Watermain Notes

1. All HDPE watermain shall be D.I.P.S. SDR 11 manufactured from a PE 4710 resin. HDPE pipe shall be marked with a permanently co-extruded blue stripe.
2. All HDPE fittings shall be manufactured from a PE 4710 resin.
3. All HDPE water services shall be SDR 9.
4. Electrofusion equipment shall be calibrated and certified per the pipe manufacturer's requirements.
5. Concrete restraining blocks and thrust blocks shall be constructed of minimum 3,500 p.s.i. concrete.
6. All HDPE piping shall be installed with two tracer/locator wires insulated with high molecular weight polyethylene (HMWPE) specifically for use in direct burial applications.
7. Tracer wires shall be 6-gauge solid or stranded annealed or hard copper per UL83 (Thermoplastic Insulated Wires and Cables) and ASTM requirements including ASTM B1 (Standard Specification for Hard-Drawn Copper Wire), B3 (Standard Specification for Soft or Annealed Copper Wire), and B8 (Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft).
8. Tracer wire shall be insulated. Insulation shall be for 600-volt applications and shall be a minimum of 45 mils thick. The minimum thickness at any point shall not be less than 90% of the specified average thickness in compliance with UL 83, The tracer wire shall have the UL 83 specification shall be clearly marked on the wire insulation. The insulation shall be colored blue for watermain applications.
9. Two tracer wires shall be attached to the watermain pipe at five foot intervals or as approved by the Engineer. Attachment to pipe shall be made with plastic cable ties or equivalent. The use of tape is not approved. Tracer wires shall be checked for continuity prior to placing the watermain into service
10. HDPE pipe transitions to ductile iron pipe shall be performed using fused-on mechanical joint adapters or flange adapters. Mega-lugs or Mega-lugs combined with internal pipe stiffeners are not approved.
11. Hydrostatic testing shall be per AWWA standards (ASTM F2164). Testing shall be performed after the initial expansion phase and after the system has stabilized. Testing pressure shall be 150 p.s.i. held for 2 hours.

HDPE Watermain Allowable Losses for 2 Hour Test Period

Pipe Dia.	Pipe Length		Allowable Water Loss Per Ft.		Total Loss Allowed
3"	___	x	0.15	=	_____
4"	___	x	0.25	=	_____
6"	___	x	0.60	=	_____
8"	___	x	1.00	=	_____
10"	___	x	1.30	=	_____
12"	___	x	2.30	=	_____
14"	___	x	2.80	=	_____
16"	___	x	3.30	=	_____
18"	___	x	4.30	=	_____
20"	___	x	5.50	=	_____
24"	___	x	8.90	=	_____

HDPE WATER MAIN
STANDARD DETAILS

REVISION BLOCK
Data Source / Source Date: N/A

Rev. No.:	Rev. By:	Rev. Date:	Description:
1	KB	02/14/18	MARKUPS PER G. APPEL
2			
3			
4			

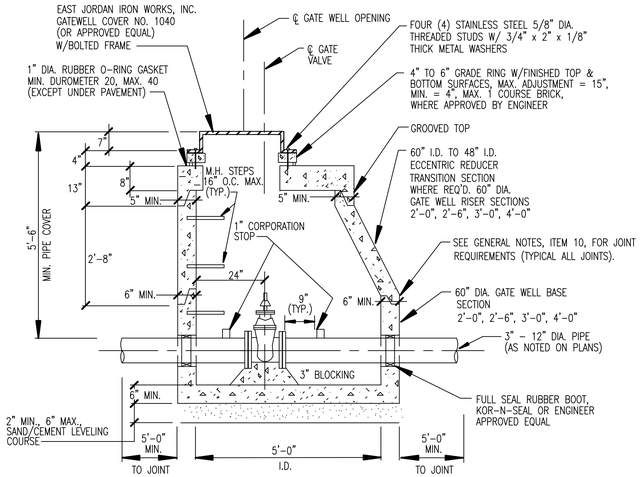
ORIG. DATE: 01/01/01
SCALE: NONE
DESIGNED BY: OCDC
DRAWN BY: OCDC Mapping

WRC WATER RESOURCES COMMISSIONER
Jim Nash

ONE PUBLIC WORKS DRIVE, BLDG 95 WEST
WATERFORD, MICHIGAN
48328-1907

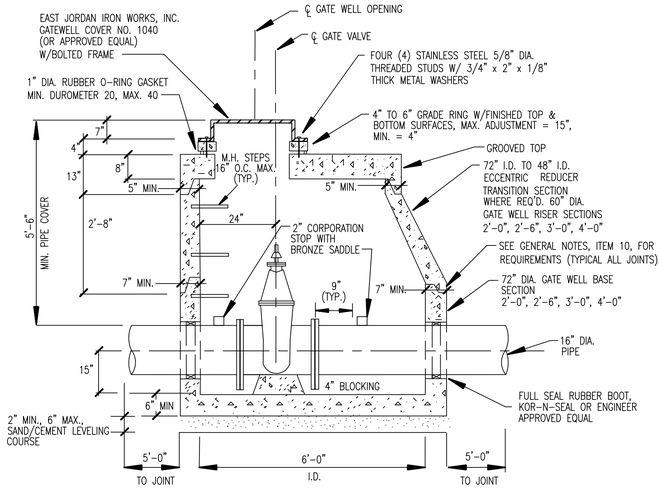
SHEET NO.: 4 OF 5

GATE VALVE & WELL DETAILS



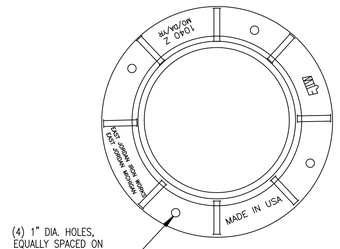
3" THRU 12" GATE WELL

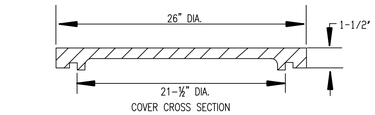
SCALE 1"= 2'



16" GATE WELL

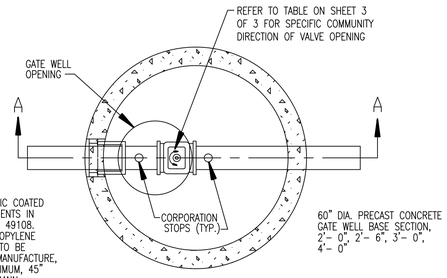
SCALE 1"= 2'





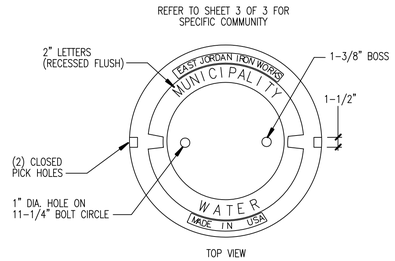
FRAME

NO SCALE



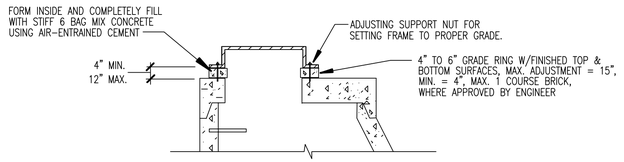
PLAN GATE WELL TYPICAL

SCALE 1"= 2'



LETTERING LAYOUT FOR GATEWELL COVERS

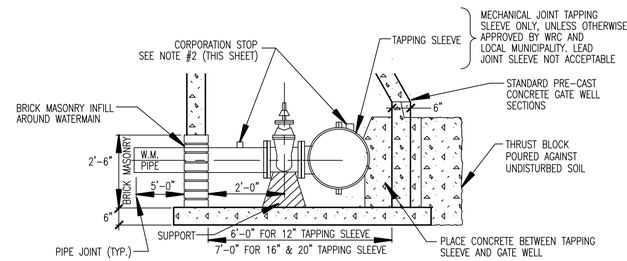
SCALE 1"= 6'



GATE WELL TOPS WITHIN PAVEMENT AREAS

SCALE 1"= 2'

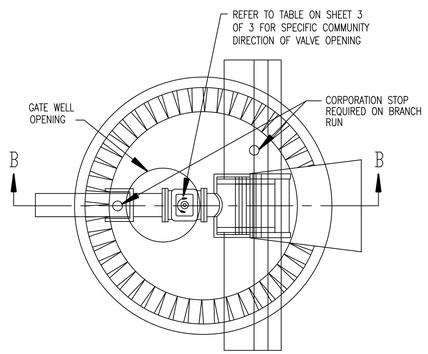
RUBBER O'RINGS SHALL
NOT BE USED IN PAVEMENT



20" x 12", 20" x 8", 16" x 12", 16" x 8", 12" x 8" TAPPING SLEEVE, VALVE & WELL

SCALE 1"= 2'

NOTES:
1. REFER TO NOTE 7 OF "VALVE AND SLEEVE NOTES" ON SHEET 3 OF 3.
2. FOR PIPE SMALLER THAN 16" USE 1" CORPORATION STOP, FOR 16" PIPE OR LARGER USE 2" CORPORATION STOP WITH BRONZE SADDLE.
3. REFER TO NOTE 11 OF "GENERAL NOTES" ON SHEET 3 OF 3.
4. WRC DOES NOT RECOMMEND SIZE ON SIZE TAPPING.



PLAN TAPPING SLEEVE VALVE & WELL (TYPICAL)

SCALE 1"= 2'

WATER MAIN STANDARD DETAILS

REVISION BLOCK

Data Source / Source Date: N/A

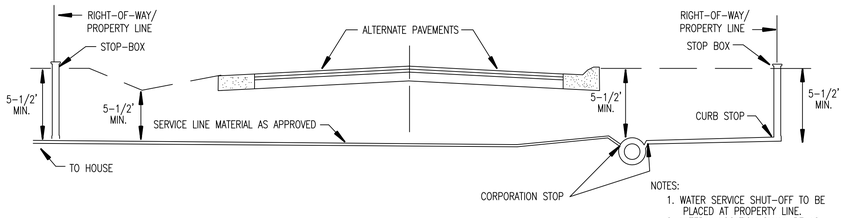
Rev. No.:	Rev. By:	Rev. Date:	Description:
1	DS	03/15/13	UPDATE TITLEBLOCK AND ARROWS
2	DS	07/08/14	PROPOSED REVISIONS
3	DS	11/21/14	PROPOSED CHANGE TO DELETE HOLES FROM GATEWELL COVERS
4	KB	03/19/18	MARKUPS PER G. APPEL

ORIG. DATE:	01/01/01
SCALE:	NONE
DESIGNED BY:	WRC
DRAWN BY:	WRC Mapping

WRC WATER RESOURCES COMMISSIONER
Jim Nash

ONE PUBLIC WORKS DRIVE, BLDG 95 WEST
WATERFORD, MICHIGAN
48328-1907

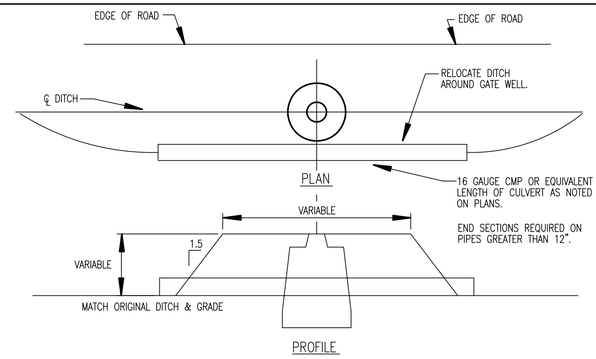
SHEET NO.: 1 of 5



NOTES:
1. WATER SERVICE SHUT-OFF TO BE PLACED AT PROPERTY LINE.
2. LATERAL LOCATION SHALL BE AS REQUESTED BY THE ABUTTING PROPERTY OWNER.

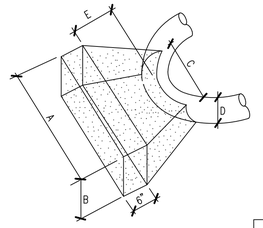
TYPICAL PUBLIC ROAD WATER SERVICE CONNECTION

NO SCALE



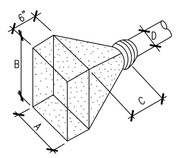
DITCH ENCLOSURE AT GATE WELL

NO SCALE



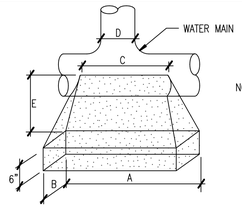
FOR 90° BENDS OR SMALLER

D	A	B	C	E MIN.
20"	8'	6.5'	3.5'	2.5'
16"	6'	4'	2.5'	2'
12"	4'	3'	2'	1.75'
10"	3'	3'	2'	1.75'
8"	3'	2'	2'	1.5'
6"	2'	1.5'	2'	1.25'



FOR PLUGS

D	A	B	C MIN.
20"	7'	5'	2.5'
16"	4'-10"	4'-10"	2'
12"	4'-4"	3'	1'-9"
10"	3'	2'	1'-6"
8"	2'-10"	2'-6"	1'-6"
6"	1'-6"	1'-6"	3"

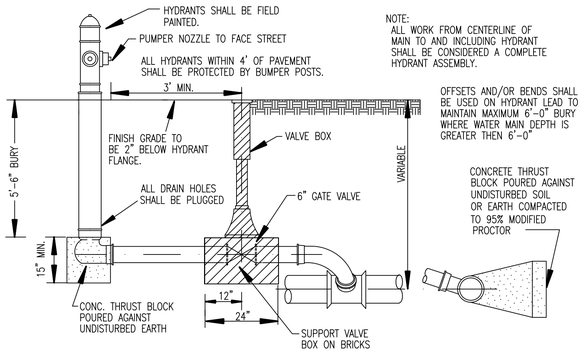


NOTE:
3000 PSI CONCRETE TO BE USED. THRUST BLOCK TO ABUT & REST AGAINST UNDISTURBED SOIL OR EARTH COMPACTED TO 95% MODIFIED PROCTER.

FOR TEES

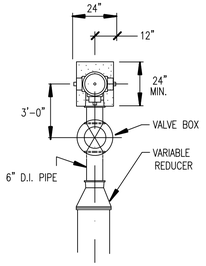
D	A	B	C	E MIN.
20"	6.5'	4.5'	3.5'	3'
16"	4'-8"	4'-8"	2.5'	2.75'
12"	4'	3'	2.5'	2.5'
10"	3'	2'	2'	2.25'
8"	2'-6"	2'	2'	2.25'
6"	2'	2'	2'	2.25'

THRUST BLOCK DETAILS



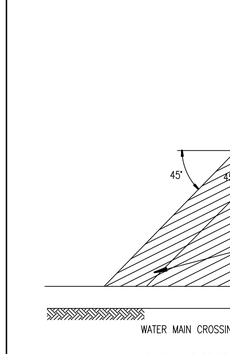
SECTION 6" HYDRANT SIDE OUTLET

SCALE 1"= 2'



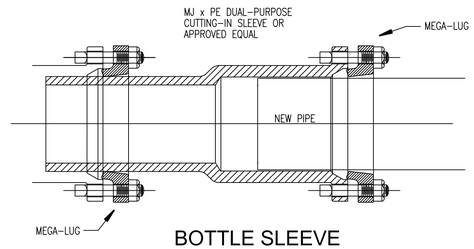
PLAN 6" HYDRANT WATER MAIN END

SCALE 1" = 1'

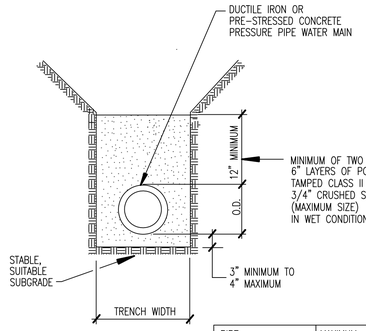


MINIMUM BACKFILL UNDER OR NEAR PAVEMENT

SCALE 1"= 6'



BOTTLE SLEEVE

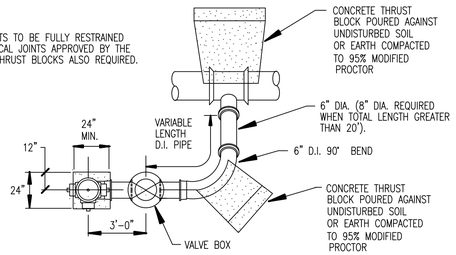


PIPE INTERNAL DIAMETER	MAXIMUM TRENCH WIDTH
LESS THAN 18"	30"
18" TO 24"	PIPE O.D. PLUS 18"
GREATER THAN 24"	PIPE O.D. PLUS 24"

STANDARD BEDDING FOR WATER MAIN

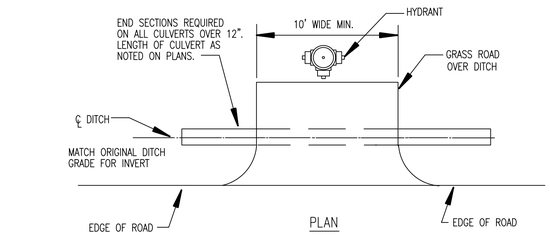
SCALE 1" = 4'

NOTE:
ALL HYDRANTS TO BE FULLY RESTRAINED BY MECHANICAL JOINTS APPROVED BY THE ENGINEER. THRUST BLOCKS ALSO REQUIRED.



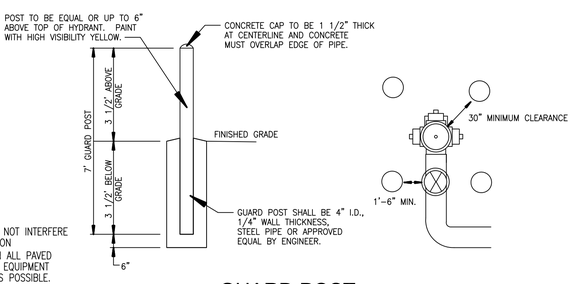
PLAN 6" HYDRANT SIDE OUTLET

SCALE 1" = 1'



DITCH ENCLOSURE AT HYDRANT

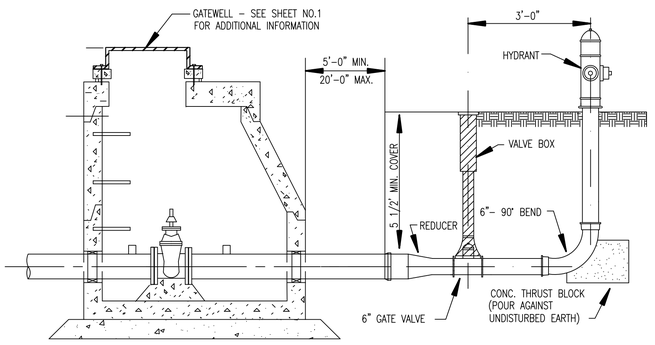
NO SCALE



NOTES:
1. GUARD POST SHALL NOT INTERFERE WITH HYDRANT OPERATION
2. TO BE INSTALLED IN ALL PAVED AREAS WHERE VEHICLE EQUIPMENT DAMAGE TO HYDRANT IS POSSIBLE.

GUARD POST

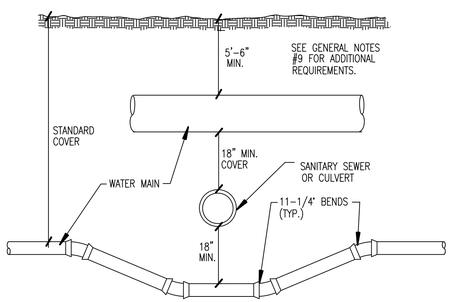
SCALE 1"= 3'



DEAD END BLOWOFF CONNECTION

SCALE 1" = 1'

HYDRANT & BLOWOFF DETAILS



SEWER OR CULVERT CROSSING

SCALE 1"= 2'

WATER MAIN STANDARD DETAILS

REVISION BLOCK			
Data Source / Source Date: N/A			
Rev. No.:	Rev. By:	Rev. Date:	Description:
1	DS	07/08/14	PROPOSED REVISIONS
2	DS	11/21/14	PROPOSED CHANGE TO DELETE REFERENCE TO BOTTLE SLEEVE MANUFACTURER
3	DL	03/23/15	FINAL CHANGE TO DELETE REFERENCE TO BOTTLE SLEEVE MANUFACTURER
4	KB	02/14/18	MARKUPS PER G. APPEL

ORIG. DATE:	01/01/01
SCALE:	NONE
DESIGNED BY:	WRC
DRAWN BY:	WRC Mapping

WRC WATER RESOURCES COMMISSIONER Jim Nash

ONE PUBLIC WORKS DRIVE, BLDG 95 WEST
WATERFORD, MICHIGAN
48328-1907

SHEET NO.: 2 of 5

Abbreviations

A

AFF	ABOVE FINISHED FLOOR
ARF	ABOVE REFERENCE FLOOR
ACCT	ACCENT
AP	ACCESS PANEL
AC	ACOUSTICAL
ACT	ACOUSTICAL TILE (OR ACTIVE)
ADD	ADDENDUM
ADDL	ADDITIONAL
ADJ	ADJACENT
AGG	AGGREGATE
A/C	AIR CONDITIONING
ALT	ALTERNATE OR ALTERNATIVE
AL_ALUM	ALUMINUM
ANCH	ANCHOR, ANCHORAGE
AB	ANCHOR BOLT
ANOD	ANODIZED
ARCH	ARCHITECT(URAL)
ASPH	ASPHALT
AUTO	AUTOMATIC

B

B.F.	BARRIER FREE
BP BP_L	BASE PLATE OR BEARING P_L
BRG	BEARING
BM	BENCH MARK OR BEAM
BETW	BETWEEN
BIT	BITUMINOUS
BLKG	BLOCKING
BD	BOARD
BS	BOTH SIDES
BOT	BOTTOM
BC	BOTTOM OF CURB
BRK	BRICK
BLDG	BUILDING
BL_L	BUILDING LINE

C

CABT	CABINET
CR	CARD READER
CPT	CARPET(ED)
CES	CARPET EDGE STRIP
CI	CAST IRON
CIP	CAST-IN-PLACE
CB	CATCH BASIN
CLG	CEILING
CEM	CEMENT
C TO C	CENTER TO CENTER
CM	CENTIMETER(S)
C°	DEGREES CENTIGRADE
CER	CERAMIC
CT	CERAMIC TILE
CHAN	CHANNEL
CHEK PL	CHECKERED PLATE
CL	CLEAR(ANCE)
CLOS	CLOSET
CO	CLEAN OUT
CHK	COAT HOOK
CW	COLD WATER
COL	COLUMN
COMB	COMBINATION
COMP	COMPRESS(ED),(ION),(IBLE)
CONCE	CONCEALED
CONC	CONCRETE
CMU	CONCRETE MASONRY UNIT (CONCRETE BLOCK)
CONN	CONNECTION
CONST	CONSTRUCTION
CONST JT	CONSTRUCTION JOINT
CONT	CONTINUOUS OR CONTINUE
CONTR	CONTRACT(OR)
CJ	CONTROL JOINT
CORR	CORRUGATED OR CORRIDOR
CTR	CENTER
CTSK	COUNTERSUNK
CF	CUBIC FOOT
CY	CUBIC YARD
CYL	CYLINDER

D

DPR	DAMPER
DP	DAMPROOFING
DL	DEAD LOAD
DET	DETAIL
DIAG	DIAGONAL
∅	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
D/W	DISHWASHER
DO	DOOR OPENING
DN	DOWN
DT	DRAIN TILE
DWG	DRAWING
DF	DRINKING FOUNTAIN

E

EA	EACH
EF	EACH FACE
EW	EACH WAY
E	EAST
ELEC	ELECTRIC(AL)
EWC	ELECTRIC WATER COOLER
EL	ELEVATION
ELEV	ELEVATOR
EMER	EMERGENCY
ENC	ENCLOS(E), (URE)
EP	EPOXY
EQ	EQUAL
EQUIP	EQUIPMENT
ESC	ESCALATOR
EPDM	ETHYLENE PROPYLENE DIENE MONOMERS
EXH	EXHAUST
EB	EXPANSION BOLT
EJ	EXPANSION JOINT
EXP CONST	EXPOSED CONSTRUCTION
EXT	EXTERIOR
ETR	EXISTING TO REMAIN

F

FWP	FABRIC WRAPPED PANEL
FB	FACE BRICK
FOC	FACE OF CONCRETE
FF	FACTORY FINISH
FS	FAR SIDE
F°	DEGREES FAHRENHEIT
FT	FEET/FOOT
FIN	FINISH(ED)
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FVC	FIRE VALVE CABINET
FLD	FIELD
FHS	FIRE HOSE STATION
FPR	FIRE PROOFING
FL	FLOOR(ING)
FD	FLOOR DRAIN
FLUOR	FLUORESCENT
FTG	FOOTING
FDN	FOUNDATION
FA	FRESH AIR
FSRS	FULLY- ADHERED SHEET ROOFING SYSTEM
FURR	FURR(ED), (ING)

G

GA	GAGE, GAUGE
GAL	GALLON
GALV	GALVANIZED
GL	GLASS, GLAZING
GR	GRADE, GRADING
g	GRAM
GRD	GROUND
GYP	GYPSUM
GYP L	GYPSUM LATH
GP	GYPSUM PLASTER
GWB	GYPSUM WALL BOARD

H

HDCP	HANDICAP(PED)
HDBD	HARDBOARD
HDWE	HARDWARE
HWD	HARDWOOD
HTG	HEATING
H&V	HEATING & VENTILATING
HVAC	HEATING/VENTILATION/ AIR CONDITIONING
HT	HEIGHT
H	HIGH
HP	HIGH POINT
HS	HIGH STRENGTH
HC	HOLLOW CORE
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HORSE POWER
HB	HOSE BIBB
HW	HOT WATER
HWH	HOT WATER HEATER
HR	HOUR

I

IN(")	INCHES)
INCL	INCLUDE(D), (ING)
INFO	INFORMATION
ID	INSIDE DIMENSION
INSUL	INSULATE(D), (ION)
ICA	INTEGRAL COLOR ANODIZED
INT	INTERIOR/INTERNAL
INTERM	INTERMEDIATE
INV	INVERT
IRR	IRRIGATION

J

JC	JANITOR'S CLOSET
JT	JOINT
JST	JOIST
JB	JUNCTION BOX

K

kg	KILOGRAMS
KV	KILOVOLT
KVA	KILOVOLT/AMPERE
KW	KILOWATT(S)
KWH	KILOWATT-HOUR
kg/m	KILOGRAM PER METER
kg/cm^2	KILOGRAM PER SQUARE CENTIMETER
K	KIPS
KSI	KIPS PER SQUARE INCH
KIT	KITCHEN
KO	KNOCKOUT

L

LAB	LABORATORY
LAM	LAMINATE(D)
LAV	LAVATORY
LCC	LEAD COATED COPPER
LH	LEFT HAND
LHR	LEFT HAND REVERSE
L	LENGTH
LT	LIGHT
LTG	LIGHTING
LP	LIGHTING PANEL
LIN	LINEAR, LINEAL
LSWD	LINEAR SUSPENDED WOOD CEILING
LL	LIVE LOAD
LG	LONG
LLBB	LONG LEGS BACK TO BACK
LLH	LONG LEG HORIZONTAL
LLO	LONG LEG OUTSTANDING
LLV	LONG LEG VERTICAL
LOC	LOCATE/LOCATION
L.P.	LOW POINT
LV	LOW VOLTAGE

M

MAG	MAGNETIC
MH	MANHOLE
MFR	MANUFACTURE(R)
MAR	MARBLE
MAR T.	MARBLE THRESHOLD
MKB	MARKER BOARD
MAS	MASONRY
MD	MASONRY OPENING
MAT	MATERIAL(S)
MAX	MAXIMUM
MECH	MECHANICAL
MC	MEDICINE CABINET
MED	MEDIUM
MEM	MEMBER
MEMB	MEMBRANE
MET	METAL
MDS	METAL DIVIDER STRIP
ML	METAL LATH
MET T.	METAL THRESHOLD
MEZZ	MEZZANINE
mm	MILLIMETER(S)
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MISC	MISCELLANEOUS IRON
MON.	MONITOR(ED)
MCC	MOTOR CONTROL CENTER
MTD	MOUNTED(), (ING)
MULL	MULLION

N

NAT	NATURAL
NCA	NATURAL COLOR ANODIZED
NEG	NEGATIVE
NRC	NOISE REDUCTION COEFFICIENT
NONCOMB	NONCOMBUSTIBLE
NOM	NOMINAL
N	NORTH
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO (#)	NUMBER

O

OFF	OFFICE
O/C	ON CENTER(S)
OPG	OPENING
OPP	OPPOSITE
OPP HD	OPPOSITE HAND
ORIG	ORIGINAL
Oz	OUNCE
OS	OUTSIDE
OA	OUTSIDE AIR
OD	OUTSIDE DIAMETER
OH	OVERHEAD

P

PH	PHYSICALLY HANDICAPPED
PT	PAINT(ED) (OR POINT)
PR	PAIR
PNL	PANEL
PTD	PAPER TOWEL DISPENSER
PTD/R	PAPER TOWEL DISPENSER & RECEPTACLE COMBINATION
PKG	PARKING
PBD	PARTICLE BOARD
PARTN	PARTITION
PE	PASSENGER ELEVATOR
PERM	PERMANENT
PLAS	PLASTER
PL	PLASTIC LAMINATE
P_L	PLATE
PLBG	PLUMBING
PLWD	PLYWOOD
POL	POLISHED
PVC	POLYVINYL CHLORIDE
#/#	POUND(S)
PCF	POUNDS PER CUBIC FOOT
PPF	POUNDS PER FOOT
PLF	POUNDS PER LINEAL FOOT
PSF	POUNDS PER SQUARE FOOT
PC	PRECAST CONCRETE
PRE-FAB	PREFABRICATE(D)

Q

QT	QUARRY TILE
QB	QUARRY TILE BASE
QTR	QUARTER

R

RAD	RADIUS, RADIATOR, RADIATION
RC	RAINWATER CONDUCTOR
RECVG	RECEIVING
REC	RECESS(ED)
REF	REFERENCE
REFL	REFLECT(ED), (IVE), (OR)
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCE(D), (ING)
REQD	REQUIRED
RESIL	RESILIENT
RT	RESILIENT TILE
RA	RETURN AIR
REV	REVISION(S), REVISED
RH	RIGHT HAND
RHR	RIGHT HAND REVERSE
ROW	RIGHT OF WAY
R	RISER
Rd	ROAD

R (CONT.)

RD	ROOF DRAIN
RS	ROOF SUMP
RFG	ROOFING
RM	ROOM
RO	ROUGH OPENING
RUB	RUBBER
RB	RUBBER BASE (OR RESILIENT BASE)

S

SAN	SANITARY
SND	SANITARY NAPKIN DISPENSER
SNWR	SANITARY NAPKIN WASTE RECEPTACLE
SCH	SCHEDULE
SJ	SCORED JOINT
S.CONC	SEALED CONCRETE
SEAL	SEALER
SECT	SECTION
SS	SERVICE SINK
SHT	SHEET
SLD	SHORT LEG OUTSTANDING
SIM	SIMILAR
SK	SINK
SB	SOIL BORING
STC	SOUND TRANSMISSION CLASS
S	SOUTH
SPC	SPACER, SPACING
SPK	SPEAKER
SPEC(S)	SPECIFICATION(S)
SPEC'D	SPECIFIED
SQ	SQUARE
cm^2	SQUARE CENTIMETER
SF	SQUARE FOOT (OR STOREFRONT) (OR SPORTS FLOORING)
STAG	STAGGERED
SST	STAINLESS STEEL
STD	STANDARD
STA	STATION
STL	STEEL
STN	STONE
STOR	STORAGE
SD	STORM DRAIN
ST	STREET
STRUCT	STRUCTURAL
SA	SUPPLY AIR
SUPP	SUPPORTS
SUSP	SUSPENDED
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRY(ICAL)

T

TKB	TACKBOARD
TP	TANGENT POINT
TEL	TELEPHONE
TV	TELEVISION
TEMP	TEMPERATURE, TEMPERED
TERR	TERRAZZO
TT	TERRAZZO TILE
THERM	THERMOSTAT
THK	THICK(NESS)
THRES	THRESHOLD
THRU	THROUGH/THOUGHOUT
TOIL	TOILET
TPH	TOILET PAPER HOLDER
TOL	TOLERANCE
T&G	TONGUE AND GROOVE
T&B	TOP & BOTTOM
TE	TOP ELEVATION
TOC	TOP OF CONCRETE
TC	TOP OF CURB
TOS	TOP OF STEEL
TWC	TOWEL & WASTE CABINET
TRAN	TRANSFORMER
T	TREAD
TYP	TYPICAL

U

UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UR	URINAL

V

VA	VALVE
VB	VAPOR BARRIER
VR	VAPOR RETARDER
VAR	VARNISH
VERT	VERTICAL
VEST	VESTIBULE
VIN	VINYL
VCT	VINYL COMPOSITION TILE
VT	VINYL TILE
VWC	VINYL WALL COVERING
VIT	VITREOUS
VRS	VINYL RESILIENT STRIP

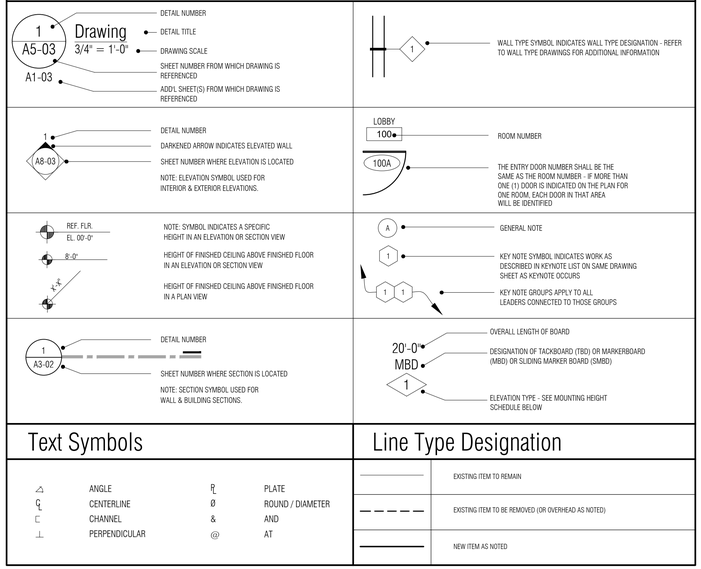
W

WAIN	WAINSCOT
WHYD	WALL HYDRANT
WH	WATER HEATER
WC	WATER CLOSET
WM	WATER MAIN
WP	WATERPROOFING
WR	WATER RESISTANT
WS	WATERSTOP
WT	WEIGHT
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
W	WIDTH, WIDE, WEST
W/	WITH
W/O	WITHOUT
WD	WOOD

Y

YD	YARD

Graphic Symbols



Text Symbols

△	ANGLE	P_L	PLATE
$\mathbb{C}_L$	CENTERLINE	Ø	ROUND / DIAMETER
⊏	CHANNEL	&	AND
⊥	PERPENDICULAR	@	AT

Line Type Designation

———	EXISTING ITEM TO REMAIN
– – – –	EXISTING ITEM TO BE REMOVED (OR OVERHEAD AS NOTED)
———	NEW ITEM AS NOTED

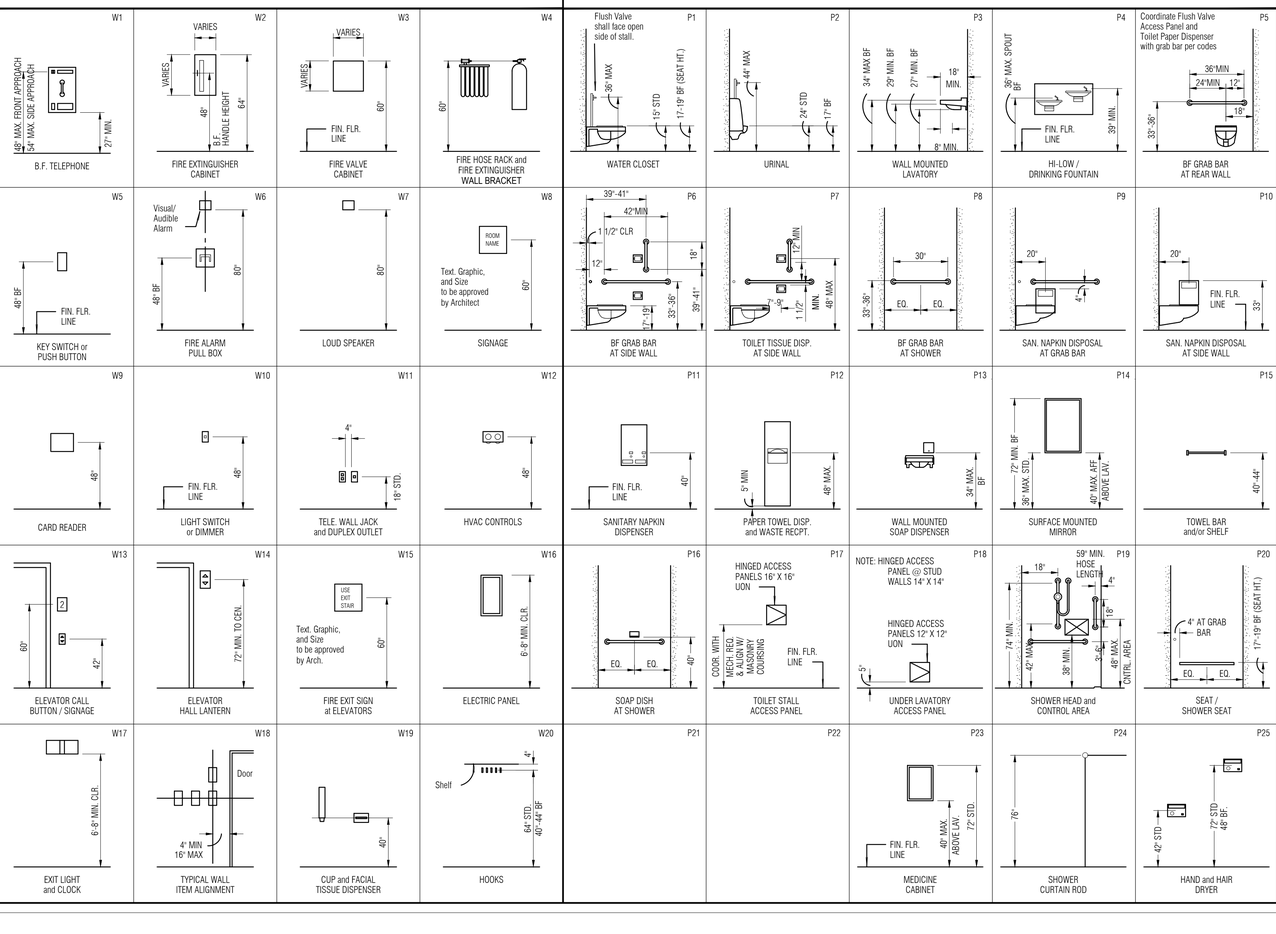
Material Poche Indications

CONCRETE (SECTION)	GYPSUM WALL BOARD	WOOD/SOLID SPECIES (FINISH MATERIAL) (NOTE MATERIAL)
CONC., STONE, PLASTER (ELEVATION) (NOTE MATERIAL)	PLASTER GYPSUM/ CEMENTITIOUS ON METAL LATH (NOTE MATERIAL)	WOOD (CONTINUOUS BOCKING)
STONE (MARBLE, STONE) (GRANITE, ETC.) (SECTION/ELEVATION) (NOTE MATERIAL)	INSULATION ACOUSTIC/THERMAL (NOTE TYPE) RIGID /SEMI-RIGID	SHIM MATERIAL (WOOD, METAL, ETC.) (NOTE MATERIAL)
GRAVEL/STONE (GRANULAR MATERIAL)	JOINT FILLER	PLYWOOD / PARTICLE BOARD (VENEER FINISH) (NOTE MATERIAL)
SAND/GRAVEL (SUB-BASE MATERIAL)	C.M.U. / MASONRY BLOCK (CONCRETE BLOCK) SOLID BLOCK OR BLOCK GROUTED SOLID IF SO NOTED	CARPET
	BRICK	INSULATION ACOUSTIC/THERMAL (NOTE TYPE) BATT OR BLANKET
	STEEL/COPPER, METAL, ALUMINUM, ETC. (NOTE MATERIAL)	

Mounting Height Schedule

NOTE:
- NOT ALL HEIGHTS SHOWN ARE TYPICAL FOR ALL ITEMS WHERE THEY OCCUR
- UNLESS SPECIFICALLY NOTED OTHERWISE ON DRAWINGS, (B.F. DENOTES BARRIER FREE REQUIREMENTS)
- NOT ALL ITEMS SHOWN ON THIS DRAWING MAY OCCUR ON THIS PROJECT

WALL MOUNTED ACCESSORIES



PLUMBING FIXTURES and TOILET ACCESSORIES

NOT FOR CONSTRUCTION

PARTNERS

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding / Construction 08/27/2020

DRAWN BY

AR

CHECKED BY

AM / JV

APPROVED BY

DWG

SHEET NAME

GENERAL INFORMATION

SHEET NO.

A0-01

BUILDING CODE INFORMATION

GOVERNING CODES:

2015 MICHIGAN BUILDING CODE (MBC)
2015 MICHIGAN MECHANICAL CODE (MMC)
2015 MICHIGAN PLUMBING CODE (MPC)
2015 MICHIGAN ENERGY CODE (MEC)
2017 NATIONAL ELECTRICAL CODE w/ AMENDMENTS (NEC)
2009 ICC / ANSI A 117.1

MICHIGAN BUILDING CODE SUMMARY:

CHAPTER 3: USE AND OCCUPANCY CLASSIFICATION

NON-SEPARATED MIXED USE OCCUPANCY:

[304.1] BUSINESS GROUP B
[310.5] RESIDENTIAL GROUP R-3
[311.3] LOW HAZARD STORAGE GROUP S-2

CHAPTER 4: SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

GROUP R-3 (SECTION 420):

[420.1] WALLS SEPARATING SLEEPING UNITS IN THE SAME BUILDING AND WALLS SEPARATING SLEEPING UNITS FROM OTHER OCCUPANCIES CONTIGUOUS TO THEM IN THE SAME BUILDING SHALL BE CONSTRUCTED AS FIRE PARTITIONS IN ACCORDANCE WITH SECTION 708.
[420.3] HORIZONTAL SEPARATION. FLOOR ASSEMBLIES SEPARATING DWELLING UNITS IN THE SAME BUILDINGS, FLOOR ASSEMBLIES SEPARATING SLEEPING UNITS IN THE SAME BUILDING AND FLOOR ASSEMBLIES SEPARATING DWELLING OR SLEEPING UNITS FROM OTHER OCCUPANCIES CONTIGUOUS TO THEM IN THE SAME BUILDING SHALL BE CONSTRUCTED AS HORIZONTAL ASSEMBLIES IN ACCORDANCE WITH SECTION 711.
[420.5] OCCUPANCIES SHALL BE EQUIPPED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH SECTION 903.2.8.
[420.6] FIRE ALARM SYSTEMS AND SMOKE ALARMS SHALL BE PROVIDED IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF CHAPTER 9.

CHAPTER 5 - GENERAL BUILDING HEIGHTS AND AREAS

[508.3.1] NON-SEPARATED OCCUPANCIES SHALL BE CLASSIFIED INDIVIDUALLY IN ACCORDANCE WITH SECTION 302.1, AND THE REQUIREMENTS OF THIS CODE SHALL APPLY TO EACH PORTION OF THE BUILDING BASED ON THE CLASSIFICATION OF THE SPACE. THE MOST RESTRICTIVE PROVISIONS OF CHAPTER 9 SHALL APPLY TO THE TOTAL NON-SEPARATED AREA.

ALLOWABLE BUILDING HEIGHT AND AREA: (USING THE MOST RESTRICTIVE REQUIREMENTS IN ALL CASES)

[TABLE 504.3] ALLOWABLE BUILDING HEIGHT: 60'-0" (ACTUAL: 42'-7")
[TABLE 504.4] ALLOWABLE STORIES: 3 (ACTUAL: 2)

[506.2] ALLOWABLE AREA: 36,000 SF
ACTUAL: 7600 MAIN LEVEL + 2250 LOWER LEVEL = 9,850 SF GROSS

CHAPTER 6 - TYPES OF CONSTRUCTION

[602.5] TYPE V-B

[TABLE 601] FIRE RESISTANCE RATING REQUIREMENTS:
NO BUILDING ELEMENTS REQUIRE FIRE RESISTANCE RATED CONSTRUCTION

CHAPTER 7: FIRE AND SMOKE PROTECTION FEATURES

[705.1] FIRE RATED EXTERIOR WALLS: NOT REQUIRED
[706.1] FIRE WALLS: NOT REQUIRED
[707.1] FIRE BARRIERS: NOT REQUIRED

[708.1] FIRE PARTITIONS: REQUIRED AND PROVIDED PER SECTION 708.3
EXCEPTION #2: SLEEPING UNITS SHALL BE SEPARATED BY FIRE RESISTANCE RATINGS OF AT LEAST 1/2 HOUR WHERE EQUIPPED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM.

[709.1] SMOKE BARRIERS: NOT REQUIRED
[710.1] SMOKE PARTITIONS: NOT REQUIRED

CHAPTER 8: INTERIOR FINISHES

[TABLE 803.11] INTERIOR WALL/CEILING FINISHES (SPRINKLERED BUILDING)
INTERIOR EXIT STAIRWAYS, RAMPS, AND PASSAGEWAYS: CLASS B
EXIT ACCESS STAIRWAYS, RAMPS, AND PASSAGEWAYS: CLASS C
ROOMS AND ENCLOSED SPACES: CLASS C

CHAPTER 9: FIRE PROTECTION SYSTEMS

[903.2.8] AN AUTOMATIC SPRINKLER SYSTEM SHALL BE PROVIDED THROUGHOUT THE BUILDING IN ACCORDANCE WITH SECTION 903.3 (NFPA 13)

[903.3.1.1.1] EXCEPTION #4: AN AUTOMATIC SPRINKLER SYSTEM SHALL NOT BE REQUIRED IN UNOCCUPIED ROOMS OR AREAS THAT ARE OF NON-COMBUSTIBLE CONSTRUCTION WITH WHOLLY NON-COMBUSTIBLE CONTENTS. (ATTIC)

[906] PORTABLE FIRE EXTINGUISHERS LOCATIONS:
WITHIN 30'-0" OF COMMERCIAL COOKING EQUIPMENT
SPECIAL HAZARD AREAS (APPARATUS BAY)
WHERE REQUIRED BY THE INTERNATIONAL FIRE CODE, MAXIMUM TRAVEL DISTANCE - 75'-0"

[907.2.11.2] SINGLE OR MULTIPLE-STATION SMOKE ALARMS SHALL BE INSTALLED IN ALL OF THE FOLLOWING LOCATIONS IN GROUP R-3: ON THE CEILING OR WALL OUTSIDE OF EACH SEPARATE SLEEPING AREA, IN EACH ROOM USED FOR SLEEPING, AND IN EACH STORY WITHIN THE DWELLING UNIT.

[907.2.11.3] SMOKE ALARMS SHALL NOT BE INSTALLED WITHIN 20'-0" OF A PERMANENT COOKING APPLIANCE.

[907.2.11.4] SMOKE ALARMS SHALL BE INSTALLED NOT LESS THAN 3'-0" FROM THE DOOR OF A BATHROOM CONTAINING A BATHTUB OR SHOWER.

[907.2.11.7] SMOKE DETECTORS LISTED IN ACCORDANCE WITH UL 268 AND PROVIDED AS PART OF THE BUILDING FIRE ALARM SYSTEM SHALL BE AN ACCEPTABLE ALTERNATIVE TO SINGLE AND MULTIPLE STATION SMOKE ALARMS. THE FIRE ALARM SYSTEM SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS IN SECTION 907 AND ACTIVATION OF A SMOKE DETECTOR IN A DWELLING UNIT OR SLEEPING UNIT SHALL INITIATE ALARM NOTIFICATION IN THE DWELLING UNIT OR SLEEPING UNIT IN ACCORDANCE WITH SECTION 907.5.2

[915.1.2] CARBON MONOXIDE DETECTION SHALL BE PROVIDED IN SLEEPING UNITS AND DWELLING UNITS SERVED BY A FUEL BURNING APPLIANCE OR FURNACE, AND SHALL BE LOCATED WITHIN THE IMMEDIATE VICINITY OF THE BEDROOMS.

CHAPTER 10: MEANS OF EGRESS

[TABLE 1004.1.2] MAXIMUM FLOOR AREA ALLOWANCE PER OCCUPANT:

Business - 430 SF / 100 SF PER PERSON = 5 OCCUPANTS
Residential - 2390 SF / 200 SF PER PERSON = 12 OCCUPANTS
Storage - 7,030 SF / 300 SF PER PERSON = 24 OCCUPANTS
Basement - 2,030 SF / 300 SF PER PERSON = 7 OCCUPANTS

GRAND TOTAL NUMBER OF OCCUPANTS: 48 PERSONS

[TABLE 1006.2.1] SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY:
MAX COMMON PATH OF EGRESS TRAVEL DISTANCE (SPRINKLERED) = 100'-0"

[TABLE 1006.3.1] MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS/STORY:
FIRST FLOOR - 1-500 OCCUPANTS = 2 EXITS REQUIRED, 4 PROVIDED

[1006.3.2] SINGLE EXITS. A SINGLE EXIT OR ACCESS TO A SINGLE EXIT SHALL BE PERMITTED FROM ANY STORY OR OCCUPIED ROOF WHERE ONE OF THE FOLLOWING CONDITIONS EXIST:
[1006.3.2.1] THE OCCUPANT LOAD AND COMMON PATH OF EGRESS TRAVEL DISTANCE DOES NOT EXCEED THE VALUES IN TABLE 1006.3.2(1) OR 1006.3.2(2)
[1006.3.22] ROOMS, AREAS AND SPACES COMPLYING WITH SECTION 1006.2.1 WITH EXITS THAT DISCHARGE DIRECTLY TO THE EXTERIOR AT THE LEVEL OF DISCHARGE, ARE PERMITTED TO HAVE ONE EXIT OR ACCESS TO A SINGLE EXIT.

[1016.2.2] EGRESS THROUGH INTERVENING SPACES SHALL BE ALLOWED WHERE THE ADJOINING ROOMS OR AREAS ARE ACCESSORY TO ONE ANOTHER, AND PROVIDE A DISCERNABLE PATH OF EGRESS TRAVEL TO AN EXIT.

[1016.2.5] EXCEPTION #1: MEANS OF EGRESS ARE NOT PROHIBITED THROUGH A KITCHEN AREA SERVING ADJOINING ROOMS CONSTITUTING PART OF THE DWELLING UNIT OR SLEEPING UNIT.

[TABLE 1017.2] EXIT ACCESS TRAVEL DISTANCE (SPRINKLERED): 250'-0" MAXIMUM (MOST RESTRICTIVE)

[1017.3.1] EXIT ACCESS STAIRWAYS AND RAMPS SHALL BE INCLUDED IN THE EXIT ACCESS TRAVEL DISTANCE MEASUREMENT.

[1019.2] EXIT ACCESS STAIRWAYS AND RAMPS THAT SERVE FLOOR LEVELS WITHIN A SINGLE STORY ARE NOT REQUIRED TO BE ENCLOSED.

[TABLE 1020.2] MINIMUM CORRIDOR WIDTHS: 44" MINIMUM

CHAPTER 11: ACCESSIBILITY

[1103.2.15] MILITARY, FIRE SERVICE, AND POLICE FACILITIES:
HOUSING, BATHING, TOILET, TRAINING, AND STORAGE AREAS INTENDED FOR USE AND OCCUPANCY EXCLUSIVELY BY PERSONNEL REQUIRED TO BE PHYSICALLY AGILE ARE NOT REQUIRED TO BE ACCESSIBLE.

[1104.1] SITE ARRIVAL POINTS:
MINIMUM (1) ACCESSIBLE ROUTE WITHIN SITE TO AN ACCESSIBLE ENTRANCE - (1) PROVIDED

[1105.1] PUBLIC ENTRANCES:
MINIMUM OF 60% OF ALL PUBLIC ENTRANCES TO BE ACCESSIBLE (100% ACCESSIBLE)

[1105.2] [TABLE 1106.1] ACCESSIBLE PARKING SPACES: (2) REQUIRED - (2) PROVIDED

2015 MICHIGAN MECHANICAL CODE:

[505.1] DOMESTIC KITCHEN EXHAUST SYSTEMS SHALL DISCHARGE TO THE OUTDOORS THROUGH AIR TIGHT SHEET METAL DUCTS EQUIPPED WITH BACKDRAFT DAMPERS AND SHALL BE INDEPENDENT OF ALL OTHER EXHAUST SYSTEMS.

[717.5.4] EXCEPTION #3: FIRE DAMPERS ARE NOT REQUIRED AT FIRE PARTITION PENETRATIONS WHERE THE DUCT SYSTEM IS CONSTRUCTED OF APPROVED MATERIALS, AND COMPLIES WITH THE REQUIREMENTS OF THIS SECTION.

PLUMBING FIXTURE CALCULATION (PER 2015 MICHIGAN PLUMBING CODE - TABLE 403.1)

REFER TO OCCUPANT LOAD CALCULATIONS ABOVE FOR TOTAL BUILDING OCCUPANT LOADS (PER 2015 MBC TABLE 1004.1.2)

TOTAL BUILDING OCCUPANT LOAD = 48 PERSONS

PER SECTION 403.2: SEPARATE FACILITIES NOT REQUIRED FOR PRIVATE FACILITIES

PER SECTION 403.3: PUBLIC ACCESS AREA <300 SF - PUBLIC TOILET FACILITIES NOT REQUIRED

REFER TO CALCULATIONS BELOW FOR NUMBER OF REQUIRED PLUMBING FIXTURES

CLASSIFICATION / OCCUPANCY		WATER CLOSETS		LAVATORIES	DRINKING FOUNTAINS	SHOWER	SERVICE SINKS
		MALE	FEMALE				
R-3 / DORMITORY 12 OCCUPANTS	REQUIRED RATIO	1 / 10		1 / 10	-	1 / 8	1 TOTAL
	# REQUIRED	2		2	-	2	1
	# PROVIDED	2		2	-	2	1
B / OFFICES 5 OCCUPANTS	REQUIRED RATIO	1 /25 (<50) + 1/50 (>50)		1/40 (<80) + 1/80 (>80)	1 / 100	-	1 TOTAL
	# REQUIRED	1		1	1	-	1
	# PROVIDED	1		1	1	-	1
S-2 / APPARATUS BAY 31 OCCUPANTS	REQUIRED RATIO	1 / 100		1 / 100	1 / 1,000	-	1 TOTAL
	# REQUIRED	1		1	1	-	1
	# PROVIDED	1		1	1	1	1

CODE AND LIFE SAFETY PLAN LEGEND

GENERAL NOTE: AT ALL FIRE RATED WALL CONSTRUCTION, NEW OR OTHERWISE ALTERED BY THIS PROJECT, PROVIDE SIGNAGE ABOVE THE ADJACENT ACCESSIBLE CEILING THAT STATES: "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS." THE LETTERS ARE TO BE 1/2" HIGH MIN. AND ARE TO BE STENCILED IN PAINT DIRECTLY ONTO THE WALL. LOCATE THE SIGNS 30 FEET O.C. MAXIMUM.

CODE ANALYSIS WALL CONSTRUCTION 1:
NEW WALL CONSTRUCTION TO BE MIN. 1/2-HOUR "FIRE PARTITION"
CONSTRUCTION PER MBC SECTION 707. REFER TO UL DESIGN DETAIL W433.

OCCUPANT CAPACITY OF EGRESS COMPONENT

OCCUPANT LOAD EXITING THROUGH EGRESS COMPONENT

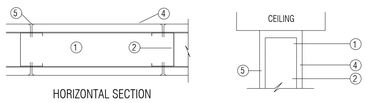
ROOM OCCUPANT LOAD

FEC PORTABLE FIRE EXTINGUISHER / SEMI-RECESSED CABINET

FE WALL MOUNTED FIRE EXTINGUISHER

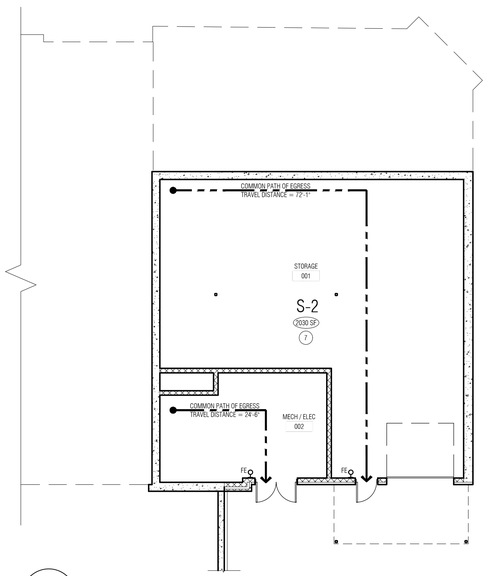
UL DESIGN DETAIL #W433

BASED ON UNDERWRITERS LABORATORIES INC. CURRENT FIRE RESISTANCE DIRECTORY DESIGN NO. W433 NONBEARING WALL RATING - 1/2 HR

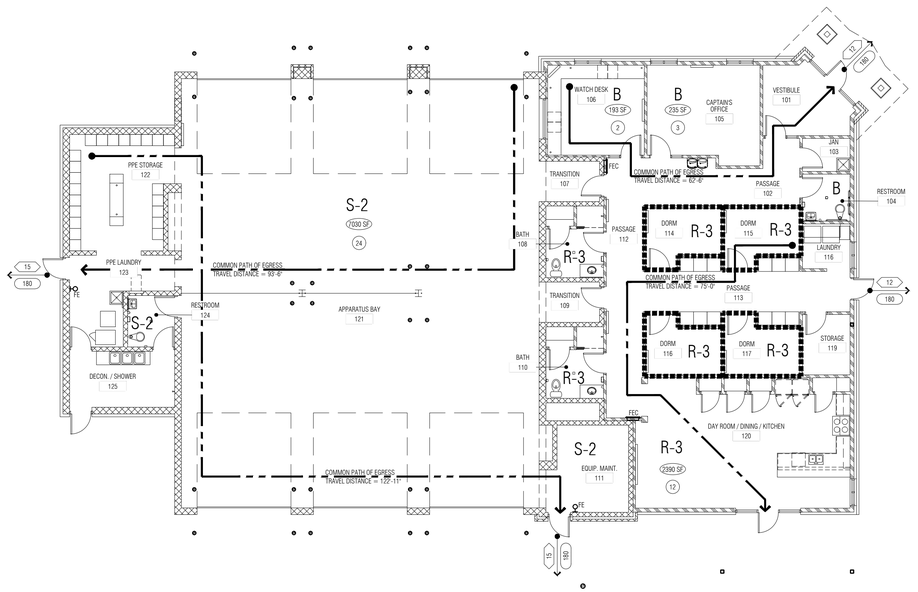


HORIZONTAL SECTION

1. Proprietary channel shaped runners, min depth to accommodate stud size , attached to floor and ceiling with fasteners 24 in. OC. max.
2. Framing Members* — Steel Studs — For the 1/2 Hour Nonbearing Wall Rating — Proprietary channel shaped studs, min. 2-1/2 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height
3. N/A
4. Gypsum Board* — 5/8 in. thick, 48 in. wide, with beveled, square, or tapered edges, applied either horizontally or vertically. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers need not be staggered.
1/2 Hour Nonbearing Rating On Steel Studs — Single layer secured to studs or resilient channels with 1 in. long Type S steel screws spaced 12 in. OC at the perimeter and in the field.
5. Joint Tape and Compound — Vinyl or casein, dry or premixed joint compound applied in two coats to joints and screw heads of outer layers. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Paper tape and joint compound may be omitted when gypsum panels are supplied with a square edge.
6. Furring Channels — (Optional, Not Shown) — Resilient furring channels fabricated from min 25 MSG corrosion-protected steel, spaced vertically a max of 24 in. OC. Flange portion attached to each intersecting stud with 1/2 in. long Type S-12 steel screws for steel studs and 1-1/4 in. long Type S or Type W screws for wood studs.



2 Lower Level Code and Life Safety Plan
3/32" = 1'-0"



1 Main Floor Code and Life Safety Plan
3/32" = 1'-0"

NOT FOR CONSTRUCTION

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KEY PLAN

OWNER
Highland Township Fire Department

PROJECT NAME
Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS
Bidding / Construction 08/27/2020

DRAWN BY
NR

CHECKED BY
AM / JV

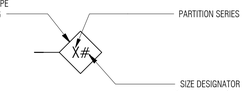
APPROVED BY
DWG

SHEET NAME
LIFE SAFETY CODE INFORMATION

SHEET NO.
A0-02

GENERAL NOTES:

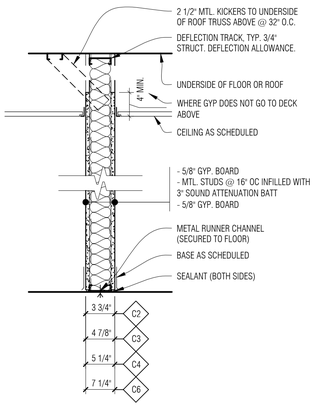
1. "WALL" AND "PARTITION" ARE USED TO DENOTE EITHER WALLS OR PARTITIONS AND ARE USED INTERCHANGEABLY
2. REFER TO STRUCTURAL FOR ALL REQUIRED REINFORCING AND FOR WALL CONNECTIONS TO FLOORS AND ROOFS
3. AT FIRE RATED WALLS FILL ALL VOIDS, PENETRATIONS ETC. AND SEAL - REFER TO DRAWING A0-02 LIFE SAFETY PLANS & CODE INFORMATION FOR ALL PARTITION FIRE RATINGS
4. WHERE A WALL RUNS PARALLEL TO THE DIRECTION OF A ROOF TRUSS AND DOES NOT ALIGN UNDERNEATH A TRUSS - PROVIDE MTL. STUD BRIDGING BETWEEN THE ROOF TRUSSES @ 48" O.C. MAX. TO ATTACH TO
5. REFER TO ROOM FINISH SCHEDULE FOR WALL FINISHES AND WAL BASE
6. PARTITION TYPE GRAPHIC TAG



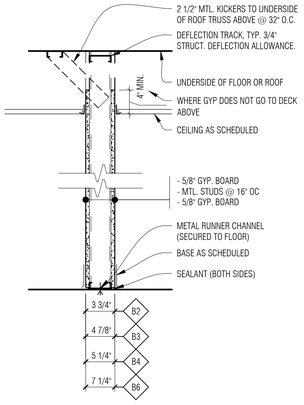
MATERIAL	DESIGNATION SIZE	ACTUAL SIZE	SPACING
MASONRY	4 6 8 12	3 5/8" 5 5/8" 7 5/8" 11 5/8"	N/A
STEEL STUDS	1 2 3 4 6	1 5/8" 2 1/2" 3 5/8" 4" 6"	16" OC
FURRING	0 1 2 3	7/8" 1 5/8" 2 1/2" 3 5/8"	16" OC
SHAFTWALL C-H STUDS	2 4 6	2 1/2" 4" 6"	24" OC

7. SUBSTITUTE TILE BACKING BOARD AT LOCATIONS TO RECEIVE A TILE WALL FINISH
8. ALL NON-LOAD BEARING METAL WALL FRAMING SHALL BE BASED ON TOTAL STUD HEIGHT
9. AT INTERSECTIONS OF DIS-SIMILAR PARTITION TYPES, THE HIGHEST RATED PARTITION IS TO RUN THROUGH THE INTERSECTION TO MAINTAIN ENCLOSURE
10. FIRE-RATED PARTITIONS SHALL BE CONSTRUCTED ACCORDING TO THE FIRE TEST INDICATED. NO SUBSTITUTIONS OF MATERIALS OR DEVIATIONS FROM CONSTRUCTION ARE ALLOWED. ADDITIONAL LAYERS MAY BE REQUIRED FOR ACOUSTICAL OR OTHER REASONS AND MUST BE EXECUTED AS SHOWN
11. STC RATINGS ARE MINIMUM ACOUSTICAL PERFORMANCE REQUIREMENT. SPECIFIC ACOUSTICAL TESTS ARE GIVEN FOR REFERENCE ONLY. SOUND ATTENUATION BLANKET THICKNESS SHALL BE AS FOLLOWS:
    - A. 1 1/2" FOR PARTITIONS WITH 1 5/8" AND 2 1/2" STUDS (INCLUDING SHAFTWALLS)
    - B. 3" FOR PARTITIONS WITH 3 5/8", 4" OR 6" STUDS UON
    - C. 3" FOR SHAFTWALLS WITH 4" OR 6" STUDS UON
    - D. AS REQUIRED FOR FIRE RATING
12. AT ALL FIRE RATED WALL CONSTRUCTION, PROVIDE SIGNAGE ABOVE THE ADJACENT ACCESSIBLE CEILING THAT STATES: "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS." THE LETTERS ARE TO BE 3" HIGH MIN. AND ARE TO BE STENCILED IN PAINT DIRECTLY ONTO THE WALL. LOCATE THE SIGNS 30'-0" O.C. MAXIMUM. AND NO MORE THAN 15'-0" FROM THE END OF EACH WALL. [703.7]
13. ALL TYPES MAY NOT BE USED. REFER TO DRAWINGS.

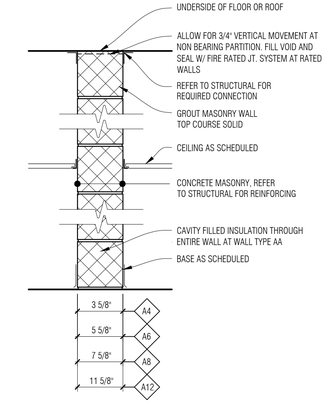
F PARTITION SERIES 'F'
1" = 1'-0"



C PARTITION SERIES 'C'
1" = 1'-0"



B PARTITION SERIES 'B'
1" = 1'-0"



A PARTITION SERIES 'A'
1" = 1'-0"

WALL TYPE 'AA': SAME AS TYPE 'A' WITH CAVITY FILLED INSULATION

Room Finish General Notes:

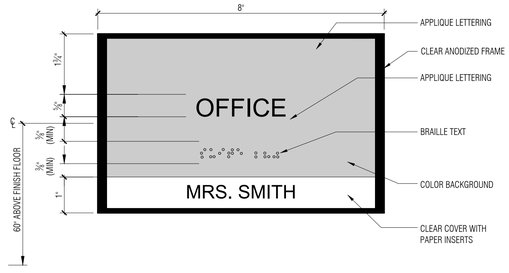
A. REFER TO SECTION 002000 MATERIAL FINISH COLOR SCHEDULE.
B. REFER TO REFLECTED CEILING PLANS, INTERIOR ELEVATIONS AND FINISH FLOOR PLANS FOR LOCATIONS OF MATERIAL/ PAINT TRANSITION.
C. PROVIDE REDUCER STRIP AT FLOOR MATERIAL TRANSITIONS AS NEEDED- REFER TO THRESHOLD DETAILS AND DOOR SCHEDULE.

Room Finish Key Notes:

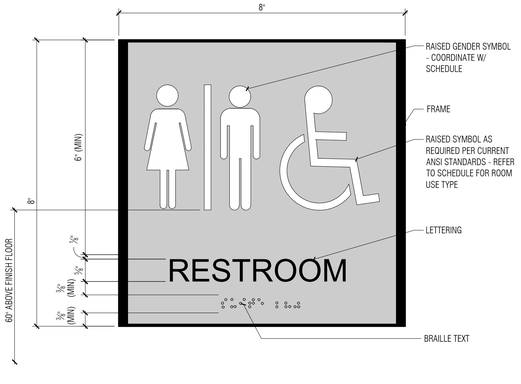
1. REFER TO INTERIOR ELEVATIONS FOR FINISHES.
2. REFER TO INTERIOR ELEVATIONS FOR BATHROOM WALL TILE LAYOUT & DESIGN.
3. ALTERNATE #1: EP-1 FLOOR TO BE REPLACED WITH DC-1.
4. FIRE SUPPRESSION TO BE PAINTED PNT-3.
5. EXPOSED STRUCTURE TO BE PAINTED PNT-2 - REFER TO INTERIOR ELEVATIONS.
6. ALL EXPOSED DUCTWORK AND GRILLS PAINTED TO MATCH ASSOCIATED WALLS OR CEILING.
7. SIGNAGE TYPE 'A' MOUNTED AT ROOM ENTRANCE - REFER TO DETAIL 2 AND MOUNTING HEIGHT SCHEDULE
8. SIGNAGE TYPE 'B' MOUNTED AT ROOM ENTRANCE - REFER TO DETAIL 3 AND MOUNTING HEIGHT SCHEDULE

Room Finish Legend:

AF	ATHLETIC FLOORING
ACT	ACOUSTIC TILE AND GRID SYSTEM
ARS	ARCHITECTURAL ROOF SHINGLES
CONC	CONCRETE
CHPL	CONDUCTIVE LAMINATED FLOOR TILE
CPT	CARPET
CT	CERAMIC TILE
EIFS	EXTERIOR INSULATION FINISHING SYSTEM
EP	EPOXY FLOOR FINISH
EP PNT	EPOXY PAINT
EXP CONST	EXPOSED CONSTRUCTION
ERW	EPOXY RESIN WORK SURFACE
FB	FACE BRICK
FWAP	FABRIC WRAPPED ACOUSTICAL PANELS
GYP	GYPSUM BOARD
GMU	GLAZED MASONRY UNITS
HV	HOMOGENOUS VINYL
LSP	LIGHTWEIGHT STONE PANELS
LVT	LUXURY VINYL TILE
MCP	METAL CEILING PANEL
MFT	METAL FLOOR TRANSITION
PL	PLASTIC LAMINATE
PT	PORCELAIN TILE
PNT	PAINT
PWAP	PERFORATED WOOD ACOUSTICAL PANELS
RA	RUBBER ACCESSORIES
RB	RESILIENT WALL BASE
RF	RESILIENT RUBBER FLOORING
RMAT	RECESSED FLOOR MAT
SC	SEALED CONCRETE
SDT	STATIC DISSIPATING TILE
SMB	SMOOTH FINISH MASONRY BLOCK (BURNISHED)
SP	STONE VENEER PANELS
SS	SOLID SURFACING
STN	STONE
ST	STREET, STAIN
TRZ	TERRAZZO
TB	TERRAZZO WALL BASE
TP	TOILET PARTITIONS
VA	VINYL ACCESSORIES
VCT	VINYL COMPOSITION TILE
WC	WALL COVERING
WD	WOOD VENEER
WO	WALK-OFF CARPET



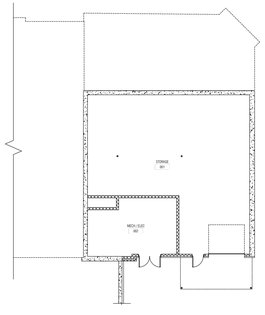
3 A0-03 Sign Type 'B'
6" = 1'-0"

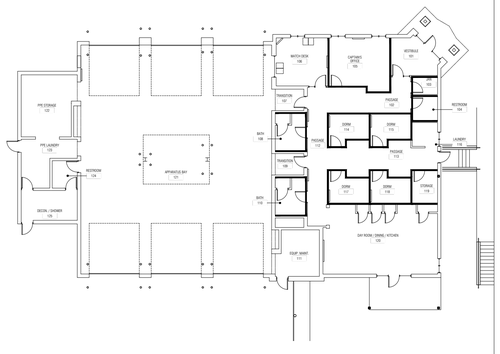


2 A0-03 Sign Type 'A'
6" = 1'-0"

Room Finish Schedule

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS NORTH	WALLS EAST	WALLS SOUTH	WALLS WEST	CEILING FINISH	ROOM FINISH KEY NOTES
LOWER LEVEL									
001	STORAGE	SC-1	NO BASE	--	--	--	--	EXP. CONST	4
002	MECH / ELEC	SC-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	EXP. CONST	4
MAIN LEVEL									
101	VESTIBULE	WO-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-2	
102	PASSAGE	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
103	JANITOR	SC-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	GYP. PNT-2	
104	RESTROOM	PT-1	PT-2	PNT -1	PNT -1 PT-2 & PT-3	PNT -1 PT-2 & PT-3	PNT -1	ACT-4	2, 7
105	CAPTAIN'S OFFICE	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	8
106	WATCH DESK	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	8
107	TRANSITION	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	GYP. PNT-2	3, 4
108	BATH	PT-1	PT-2	PNT -1 & WP-1	PNT -1 & WP-1	PNT -1 & WP-1	PNT -1 & WP-1	ACT-3 / GYP. PNT-2	2
109	TRANSITION	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	GYP. PNT-2	3, 4
110	BATH	PT-1	PT-2	PNT -1 & WP-2	PNT -1 & WP-2	PNT -1 & WP-2	PNT -1 & WP-2	ACT-3 / GYP. PNT-2	2
111	EQUIP. / MAINT.	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	GYP. PNT-2	3, 4, 5, 6
112	PASSAGE	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
113	PASSAGE	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
114	DORM	CPT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
115	DORM	CPT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
116	LAUNDRY	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
117	DORM	CPT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
118	DORM	CPT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-1	
119	STORAGE	LVT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	GYP. PNT-2	
120	DAY ROOM / DINING / KITCHEN	LVT-2 CPT-1	RB-1	PNT-1	PNT-1	PNT-1	PNT-1	ACT-2	1
121	APPARATUS BAY	EP-1	NO BASE	EP PNT-1 PNT-2	EP PNT-1 PNT-2	EP PNT-1 PNT-2	EP PNT-1 PNT-2	EXP CONST / PNT-2	1, 3, 4, 5, 6
122	PPE STORAGE	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	ACT-4	3
123	PPE LAUNDRY	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	ACT-4	3
124	RESTROOM	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	ACT-3	3
125	DECON. / SHOWER	EP-1	NO BASE	EP PNT-1	EP PNT-1	EP PNT-1	EP PNT-1	GYP. PNT-2	3, 4, 6
CLERESTORY LEVEL									
201	CLERESTORY	--	--	PNT -2 & PNT-3	PNT -2 & PNT-3	PNT -2 & PNT-3	PNT -2 & PNT-3	GYP. PNT-2	1





1 Walls to Deck Plan
1" = 20'-0"

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CONSULTANT

KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding / Construction 08/27/2020

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DWG

SHEET NAME

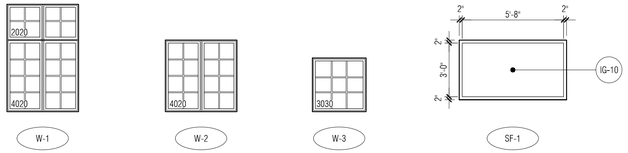
ROOM FINISH SCHEDULE & WALL TYPES

SHEET NO.
A0-03

Window Schedule

WINDOW NO.	WINDOW		DETAILS			WINDOW NOTES
	STYLE	MATERIAL	HEAD	JAMB	SILL	
W-1	CASEMENT FIXED	ALUM CLAD WD	5/A6-11	D8	3/A6-12	1, 2, 4
W-2	CASEMENT FIXED	ALUM CLAD WD	9/A6-12	9/A6-12 SIM	12/A6-10	1, 2, 3
W-3	CASEMENT FIXED	ALUM CLAD WD	4/A6-10	6/A3-22	3/A6-10	1, 2
SF-1	STOREFRONT	ALUMINUM	D5	D6	D17	

Window Types



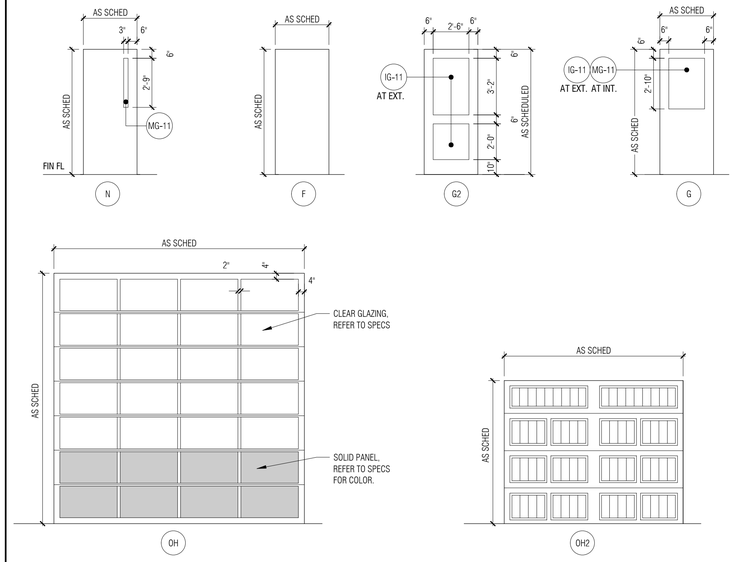
Window General Notes:

A. REFER TO SPECIFICATION FOR INTERIOR OR EXTERIOR FINISHES

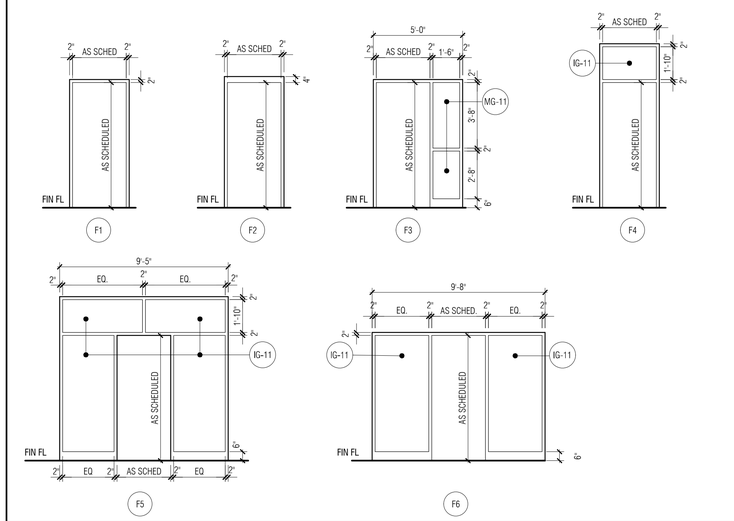
Window Key Notes:

1. REFER TO SPECIFICATIONS FOR BASIS OF DESIGN.
2. REFER TO WINDOW TYPE AND MODEL NUMBER FOR DIMENSIONS.
3. DORMER WINDOW - REFER TO ENLARGED EXTERIOR ELEVATIONS ON A5-03.
4. ALTERNATE #3: REFER TO SHEET A30-01 AT LAUNDRY 116 AND KEY NOTE #40.

Door Types



Frame Types



Door/ Openings General Notes:

A. FIELD VERIFY ALL OPENINGS PRIOR TO DOOR/FRAME FABRICATION.
B. DOOR TYPE NAMING CONVENTIONS ARE BASED ON SDI 108-18 STANDARDS WHERE APPLICABLE.
C. FIRE RATED LABEL DOORS AND FRAMES ARE LISTED IN MINUTES.
D. REFER TO 087100 DOOR HARDWARE SPEC FOR SECTION NUMBERS.
E. ALL WOOD DOORS TO BE SOLID CORE.
F. DOORS WITH THE SYMBOL "◄" ON MAIN LEVEL FLOOR PLAN A3-01 ARE TO BE PREPARED TO RECEIVE FUTURE CARD KEY ACCESS. PROVIDE CONDUIT AND PULL STRING. INDICATE LOCATION OF CONDUIT ABOVE CEILING SYSTEM. REFER TO HARDWARE SPECIFICATIONS. CARD READER PROVIDED BY OWNER.

Door/ Opening Key Notes:

1. ALTERNATE #2: DOOR 001B TO BE CHANGED TO (2) 3'-0"x7'-0" AND REVISE HARDWARE TO ACCOMMODATE DOUBLE DOOR. ADJUST STRUCTURAL HEADER AS REQUIRED FOR NEW OPENING SIZE.
2. ALTERNATE #2: DOOR 001A TO BE REMOVED WITH ALL ASSOCIATED HARDWARE AND STRUCTURAL HEADER - INFILL TO MATCH ADJACENT MATERIALS.
3. DOOR FRAME TO BE ALIGNED TO "PASSAGE" SIDE OF CMU. DOOR FRAME SHOULD ALIGN WITH END OF GYP. BD RETURN.
4. 1/2" CONDUIT FOR ELECTRIFIED HARDWARE AND ACCESS CONTROL - REFER TO ELEC. AND DOOR HARDWARE.

Door / Opening Schedule

DOOR NO.	DOOR / OPENING SIZE (W X H) CONTRACTOR TO VERIFY DOOR SIZE IF OPENING IS EXISTING)	DOOR			FRAME			DETAILS			HARDWARE SET #	LABEL (MIN.)	DOOR / OPENING KEY NOTES
		TYPE	MATERIAL	FINISH	TYPE	MATERIAL	FINISH	HEAD	JAMB	THRES. / SILL			
LOWER LEVEL													
001A	10'-0" X 8'-0"	OH2	PREMANUFAC. SECTION OVERHEAD DOOR					8/A6-10	10/A3-21	--	16.0		2
001B	3'-0" X 7'-0"	F	HM	PNT-2	F2	HM	PNT-2	D23 (SIM)	D23 (SIM)	T1	4.0		1, 4
002	(2) 3'-0" X 7'-0"	F	HM	PNT-2	F2	HM	PNT-2	D23 (SIM)	D23	T1	5.0		
MAIN LEVEL													
101	3'-0" X 7'-0"	G2	ALUM	ANOD-1	F5	ALUM	ANOD-1	D7	1, 2/A3-21	T2	2.0		
102	3'-0" X 7'-0"	F	WD	ST-1	F3	HM	PNT-2	D3	D4	T3	7.0		4
103	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T5	8.0		
104	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T7	13.0		
105	3'-0" X 7'-0"	F	WD	ST-1	F3	HM	PNT-2	D3	D4	T8	9.0		
106	3'-0" X 7'-0"	F	WD	ST-1	F3	HM	PNT-2	D3	D4	T8	9.0		
107	3'-0" X 7'-0"	G	HM	PNT-2	F1	HM	PNT-2	D5	D6	T5	6.0		3
108A	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T7	12.0		
108B	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	14.0		
109	3'-0" X 7'-0"	G	HM	PNT-2	F1	HM	PNT-2	D5	D6	T5	6.0		3
110A	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T7	12.0		
110B	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	14.0		
111	3'-0" X 7'-0"	N	FRP	--	F2	ALUM	ANOD-1	D15	D16	T1	4.0		4
113	3'-0" X 7'-0"	F	ALUM	ANOD-1	F4	ALUM	ANOD-1	D7	D8/D15	T1	3.0		4
114	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T3	11.0	20	
115	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T3	11.0	20	
117	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T3	11.0	20	
118	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	T3	11.0	20	
119	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	8.0		
120A	3'-0" X 7'-0"	G2	ALUM	ANOD-1	F6	ALUM	ANOD-1	D7	D8	T1	1.0		
120B	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	10.0		
120C	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	10.0		
120D	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	10.0		
120E	3'-0" X 7'-0"	F	WD	ST-1	F1	HM	PNT-2	D3	D4	--	10.0		
121A	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D20	--	16.0		
121B	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D20	--	16.0		
121C	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D20	--	16.0		
121D	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D18 / D20	--	16.0		
121E	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D18	--	16.0		
121F	14'-0" X 14'-0"	OH	PREMANUFAC. SECTION OVERHEAD DOOR					D19	D18 / D20	--	16.0		
123A	3'-0" X 7'-0"	F	HM	PNT-2	F2	HM	PNT-2	D1	D2	--	15.0		
123B	3'-0" X 7'-0"	N	FRP	--	F2	ALUM	ANOD-1	D9	D10	T1	3.1		4
124A	3'-0" X 7'-0"	F	HM	PNT-2	F2	HM	PNT-2	D1	D2	--	11.0		
124B	3'-0" X 7'-0"	F	HM	PNT-2	F2	HM	PNT-2	D1	D2	--	11.0		
125	3'-0" X 7'-0"	N	FRP	--	F2	ALUM	ANOD-1	D9	D10	T1	4.0		

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CONSULTANT

KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding / Construction 08/27/2020

DRAWN BY

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APPROVED BY

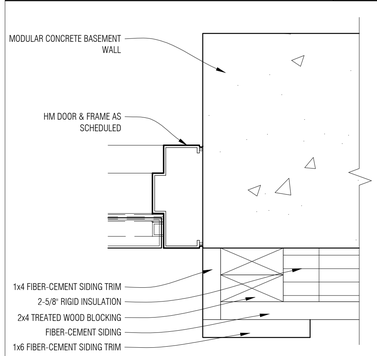
DWG

SHEET NAME

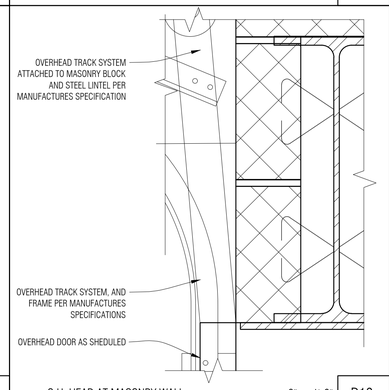
DOOR SCHEDULE & FRAME TYPES

SHEET NO.

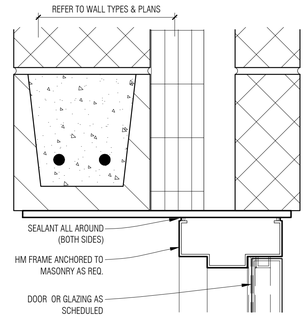
A0-04



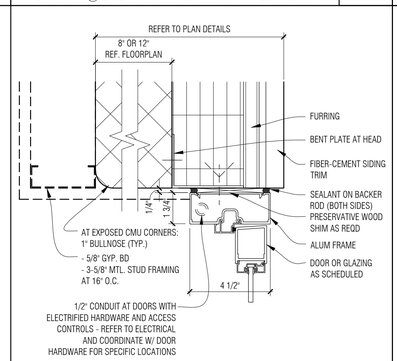
H.M. JAMB AT CONCRETE WALL — D23



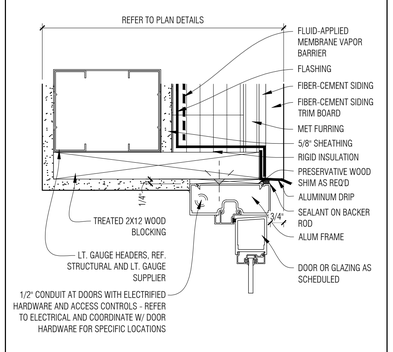
O.H. HEAD AT MASONRY WALL — 3" = 1'-0" — D19



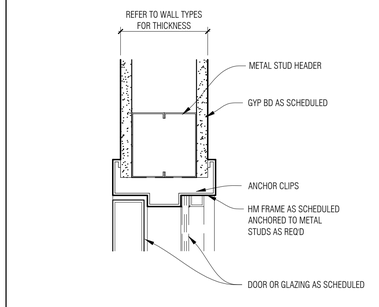
HM HEAD @ EXTERIOR MASONRY WALL — 3" = 1'-0" — D15



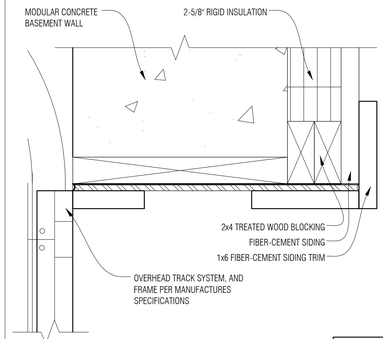
ALUM HEAD @ EXTERIOR STUD AND MASONRY WALL — 3" = 1'-0" — D11



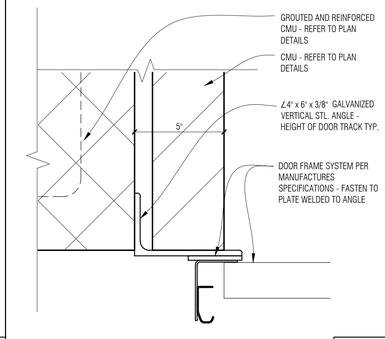
ALUM HEAD @ EXTERIOR STUD WALL — 3" = 1'-0" — D7



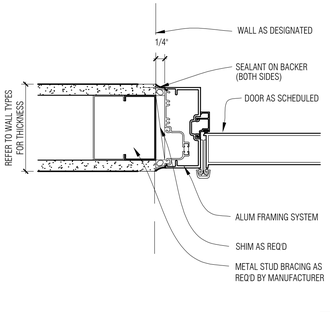
HM HEAD AT STUD WALL — 3" = 1'-0" — D3



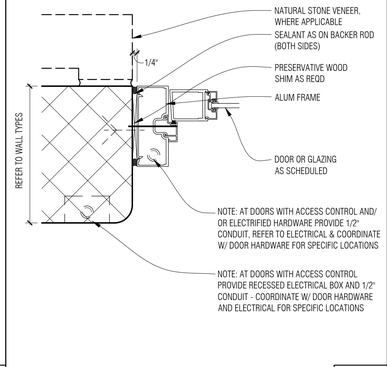
O.H. DOOR HEAD @ CONCRETE WALL — D22



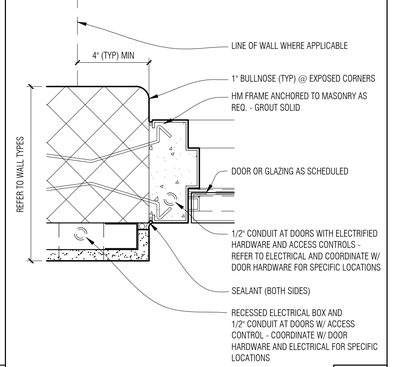
O.H. DOOR JAMB @ EXTERIOR CMU — 3" = 1'-0" — D18



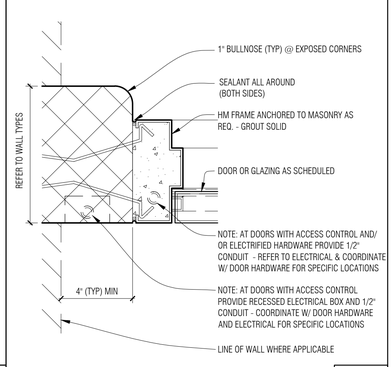
ALUM JAMB AT STUD WALL — 3" = 1'-0" — D14



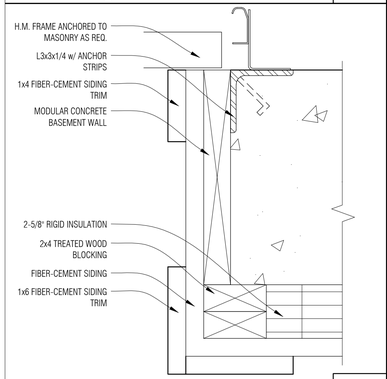
ALUM JAMB AT MASONRY WALL — 3" = 1'-0" — D10



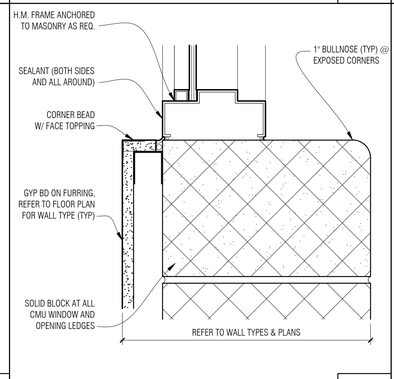
HM JAMB AT GYP BD ON MASONRY WALL — 3" = 1'-0" — D6



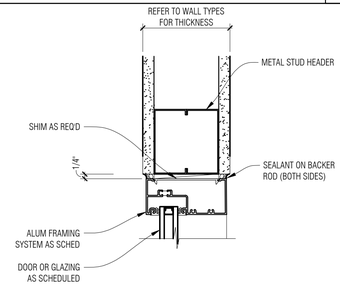
HM JAMB AT MASONRY WALL — 3" = 1'-0" — D2



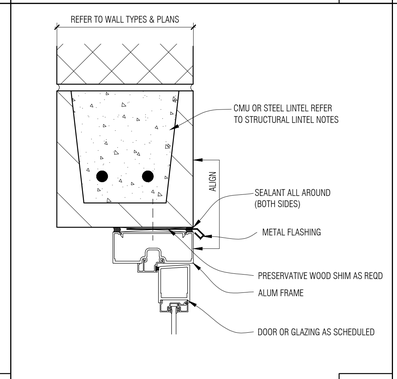
O.H. DOOR JAMB @ CONCRETE WALL — D21



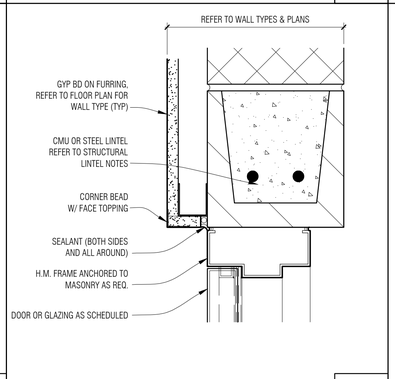
HM SILL AT GYP BD ON MASONRY WALL — 3" = 1'-0" — D17



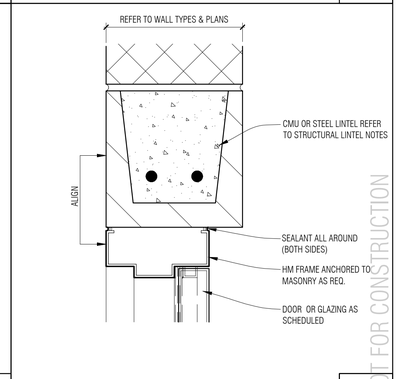
ALUM HEAD AT STUD WALL — 3" = 1'-0" — D13



ALUM HEAD AT MASONRY WALL — 3" = 1'-0" — D9



HM HEAD AT GYP BD ON MASONRY WALL — 3" = 1'-0" — D5



HM HEAD AT MASONRY WALL — 3" = 1'-0" — D1

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APPROVED BY

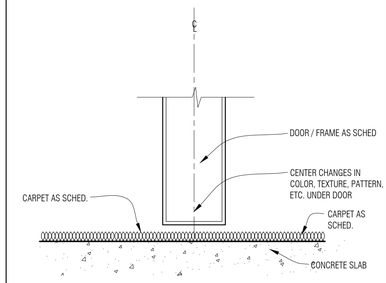
DWG

SHEET NAME

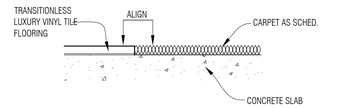
OPENING DETAILS

SHEET NO.

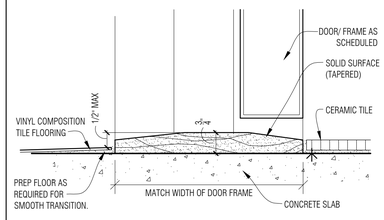
A0-13



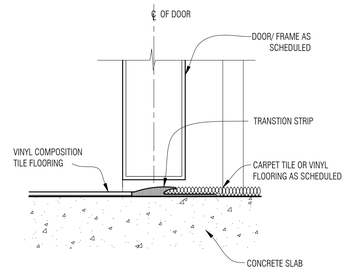
CARPET TO CARPET TRANSITION 6" = 1'-0" T8



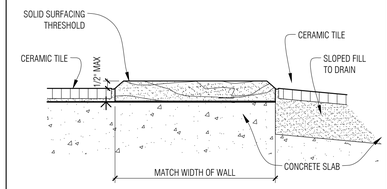
LVT TO CARPET TRANSITION 3" = 1'-0" T4



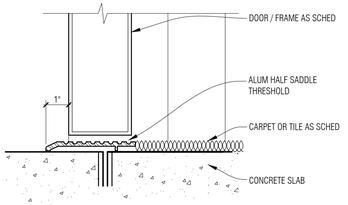
SOLID SURFACE THRESHOLD 6" = 1'-0" T7



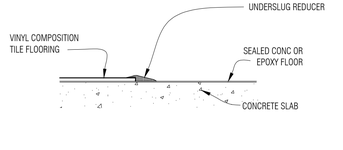
VINYL TO CARPET OR VINYL TRANSITION 3" = 1'-0" T3



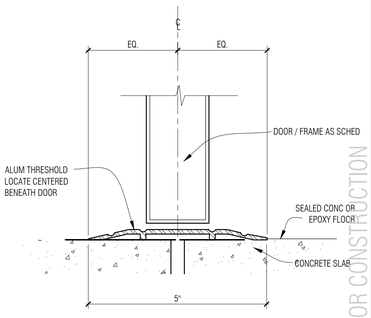
HARD TILE TO HARD TILE TRANSITION @ SHOWER 6" = 1'-0" T6



HALF SADDLE THRESHOLD 6" = 1'-0" T2



VINYL TO CONC TRANSITION 6" = 1'-0" T5



FULL SADDLE THRESHOLD 6" = 1'-0" T1

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P:\2018\18-122-Highland Township Fire Stations\02_CAD\Fire Station 2\A0-13_14_Typical Opening Details.dwg, 8/27/2020 1:26:30 PM, aray

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OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

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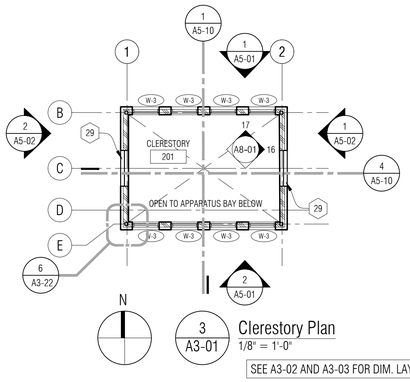
SHEET NO.

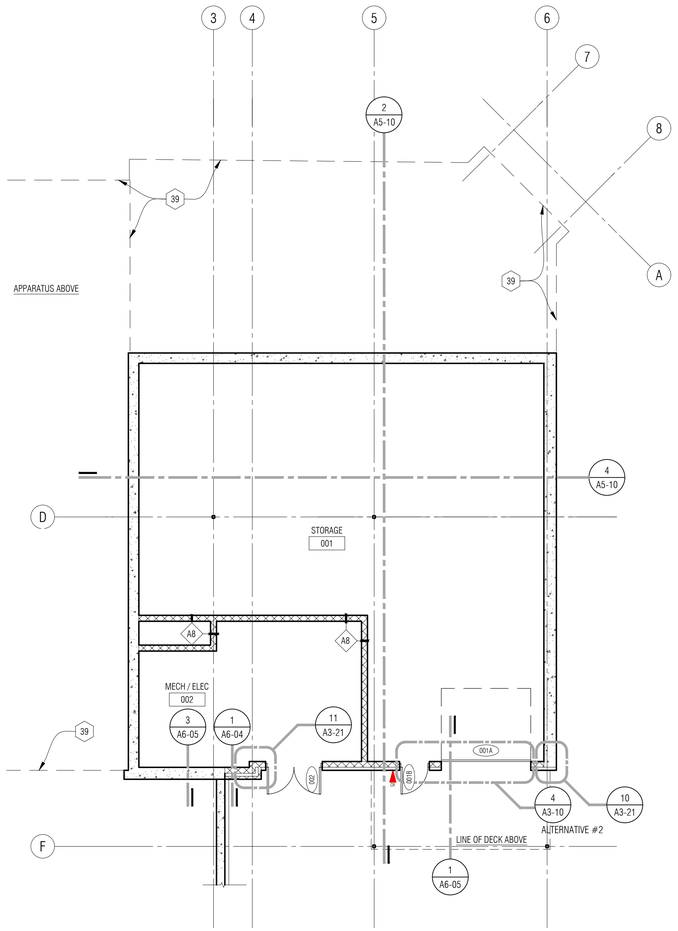
A0-14

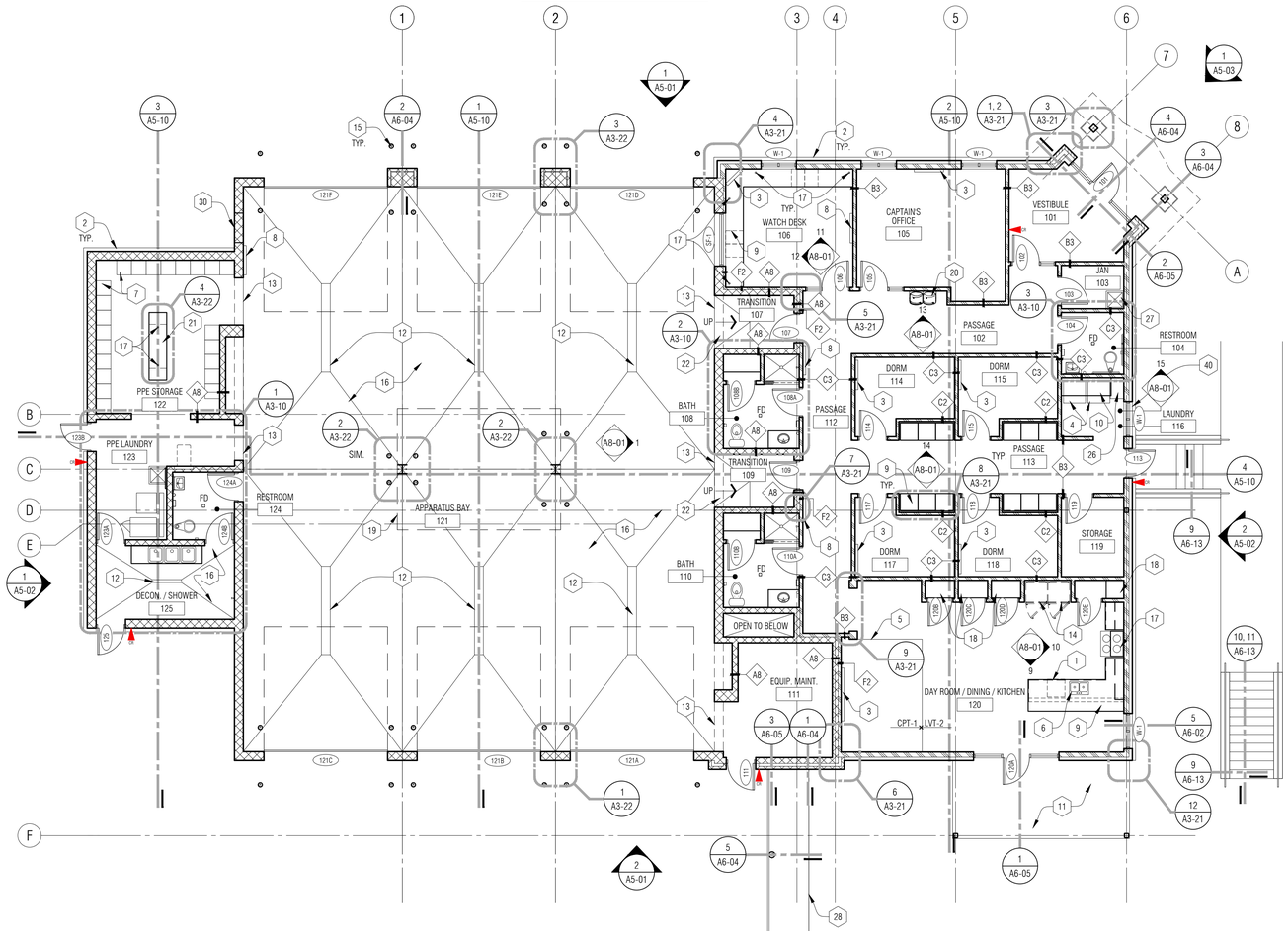


N

3 A3-01 Clerestory Plan
1/8" = 1'-0"

SEE A3-02 AND A3-03 FOR DIM. LAYOUT





N

2 A3-01 Lower Level Floor Plan
1/8" = 1'-0"

SEE A3-02 AND A3-03 FOR DIM. LAYOUT

N

1 A3-01 Main Level Floor Plan
1/8" = 1'-0"

SEE A3-02 AND A3-03 FOR DIM. LAYOUT

FLOOR PLAN GENERAL NOTES:

A. ALL DIMENSIONS ARE TO FINISH FACE OF WALL - WALL THICKNESS IS SHOWN AS NOMINAL. SEE WALL TYPES FOR ACTUAL THICKNESS.

B. COORDINATE SIZE AND LOCATION OF ALL DUCT, SHAFT AND LOUVER OPENINGS IN WALLS AND FLOORS WITH MECHANICAL AND ELECTRICAL. PROVIDE ALL REQUIRED LINTELS FOR OPENINGS.

C. DO NOT SCALE DRAWINGS. USE DIMENSIONS PROVIDED. IF A CONFLICT IS ENCOUNTERED OR A REQUIRED DIMENSION IS NOT PROVIDED, REQUEST A CLARIFICATION FROM THE ARCHITECT.

D. AT ALL LOCATIONS WHERE GYPSUM BOARD WALL INTERSECTS PERPENDICULAR TO MASONRY BLOCK WALL CORNER, THE GYPSUM BOARD IS TO BE SET BACK 1" FROM BULLNOSE OF BLOCK.

FLOOR PLAN KEY NOTES:

1. UNDER COUNTER DISHWASHER PROVIDED BY OWNER
2. LINE OF STONE SKIRTING AND SILL BELOW - REFER TO SECTIONS
3. TV BY OWNER - REFER TO ELEC
4. WASHER/DRYER PROVIDED BY OWNER - REFER TO MECH. & ELEC.
5. LINE OF FLOOR MATERIAL CHANGE - NO TRANSITION STRIP BETWEEN MATERIALS - REFER TO DETAIL T4 ON A0-14
6. PLUMBING FIXTURE - REFER TO PLUMBING
7. WALL MOUNTED PPE STORAGE - REFER TO SPECIFICATIONS
8. MONITOR BY OWNER - REFER TO ELEC.
9. MILLWORK/CASEWORK - REFER TO INTERIOR ELEVATIONS
10. 42" HIGH COUNTERTOP WITH BRACKETS
11. COMPOSITE WOOD FLOOR DECK ON WOOD TREATED FLOOR CONSTRUCTION - REFER TO WALL SECTIONS AND STRUCTURAL.
12. PRE-FABRICATED TRENCH DRAIN - PROVIDE 2" CHASE WITH JOINT SEALANT AROUND PERIMETER - REFER TO PLUMBING. (SET TOP OF GRATE AT 1" BELOW F.F. ELEVATION
13. MASONRY OPENING - REFER TO DIMENSION PLAN AND ELEVATIONS FOR OPENING SIZE
14. APPLIANCE - PROVIDED & INSTALLED BY OWNER
15. 6" Ø x 4'-0" HIGH CONCRETE FILLED GALVANIZED STEEL PIPE BOLLARD
16. SLOPED FLOORING - PITCH TO TRENCH DRAIN
17. GROMMET IN COUNTERTOP OR SURFACE
18. (3) ADJUSTABLE SHELVING AT 24" DEPTH
19. LINE OF CLERESTORY ABOVE - REFER TO DETAIL 3/A3-01
20. ELECTRICAL WATER COOLER - REFER TO MECH. & ELEC
21. PPE CHARGING STATION - REFER TO SECTION DETAIL 1/A6-12
22. TRANSITION RAMPED FLOOR - 1/2" PER 1'-0" SLOPE
23. TRANSITION FROM FULL BED DEPTH STONE TO A 2" VENEER AT EXTERIOR LINE OF BUILDING BELOW
24. LINE OF ENTRANCE SLAB - REFER TO STRUCTURAL
25. WALL MOUNTED HOSE BIB - REFER TO PLUMBING
26. LAUNDRY TUB - REFER TO MECH
27. 2'-0" x 2'-0" MOP SINK - REFER TO PLUMBING
28. LINE OF RETAINING WALL
29. 4'-0" x 2'-0" MECHANICAL LOUVER MANUALLY OPERATED - REFER TO MECH.
30. KNOCK OUT PANEL W/ SOFT JOINTS FOR FUTURE OPENING - 3'-4"W x 7'-4"H - REFER TO STRUCTURAL FOR LINTEL SIZE.
31. SOLID SURFACE TRANSITION AT SHOWER - REFER TO DETAIL T7 ON A0-14
32. STAINLESS STEEL WORK SURFACE - REFER TO SPECIFICATIONS
33. PORCELAIN TILE SHOWER WITH SHOWER PAN AND FLOOR DRAIN. COORDINATE DEPRESSION IN CONCRETE FLOOR SLAB AS REQUIRED FOR FLUSH FLOOR FINISH
34. MOP RACK
35. EXTRACTOR TO BE RELOCATED FROM STATION 1 - BASE MOUNTING DETAIL BY MANUFACTURER - REFER TO MECH. & ELEC - OWNER TO RELOCATE
36. WALL MOUNTED HOSE BIB - REFER TO PLUMBING
37. EYE WASH STATION
38. STACKED WASHER/DRYER PROVIDED BY OWNER - REFER TO MECH. & ELEC.
39. DASHED LINE OF BUILDING FOOTPRINT ABOVE
40. ALTERNATE #3: REMOVE W-1 AND STRUCTURAL HEADER AT ROOM 116 - REFER TO SPECS AND STRUCT.
41. REVISE CMU LINTEL FOR NEW SIZE OPENING - REFER TO STRUCT.
42. REVISE DOOR 001B TO DOUBLE DOOR - REFER TO DOOR SCHEDULE
43. REMOVE OVERHEAD DOOR CMU LINTEL, AND ALL ASSOCIATED HARDWARE - REFER TO DOOR SCHEDULE

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Fire Department

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Fire Station No. 2

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Highland, MI 48356

PROJECT NO.

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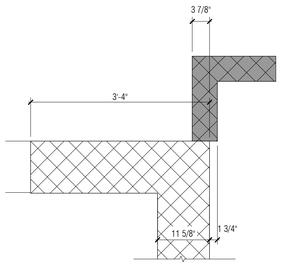
FLOOR PLANS

SHEET NO.

A3-01



3 / A3-02 Plan Detail
3/4" = 1'-0"

MASONRY DIMENSION PLAN GENERAL NOTES:

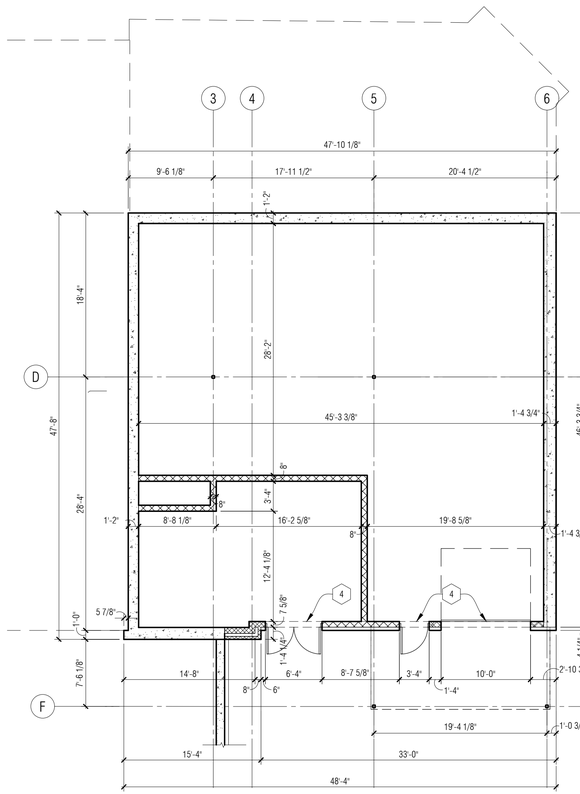
A. ALL DIMENSIONS ARE TO FACE OF MASONRY WALL - WALL THICKNESS IS SHOWN AS NOMINAL.

B. COORDINATE SIZE AND LOCATION OF ALL DUCT, SHAFT AND LOUVER OPENINGS IN WALLS AND FLOORS WITH MECHANICAL AND ELECTRICAL. PROVIDE ALL REQUIRED LINTELS FOR OPENINGS.

C. DO NOT SCALE DRAWINGS. USE DIMENSIONS PROVIDED. IF A CONFLICT IS ENCOUNTERED OR A REQUIRED DIMENSION IS NOT PROVIDED, REQUEST A CLARIFICATION FROM THE ARCHITECT.

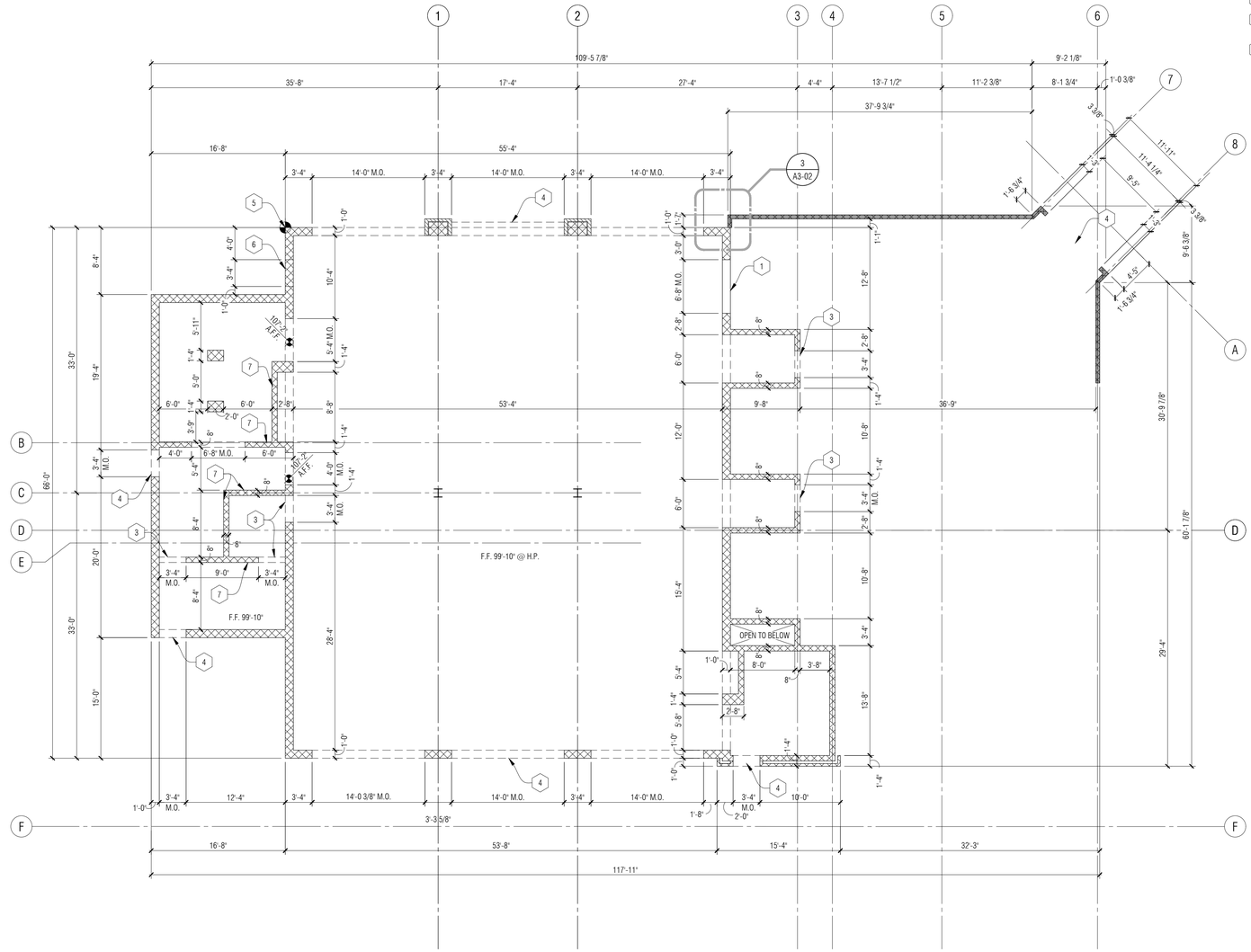
MASONRY DIMENSION PLAN KEY NOTES:

1. MASONRY OPENING FOR WINDOW - REFER TO SECTIONS FOR SILL HEIGHT
2. SHADED AREAS [ ] DENOTE AREAS OF STARTER COURSE ONLY, MTL. STUD WALL ABOVE
3. MASONRY OPENING FOR DOOR - REFER TO DOOR SCHEDULE
4. OPENING IN MASONRY STARTER COURSE FOR DOOR - REFER TO SCHEDULE
5. MASONRY CONTROL JOINT
6. KNOCK OUT PANEL W/ SOFT JOINTS FOR FUTURE OPENING - 3'-4"W x 7'-4"H - REFER TO STRUCTURAL FOR LINTEL SIZE
7. TOP OF WALL 11'-4" - REFER TO SECTIONS



N

2 Lower Level Dimension Plan
1/8" = 1'-0"



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1 Main Level DImension Plan
1/8" = 1'-0"

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2550 E. Wardlow Rd.
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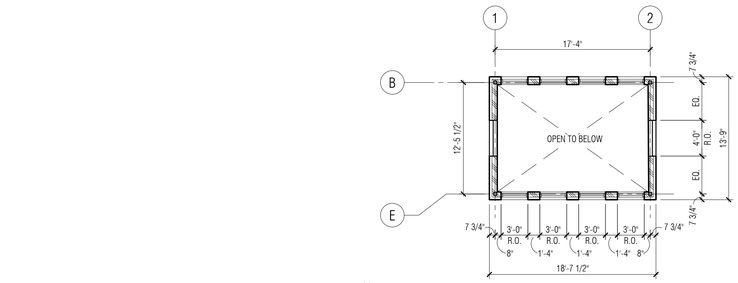
MASONRY
DIMENSION PLAN

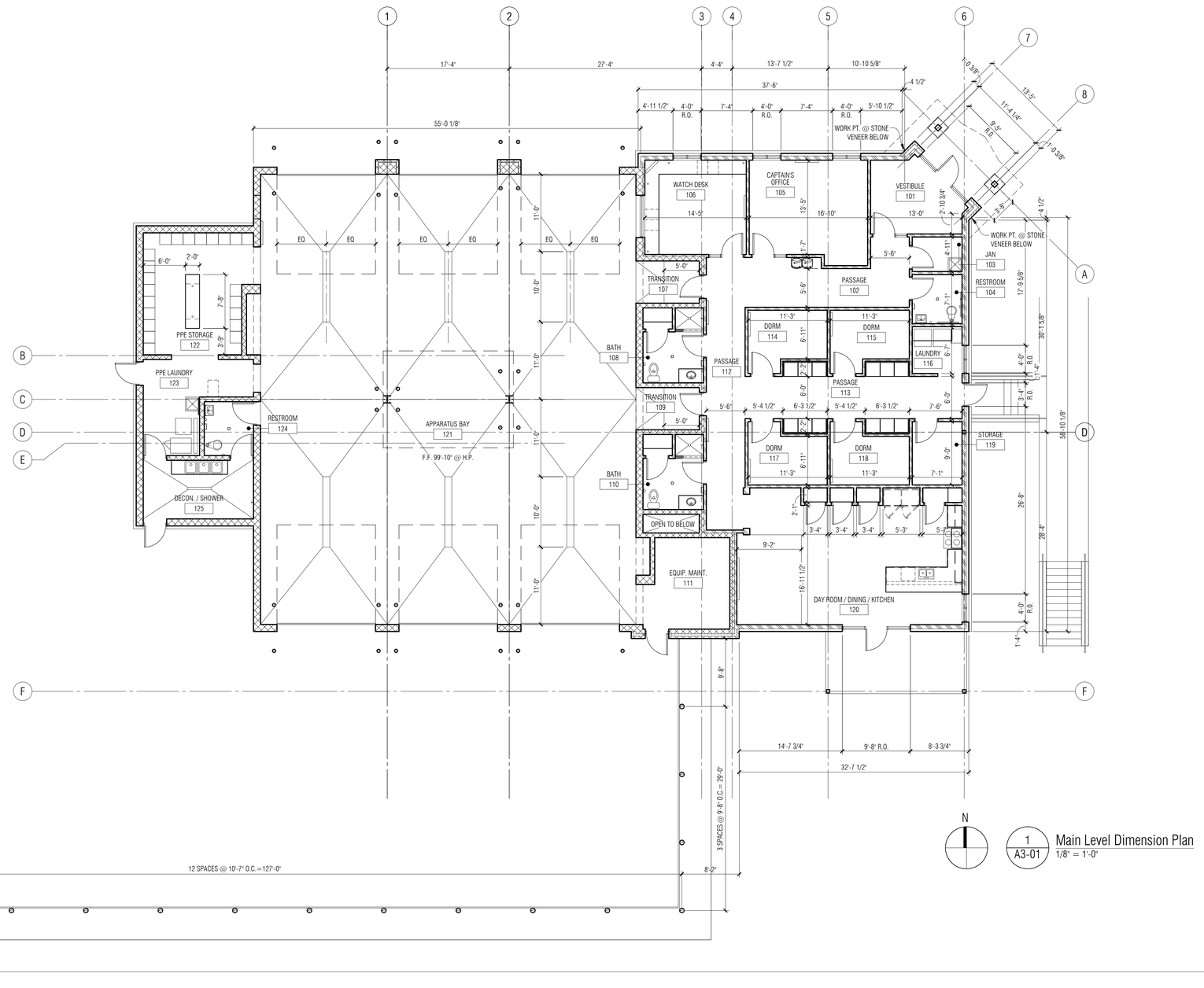
SHEET NO.

A3-02



N

3 Clerestory Dimension Plan
1/8" = 1'-0"



N

1 / A3-01 Main Level Dimension Plan
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES:

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Fire Department

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PROJECT NO.

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DIMENSION PLANS

SHEET NO.
A3-03

GENERAL NOTES - TOILET ACCESSORIES

A. REFER TO SPECIFICATION SECTION 102800 FOR DESCRIPTION OF TOILET ACCESSORIES.

B. REFER TO MECHANICAL PLANS FOR ALL PLUMBING FIXTURES.

C. CENTER FLOOR DRAIN IN ROOM UON. ENSURE 1/8" PER FOOT SLOPE TOWARD FLOOR DRAINS. (TYP.)

D. PROVIDE WD BLOCKING SUPPORT AT ALL GRAB BAR LOCATIONS PER GRAB BAR MANUFACTURER'S RECOMMENDATION.

LEGEND - TOILET ACCESSORIES

TA-1 42" GRAB BAR

TA-2 36" GRAB BAR

TA-3 18" GRAB BAR - VERTICAL

TA-4 WALL MOUNTED MIRROR

TA-5 TOILET TISSUE DISPENSER - BY OWNER

TA-6 SURFACE MOUNTED SOAP DISPENSER - BY OWNER

TA-7 SHOWER CURTAIN ROD & HOOKS

TA-8 PAPER TOWEL DISPENSER - BY OWNER

TA-9 NOT USED

TA-10 TOWEL HOOK

TA-11 LAVATORY GUARD

TA-12 FREE STANDING WASTE RECEPTACLE (NOT SHOWN- PROVIDE 1 AT EACH RESTROOM)

FLOOR PLAN GENERAL NOTES:

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21. PPE CHARGING STATION - REFER TO SECTION DETAIL 1/A6-12
22. TRANSITION RAMPED FLOOR - 1/2" PER 1'-0" SLOPE
23. TRANSITION FROM FULL BED DEPTH STONE TO A 2" VENEER AT EXTERIOR LINE OF BUILDING BELOW
24. LINE OF ENTRANCE SLAB - REFER TO STRUCTURAL
25. WALL MOUNTED HOSE BIB - REFER TO PLUMBING
26. LAUNDRY TUB - REFER TO MECH
27. 2'-0" x 2'-0" MOP SINK - REFER TO PLUMBING
28. LINE OF RETAINING WALL
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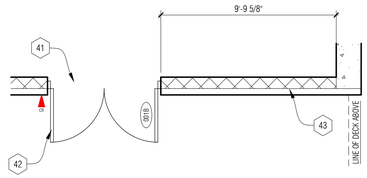
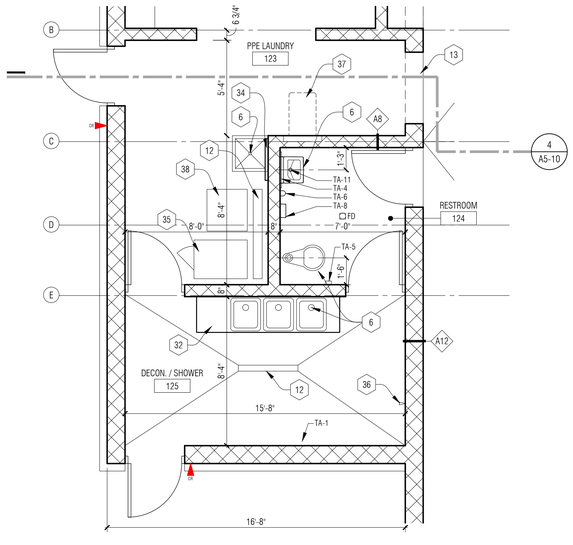
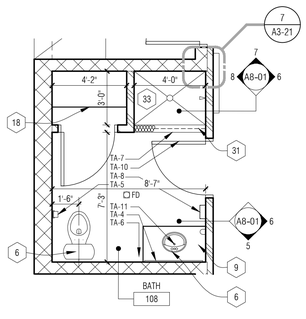
43. REMOVE OVERHEAD DOOR CMU LINTEL, AND ALL ASSOCIATED HARDWARE - REFER TO DOOR SCHEDULE



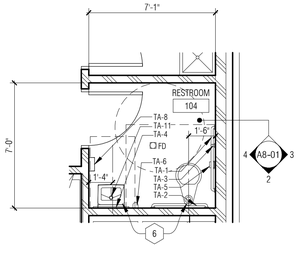
4 / A3-01 Enlarged Lower Level PlanI - Alternate #2
1/4" = 1'-0"



1 / A3-01 Enlarged Plan - Decon Area
1/4" = 1'-0"



2 / A3-01 Enlarged Plan - Bath
1/4" = 1'-0"



3 / A3-01 Enlarged Plan - Restroom
1/4" = 1'-0"

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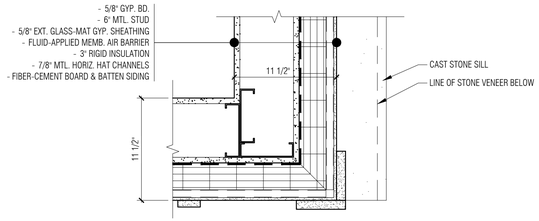
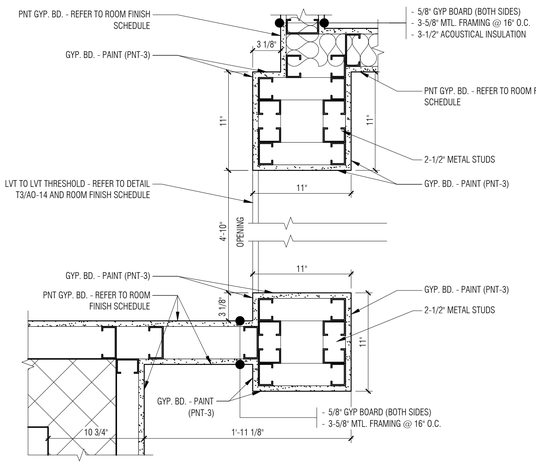
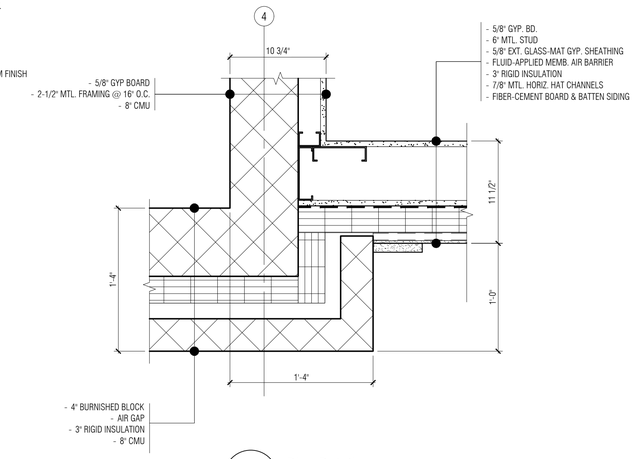


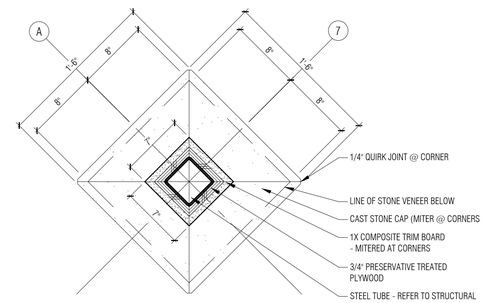
12 A3-01 Plan Detail
1 1/2" = 1'-0"



9 A3-01 Plan Detail
1 1/2" = 1'-0"



6 A3-01 Plan Detail
1 1/2" = 1'-0"



3 A3-01 Plan Detail
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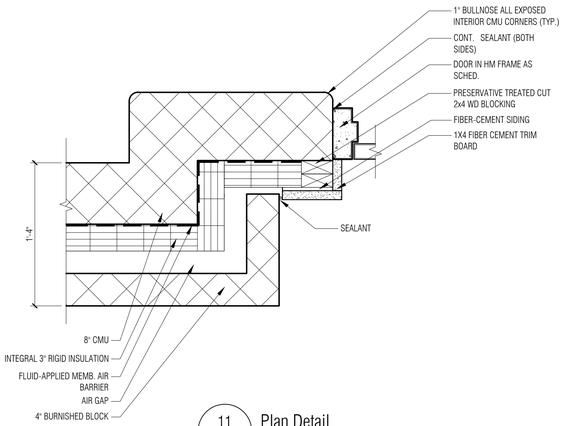
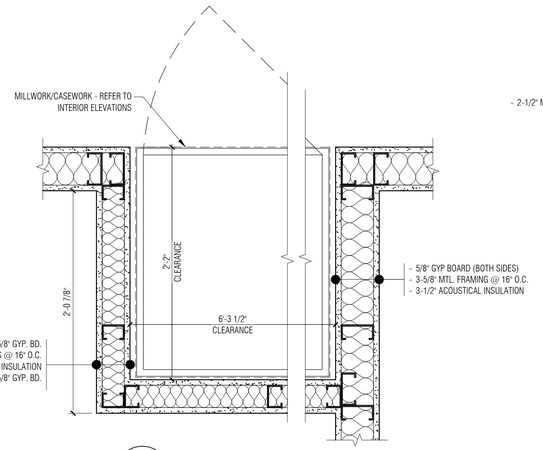
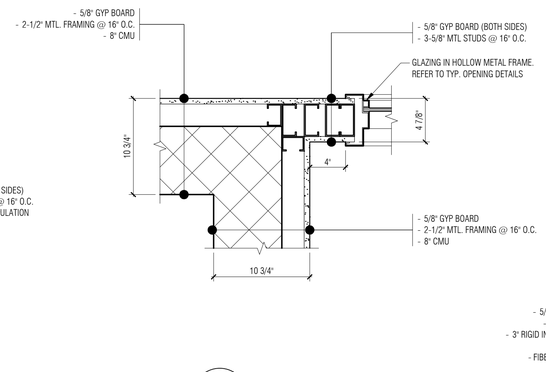


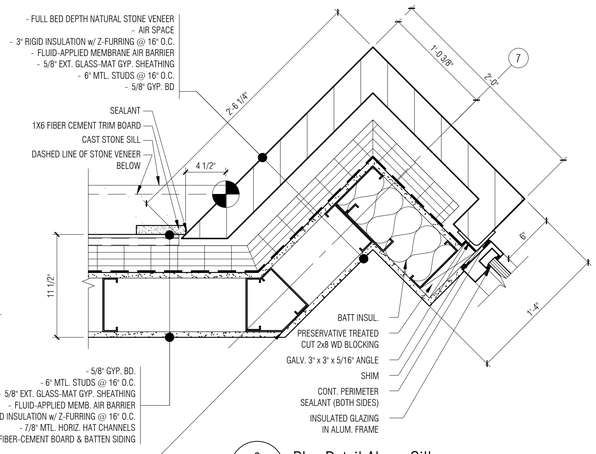
11 A3-01 Plan Detail
1 1/2" = 1'-0"



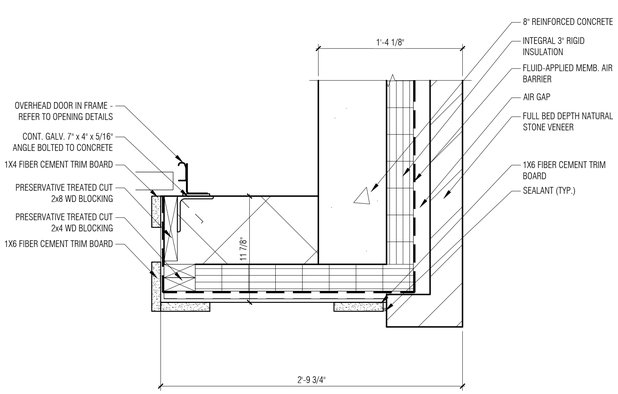
8 A3-01 Plan Detail
1 1/2" = 1'-0"



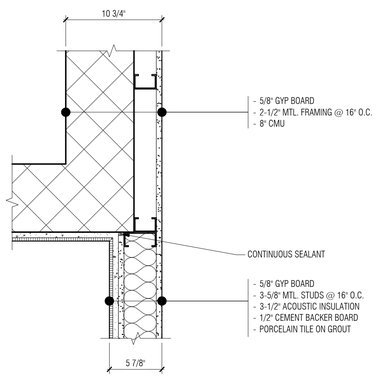
5 A3-01 Plan Detail
1 1/2" = 1'-0"



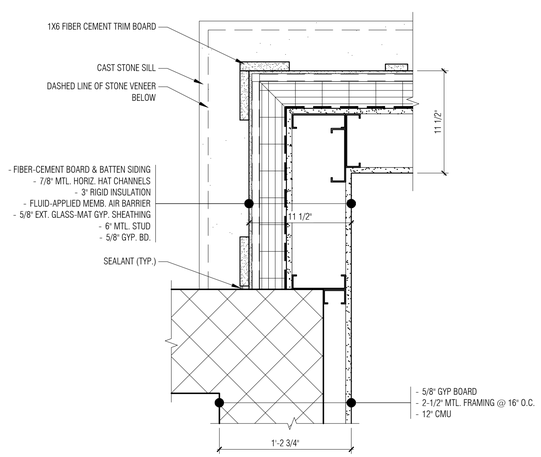
2 A3-01 Plan Detail Above Sill
1 1/2" = 1'-0"



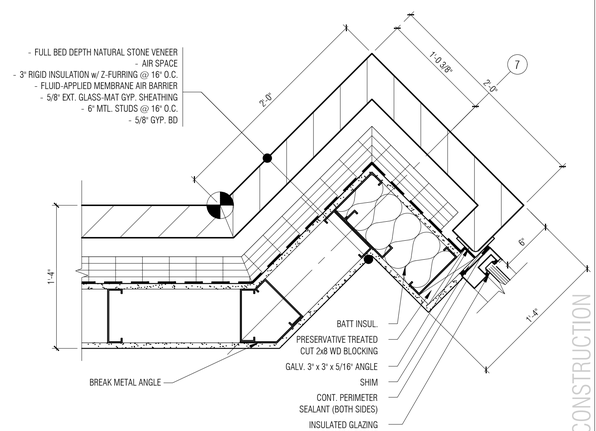
10 A3-01 Plan Detail
1 1/2" = 1'-0"



7 A3-10 Plan Detail
1 1/2" = 1'-0"



4 A3-01 Plan Detail
1 1/2" = 1'-0"



1 A3-01 Plan Detail Below Sill
1 1/2" = 1'-0"

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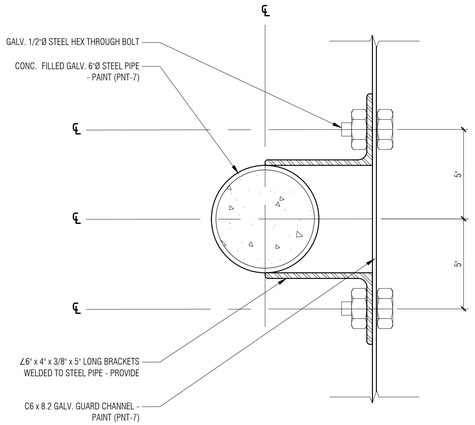
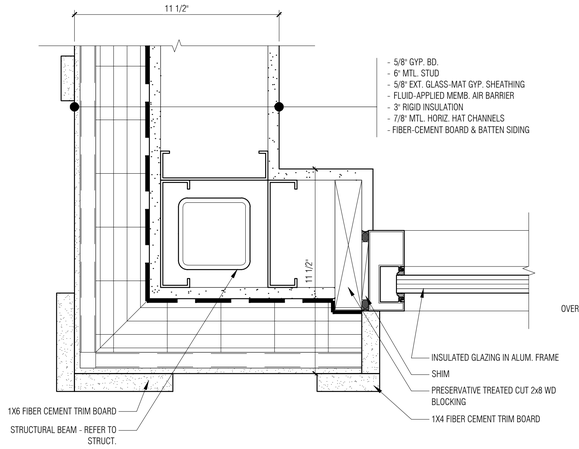
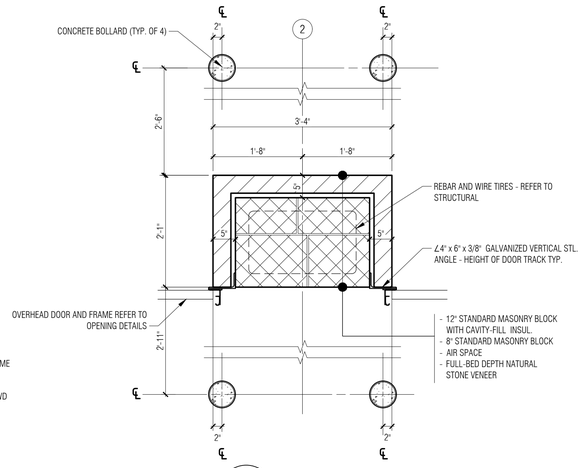
A3-21



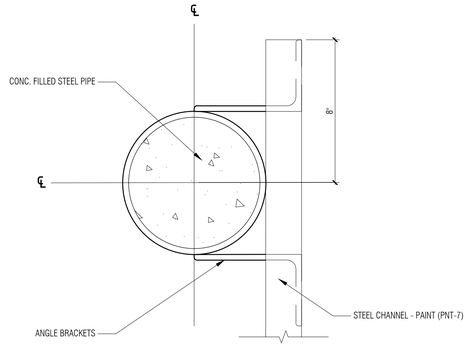
9 A3-01 Plan Detail
3" = 1'-0"



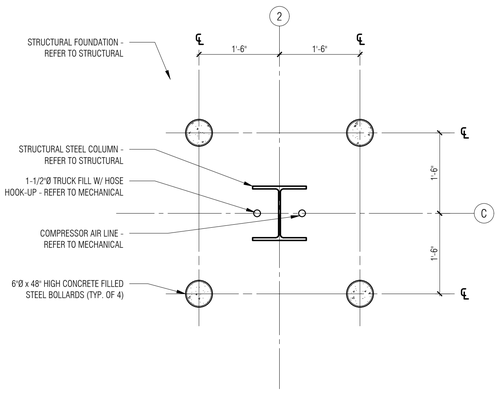
6 A3-01 Plan Detail
3" = 1'-0"



3 A3-01 Plan Detail
3/4" = 1'-0"

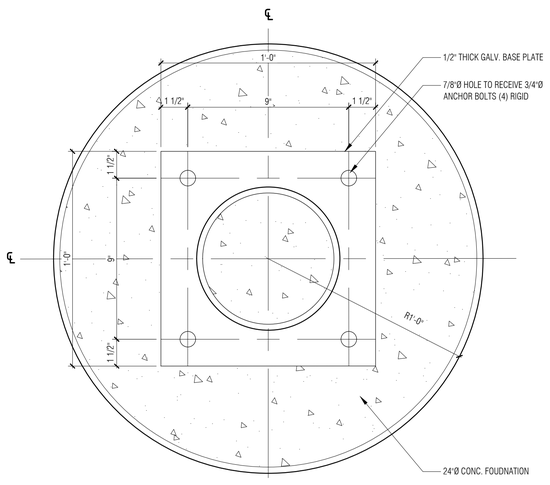


5 A3-01 Plan Detail
3" = 1'-0"

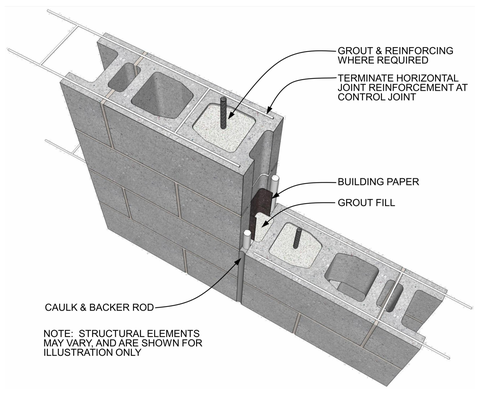


2 A3-01 Plan Detail
3/4" = 1'-0"

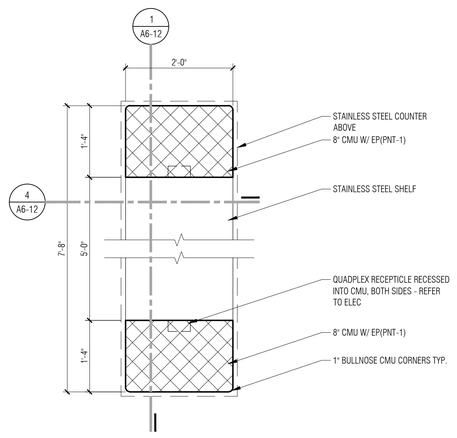
8 A3-22 Not Used
N.T.S.



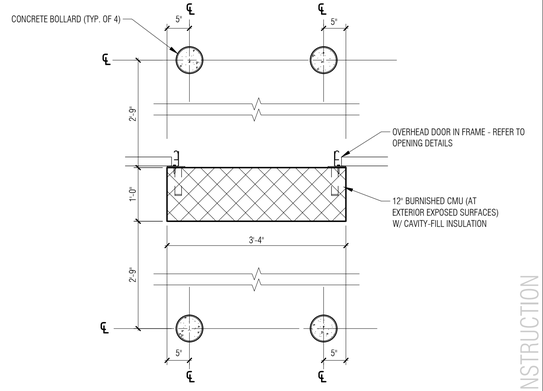
10 A3-01 Plan Detail
3" = 1'-0"



7 A3-22 Control Joint Detail - Grout Fill
N.T.S.



4 A3-01 Plan Detail
3/4" = 1'-0"



1 A3-01 Plan Detail
3/4" = 1'-0"

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A3-22

ROOF PLAN GENERAL NOTES:

A. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION FOR ROOF RELATED ITEMS.

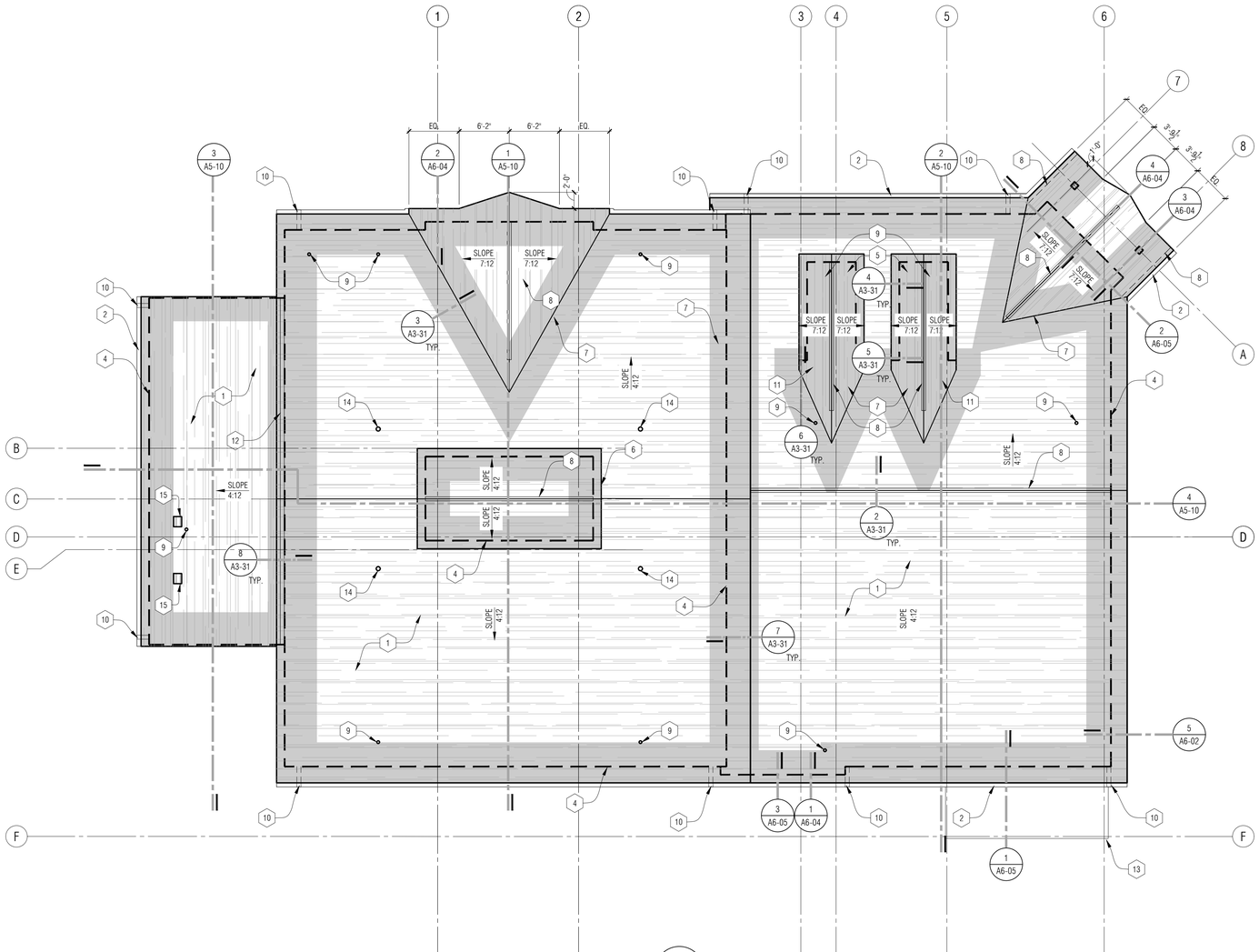
B. ARROWS SHOWN REPRESENT DOWN SLOPE OF ROOF.

C. REFER TO ROOF DETAILS FOR ALL PIPE PENETRATIONS - COORDINATE LOCATIONS AND QUANTITIES W/ MECHANICAL.

D. DO NOT PENETRATE SHINGLE ROOF - REFER TO MECHANICAL AND ELECTRICAL FOR ALL THRU ROOF PENETRATIONS. FLASH AND SEAL ALL PENETRATIONS IN ACCORDANCE WITH THE ROOF MANUFACTURER'S SPECIFICATIONS AND DETAILS TO ENSURE WARRANTY & DETAILS.

ROOF PLAN KEY NOTES:

1. ASPHALT SHINGLE ROOF.
2. 6" K-STYLE METAL GUTTER (MRS-2)
3. LINE OF ROOF BELOW
4. LINE OF FACE OF WALL BELOW, TYPICAL (DASHED LINE)
5. PROVIDE FLASHING AT SIDEWALL TO ROOF TRANSITION - SEE DETAIL 6/A3-21
6. PARAPET FLASHING MEMBRANE ON BOTH SIDES OF ROOF CUT-OUT. PROVIDE METAL FLASHING W/ DRIP EDGE AT SHINGLES SEE SIM. DETAIL 6/A3-31
7. SHADED AREA OF ICE AND WATER SHIELD SYSTEM - EXTEND 3'-0" MIN. PAST WALL BELOW AND VALLEYS.
8. CONTINUOUS RIDGE VENT - REFER TO DETAIL 2/A3-31
9. MECHANICAL VENT STACK - REFER TO MECH. & DETAIL 1/A3-31
10. METAL DOWNSPOUT DRAIN (MRS-2)
11. NO SHEATHING BELOW DORMER FOR CONTINUOUS ATTIC ATMOSPHERE
12. CONTINUOUS ROOF TO WALL TRANSITION VENT - REFER TO DETAIL 8/A3-31
13. LINE OF WOOD DECK BELOW - REFER TO SHEET A3-01
14. MECHANICAL INTAKE THROUGH ROOF - REFER TO MECH.
15. MECHANICAL EXHAUST THROUGH ROOF - REFER TO MECH.



1 / A3-30 Roof Plan
1/8" = 1'-0"

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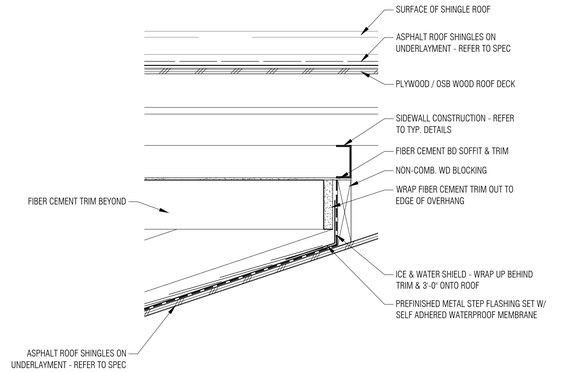
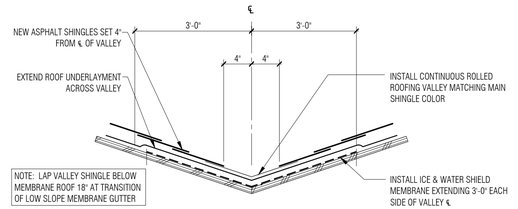
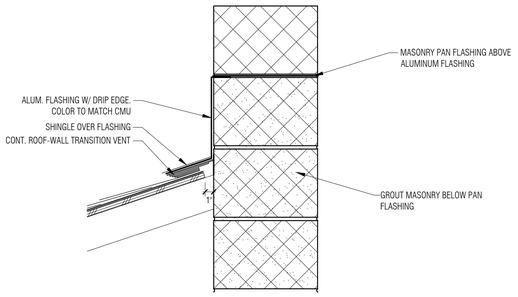
A3-30



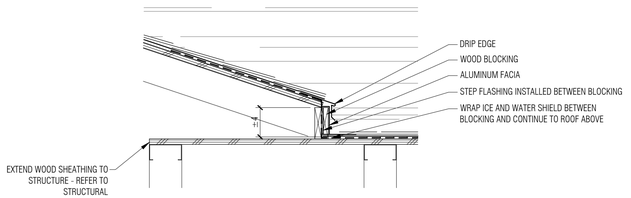
6 / A3-30 — A3-31
Typical Detail @ Roof to Sidewall Transition
1-1/2" = 1'-0"



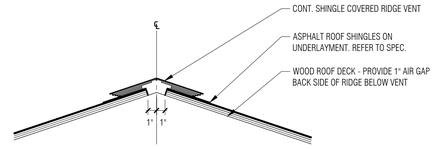
3 / A3-30
Typical Detail Thru Roof Valley
N.T.S.



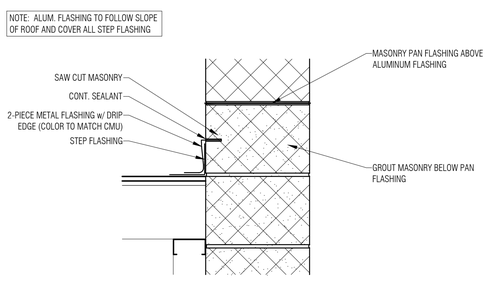
8 / A3-30 — A5-10
Flashing at CMU Wall
NTS



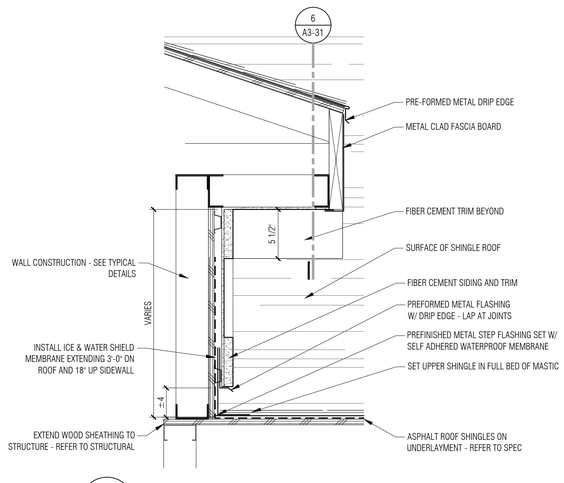
5 / A3-30
Typical Detail @ Roof to Sidewall Transition
1-1/2" = 1'-0"



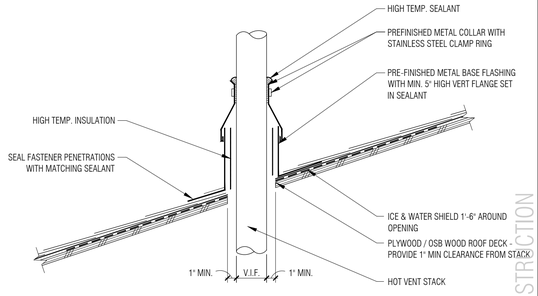
2 / A3-30
Ridge Vent Detail @ Sloped Roof
1-1/2" = 1'-0"



7 / A6-03 — A3-30
Flashing on Sloped Roof at CMU Wall
NTS



4 / A3-30
Typical Detail @ Roof to Sidewall Transition
1-1/2" = 1'-0"



1 / A3-30
Hot Vent Stack
1 1/2" = 1'-0"

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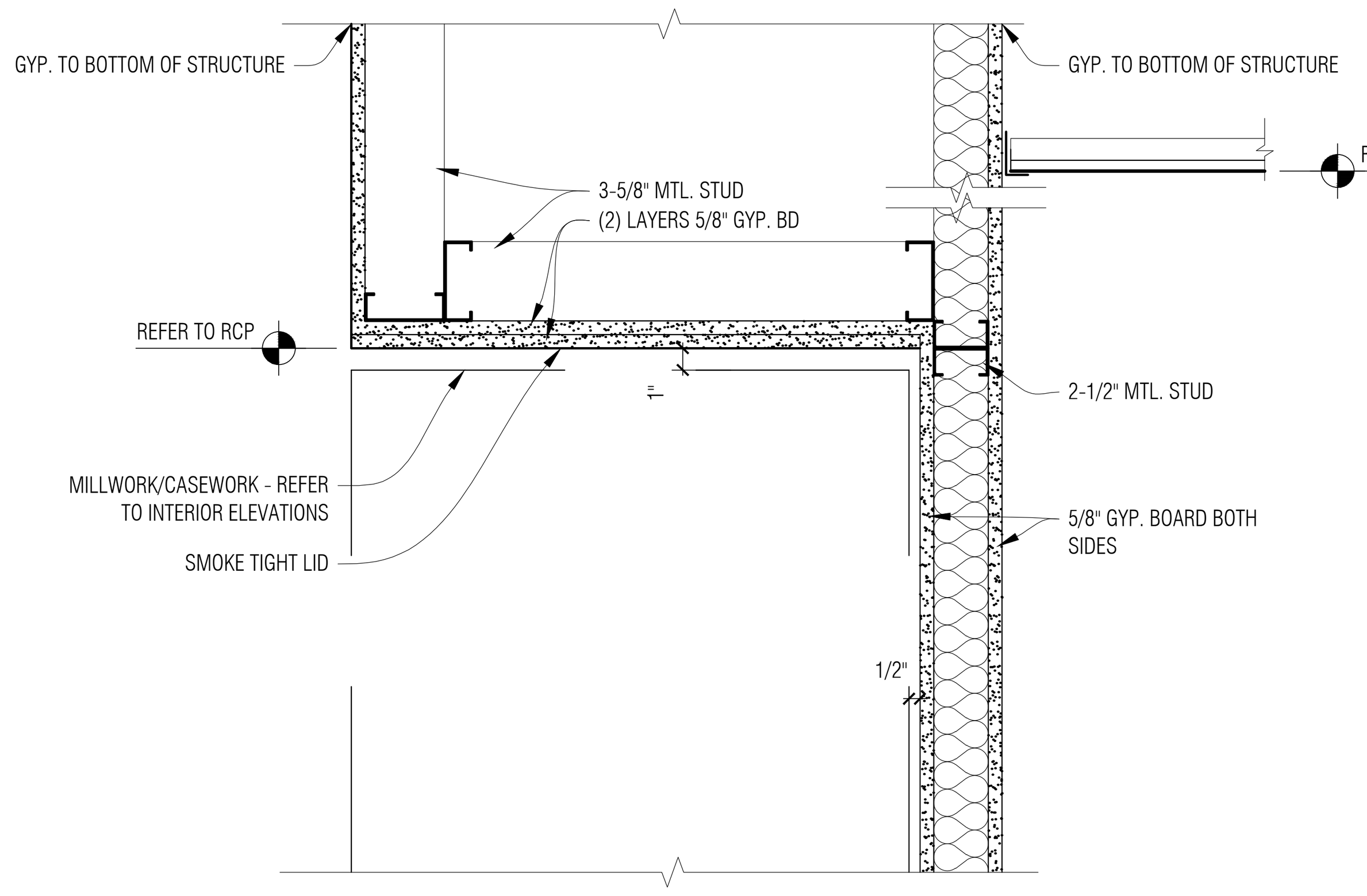
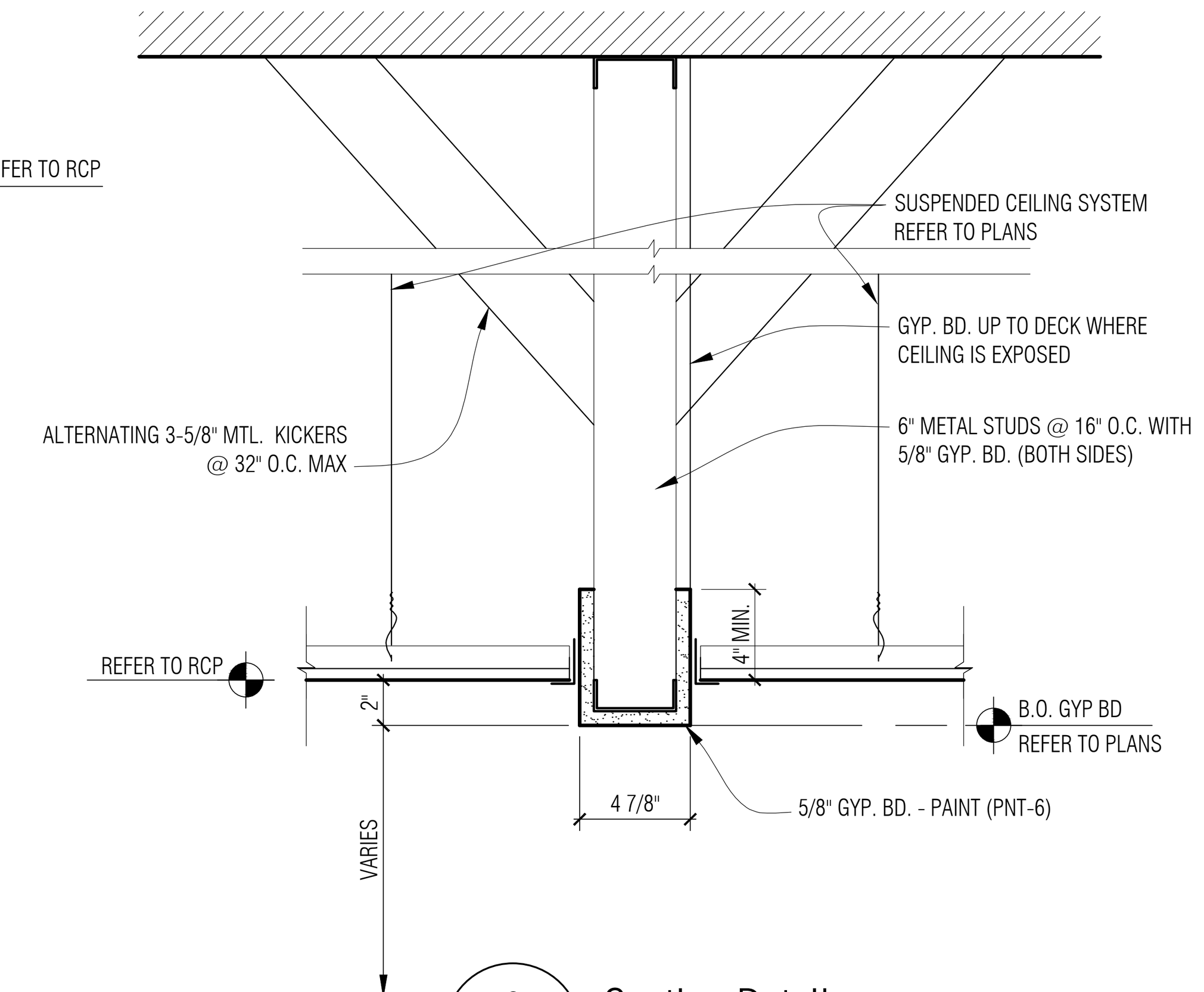
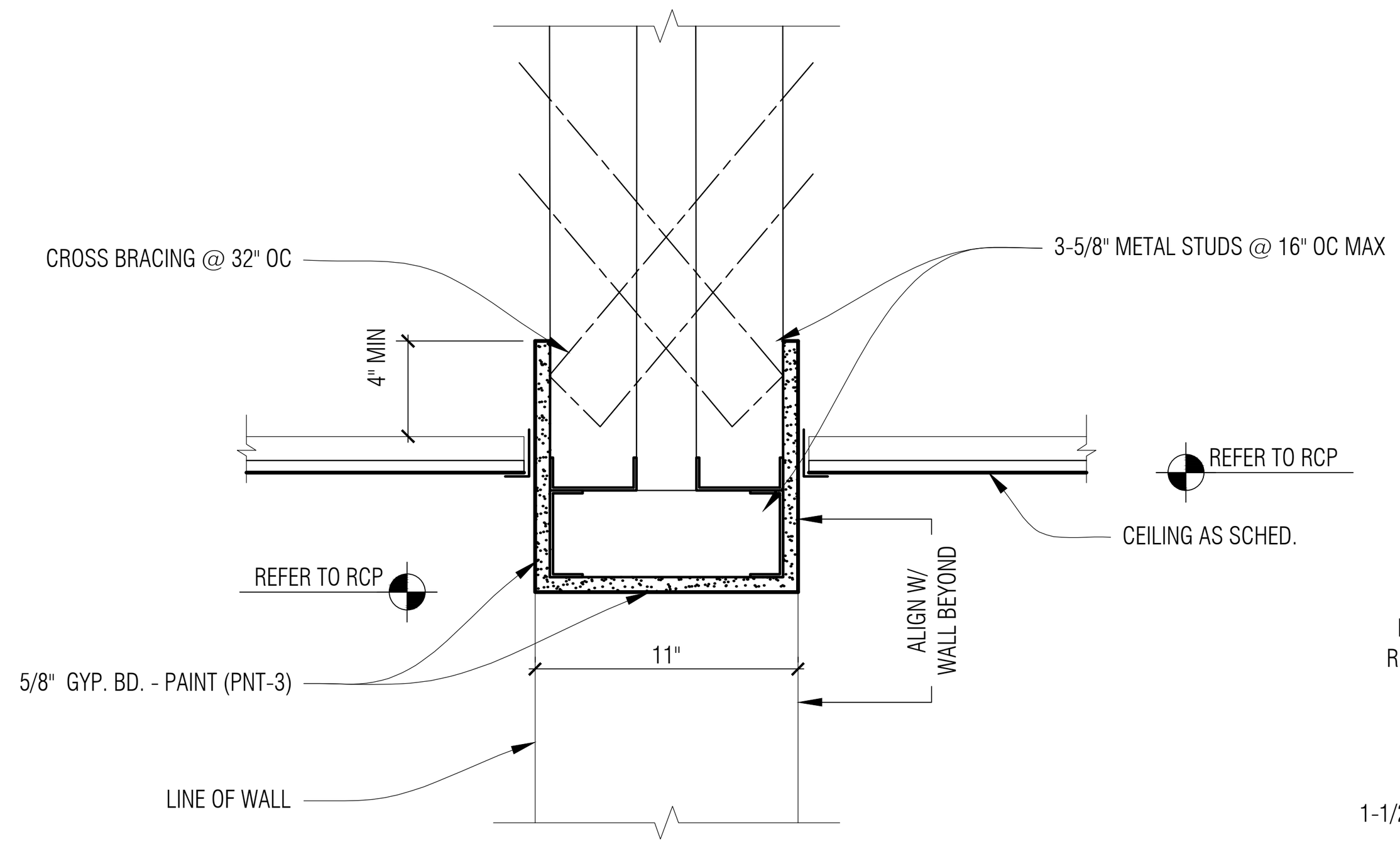


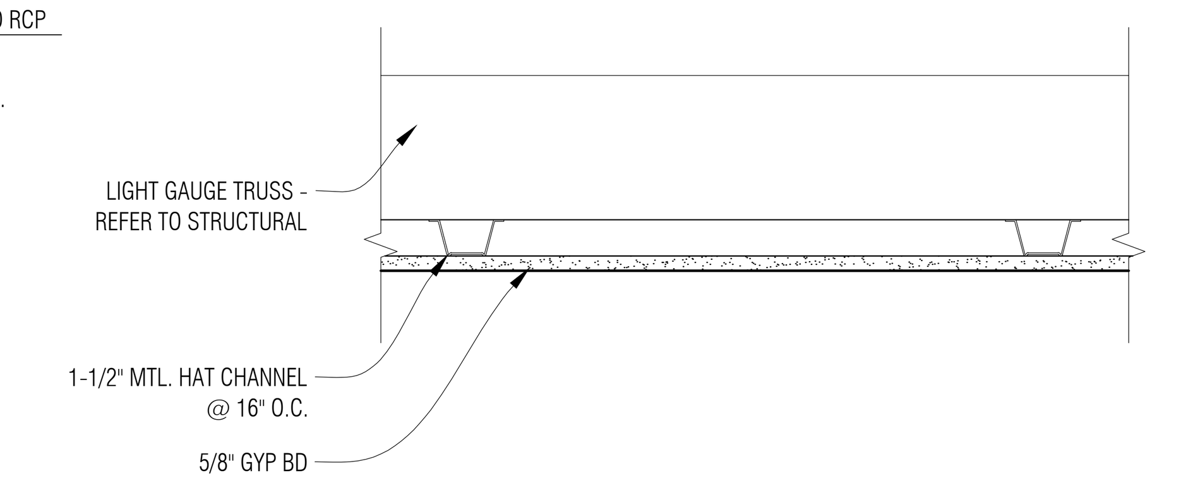
7 / A4-01 Section Detail
1 1/2" = 1'-0"



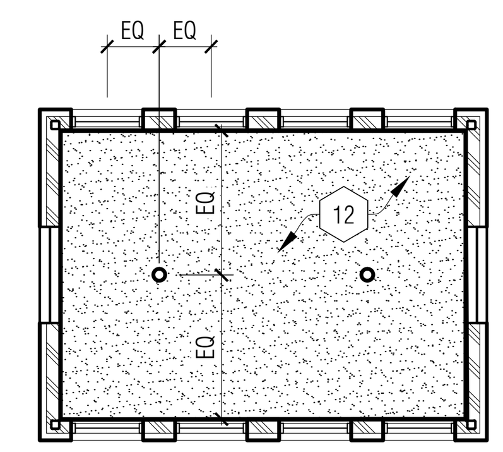
6 / A4-01 Section Detail
1 1/2" = 1'-0"



5 / A4-01 Section Detail
1 1/2" = 1'-0"

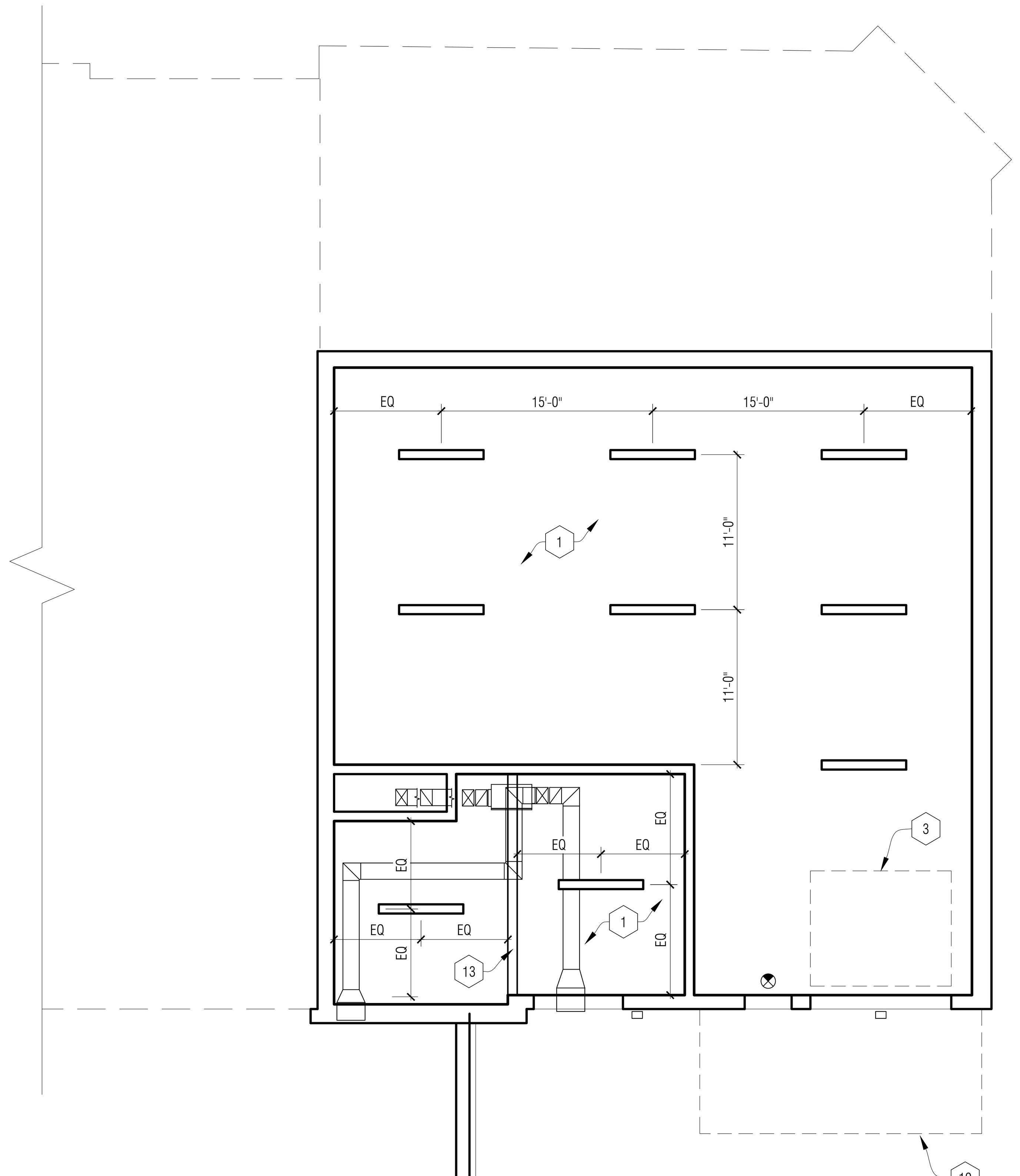


4 / A4-01 Section Detail
1 1/2" = 1'-0"

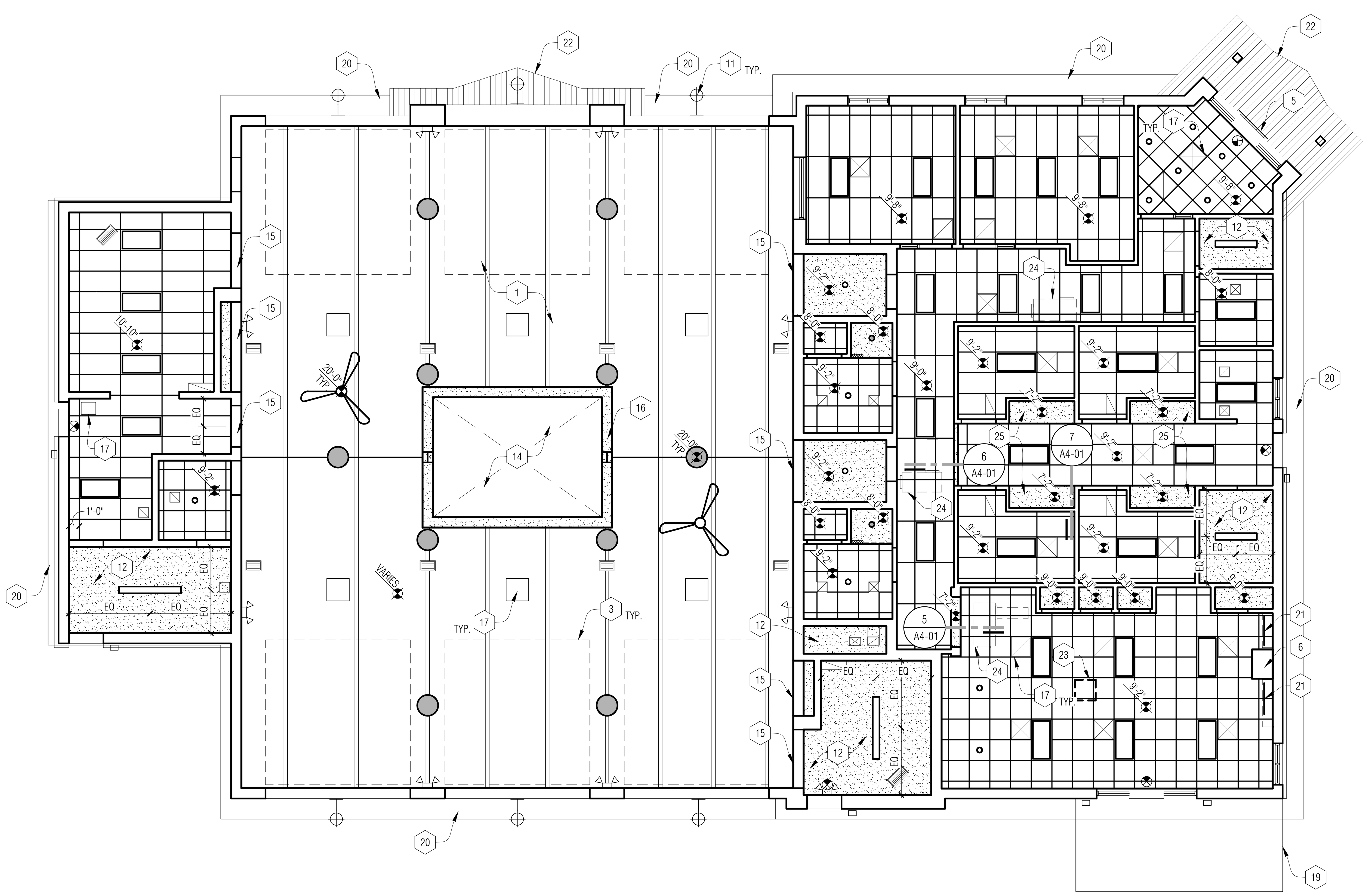


N

3 Clerestory Reflected Ceiling Plan
1/8" = 1'-0"



2 Lower Level Reflected Ceiling Plan
1/8" = 1'-0"



N

1 Main Level Reflected Ceiling Plan
1/8" = 1'-0"

REFLECTED CEILING PLAN - GENERAL NOTES:

A. REFER TO FLOOR PLANS FOR ROOM NAMES, NUMBERS AND ROOM DIMENSIONS.

B. REFER TO ELECTRICAL FOR LIGHT FIXTURE TYPES AND SPECIFICATIONS.

C. REFER TO MECHANICAL FOR DIFFUSERS, REGISTERS, AND RETURNS.

D. ALL LIGHT FIXTURES ARE TO BE CENTERED WITHIN CEILING U.O.N.

E. CEILING HEIGHT MEASURED FROM 100'-0" FINISH FLOOR.

REFLECTED CEILING PLAN - KEY NOTES:

1. EXPOSED CEILING TO UNDERSIDE OF ROOF DECK - REFER TO ROOM FINISH SCHEDULE
2. GYPSUM BOARD CEILING
3. LINE OF OVERHEAD DOOR - REFER TO DOOR SCHEDULE
4. GYPSUM BOARD CEILING / SOFFIT - REFER TO DETAIL 1/A4-01
5. WALL MOUNTED SIGN ABOVE DOOR - PROVIDED BY OWNER
6. HOOD - REFER TO SPECIFICATIONS
7. WALL COVERING SOFFIT ACCENT BAND - REFER TO DETAIL 6/A4-01 AND INTERIOR ELEVATIONS
8. SUPPLY AIR DIFFUSER - REFER TO MECH
9. IN GROUND LIGHT FIXTURE - REFER TO ELEC
10. EXPOSED MECHANICAL DUCTWORK - PAINT TO MATCH CEILING, REFER TO MECH. AND ROOM FINISH SCHEDULE
11. GOOSENECK FIXTURE - REFER TO ELECTRICAL AND SPECIFICATIONS
12. GYP. BOARD CEILING ON 1-1/2" HAT CHANNELS 16" O.C. MOUNTED TO UNDERSIDE OF STRUCTURE - REFER TO DETAIL 4/A4-01
13. EXPOSED STRUCTURE - PAINT TO MATCH CEILING, REFER TO MECH. AND ROOM FINISH SCHEDULE
14. OPEN TO CLERESTORY ABOVE - REFER TO PLAN (3/A4-01)
15. CMU OPENING - REFER TO INTERIOR ELEVATIONS
16. GYP. BOARD FRAMING AROUND STRUCTURE - REFER TO BUILDING SECTIONS (A5-10)
17. MECH UNIT - REFER TO MECH.
18. LINE OF ROOF ABOVE
19. LINE OF WOOD DECK - REFER TO SHEET A3-01
20. EXTERIOR FIBER CEMENT SOFFIT (SD-4)
21. UNDER CABINET LIGHT FIXTURE - REFER TO INTERIOR ELEVATIONS AND ELEC
22. EXTERIOR METAL SOFFIT
23. 24"x24" ATTIC ACCESS PANEL ABOVE DROP CEILING IN GYPSUM BOARD AT UNDERSIDE OF TRUSS - BATT INSULATION TO BE ADHEARED TO TOP SIDE OF ACCESS PANEL
24. DASHED LINE OF MECHANICAL UNIT ABOVE CEILING. SECURE TO BOTTOM OF TRUSS - REFER TO MECH
25. SMOKE TIGHT LIT AT DORM ROOM LOCKERS - REFER TO DETAIL 7/A4-01

Ceiling Symbols Legend

	5/8" GYP BD ON 3 5/8" MTL. STUD AT 16" O.C. SECURE TO STRUCTURE ABOVE AT 48" O.C. MAX EACH WAY
	SURFACE-MOUNTED LINEAR PENDANT FIXTURE
	2' X 4' LAY-IN LIGHT FIXTURE IN GRID
	SUPPLY AIR DIFFUSER (MECHANICAL)
	RETURN AIR GRILLE (MECHANICAL)
	GAS UNIT HEATER (MECHANICAL)
	INFRARED HEATER (MECHANICAL)
	HIGH BAY LIGHT FIXTURE
	6" RECESSED ROUND LIGHT FIXTURE
	6" RECESSED ROUND LIGHT WET FIXTURE
	PENDANT LIGHT FIXTURE
	EXTERIOR GARAGE LIGHT FIXTURE - WALL MOUNTED
	EXTERIOR LIGHT FIXTURE
	EXIT LIGHT - CEILING MOUNTED
	EXIT LIGHT - WALL MOUNTED
	EMERGENCY LIGHT - WALL MOUNTED

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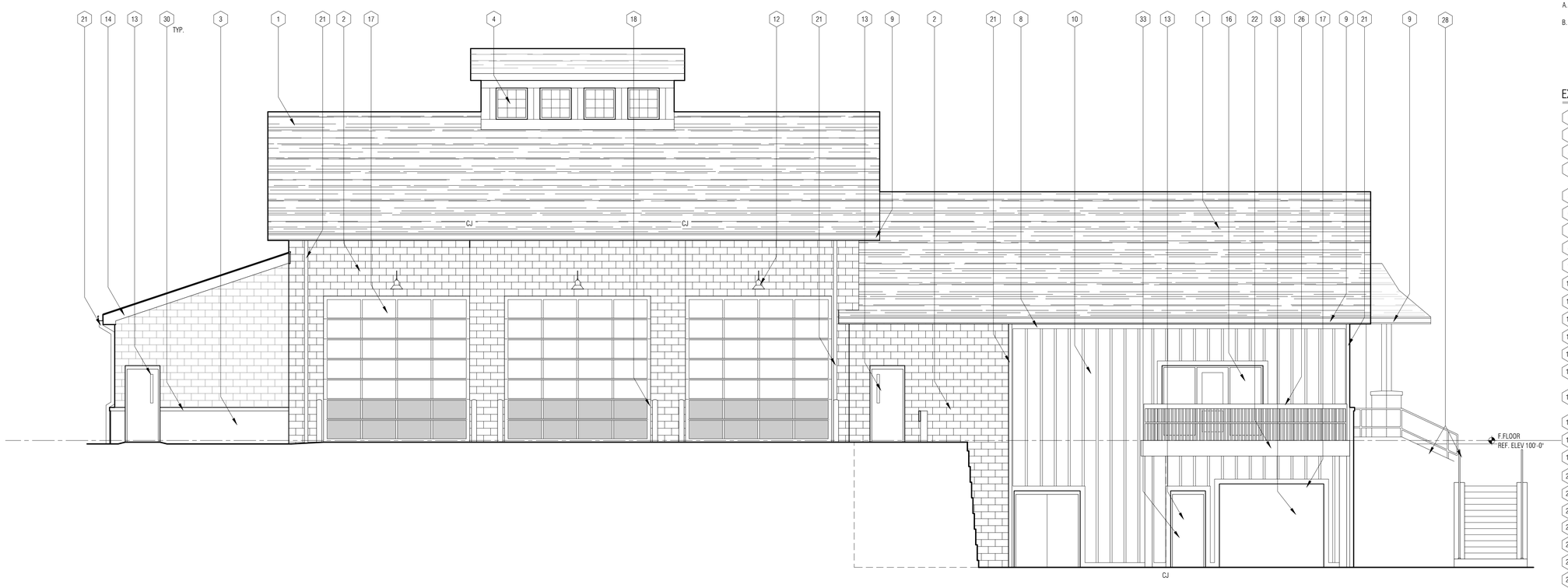
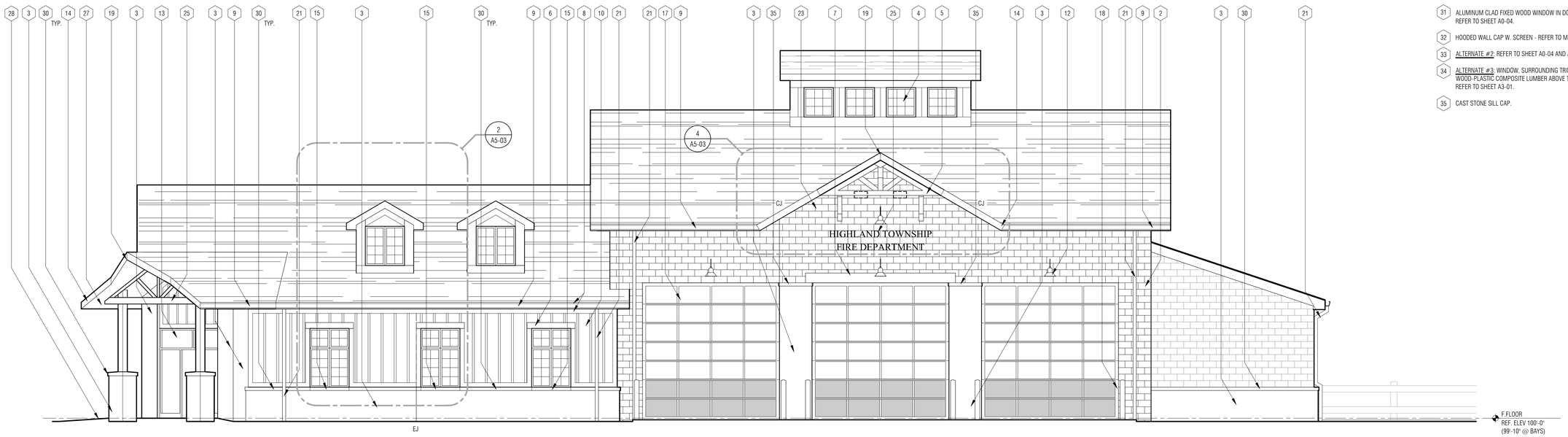
SHEET NO.
A4-01



2 A3-01 South Elevation
3/16" = 1'-0"



1 A3-01 North Elevation
3/16" = 1'-0"

EXTERIOR ELEVATIONS GENERAL NOTES:

A. REFER TO MATERIAL FINISH / COLOR SCHEDULE (SPEC SECTION 000200) FOR ALL MATERIAL NOTES.
B. REFER TO 7,8/A3-22 FOR CONTROL JOINT DETAILS.

EXTERIOR ELEVATIONS KEY NOTES:

1. ASPHALT ROOF SHINGLES (ARS-1)
2. BURNISHED CMU VENEER
3. FULL BED DEPTH NATURAL STONE VENEER (STN-1)
4. ALUMINUM CLAD FIXED WOOD WINDOW - REFER TO SHEET A0-04.
5. WALL-MOUNTED METAL SIGNAGE BY OWNER
6. WOOD-PLASTIC COMPOSITE LUMBER (CL-1)
7. WOOD-PLASTIC COMPOSITE LUMBER (CL-2)
8. FIBER-CEMENT TRIM BOARD (SD-3) - PAINT
9. ALUMINUM GUTTER (MRS-2) ON ALUMINUM FASCIA (MRS-1)
10. FIBER-CEMENT BOARD & BATTEN SIDING (SD-1 & SD-2) - PAINT
11. FIBER-CEMENT SOFFIT (SD-4) - PAINT
12. GOOSENECK LIGHT FIXTURE - SEE ELECTRICAL
13. DOOR AND FRAME AS SCHEDULED - REFER TO SHEET A0-04
14. ALUMINUM FASCIA (MRS-1)
15. CAST STONE SILL (CS-1) AT WINDOW OPENINGS - REFER TO SECTION DETAILS FOR PROFILES
16. ALUMINUM STOREFRONT WINDOW AS SCHEDULED - REFER TO SHEET A0-04
17. INSULATED OVERHEAD DOORS - REFER TO SHEET A0-04
18. 6" CONCRETE FILLED BOLLARD
19. BIRD'S BEAK ROOF OVERHANG
20. 6" K-SHAPED METAL GUTTER (MRS-2)
21. METAL DOWNSPOUT DRAIN TO GROUND LEVEL OR ROOF (MRS-2)
22. PRESSURE TREATED WOOD DECKING
23. LOUVER VENT - ALIGN w/ BLOCK COURSING
24. 4'-0" EXHAUST LOUVER VENT - REFER TO MECH.
25. METAL CHANNEL LETTERS
26. WOOD GUARDRAIL ON DECK
27. EXTERIOR METAL SOFFIT (MS-1)
28. CONCRETE STAIR AND RAILING
29. 3'-4" x 7'-4" KNOCK-OUT PANEL
30. CAST STONE SILL (CS-2) - REFER TO SECTION DETAILS FOR PROFILES
31. ALUMINUM CLAD FIXED WOOD WINDOW IN DORMER (W-2) - REFER TO SHEET A0-04.
32. HOODED WALL CAP W. SCREEN - REFER TO MECH.
33. ALTERNATE #2: REFER TO SHEET A0-04 AND A3-10.
34. ALTERNATE #3: WINDOW, SURROUNDING TRIM BOARD AND WOOD-PLASTIC COMPOSITE LUMBER ABOVE TO BE REMOVED - REFER TO SHEET A3-01.
35. CAST STONE SILL CAP.

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Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

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AM / JV

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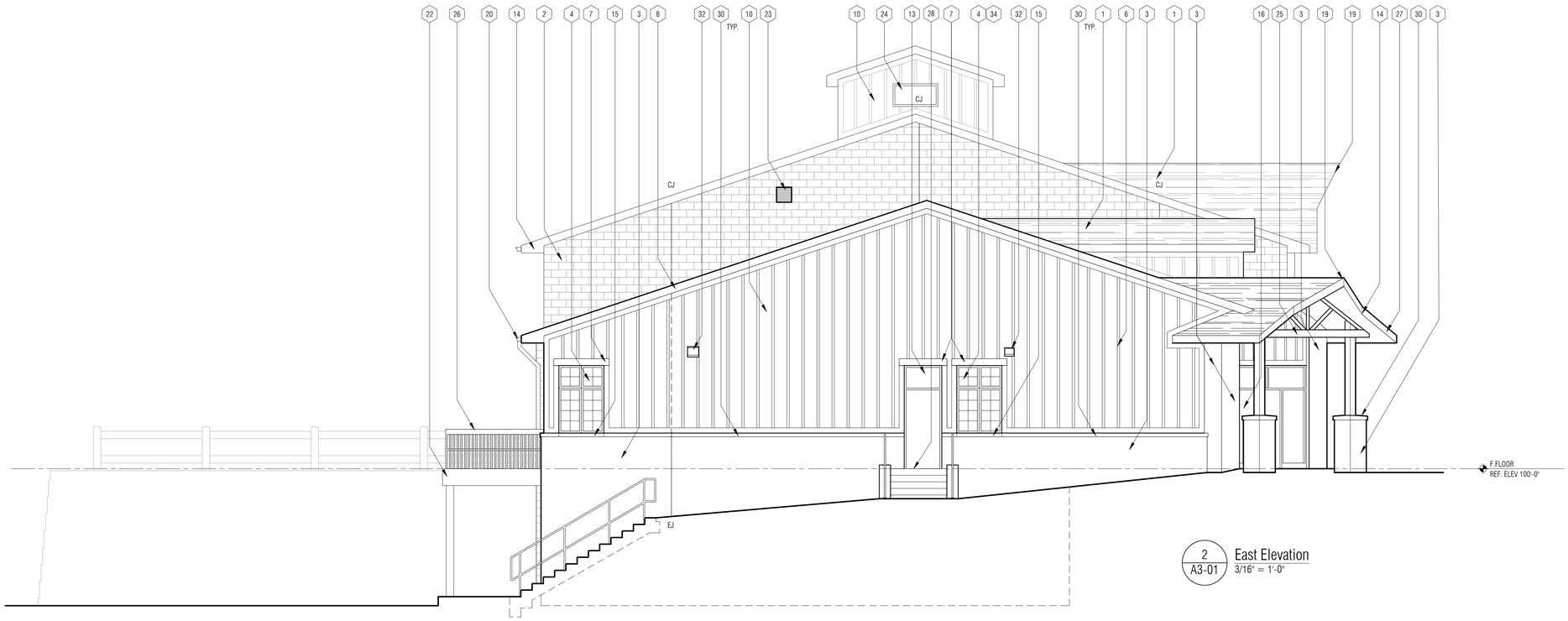
DWG

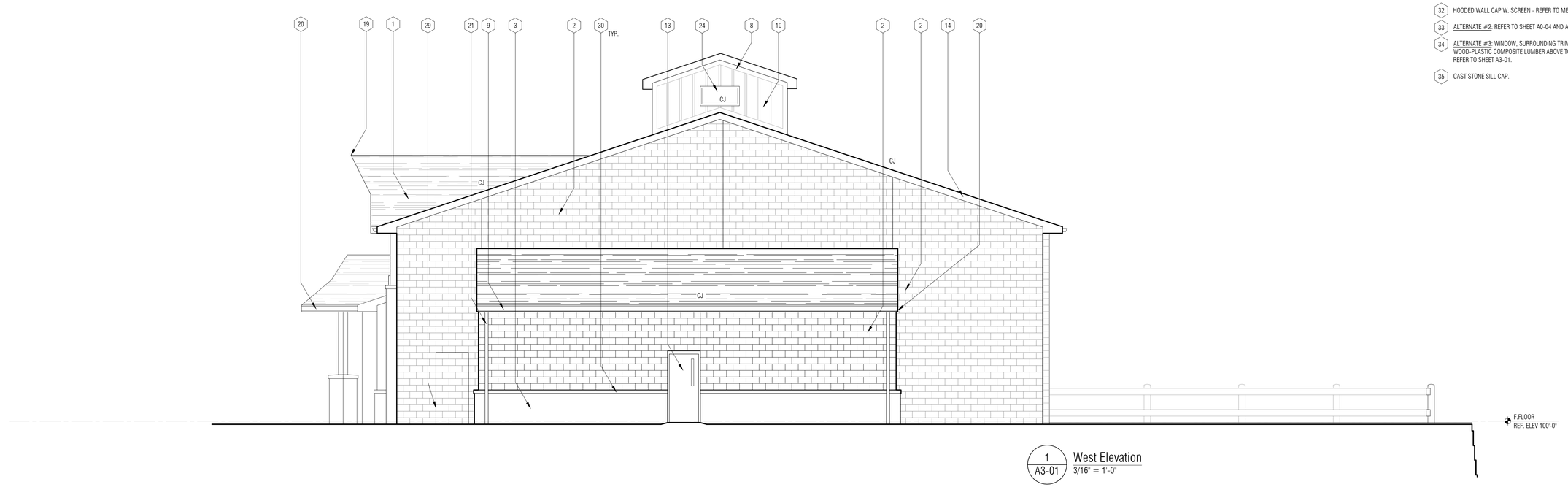
SHEET NAME

EXTERIOR
ELEVATIONS

SHEET NO.
A5-01



2 A3-01 East Elevation
3/16" = 1'-0"



1 A3-01 West Elevation
3/16" = 1'-0"

EXTERIOR ELEVATIONS GENERAL NOTES:

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11. FIBER-CEMENT SOFFIT (SD-4) - PAINT
12. GOOSENECK LIGHT FIXTURE - SEE ELECTRICAL
13. DOOR AND FRAME AS SCHEDULED - REFER TO SHEET A0-04
14. ALUMINUM FASCIA (MRS-1)
15. CAST STONE SILL (CS-1) AT WINDOW OPENINGS - REFER TO SECTION DETAILS FOR PROFILES
16. ALUMINUM STOREFRONT WINDOW AS SCHEDULED - REFER TO SHEET A0-04
17. INSULATED OVERHEAD DOORS - REFER TO SHEET A0-04
18. 6" CONCRETE FILLED BOLLARD
19. BIRD'S BEAK ROOF OVERHANG
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21. METAL DOWNSPOUT DRAIN TO GROUND LEVEL OR ROOF (MRS-2)
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23. LOUVER VENT - ALIGN w/ BLOCK COURSING
24. 4'-0" EXHAUST LOUVER VENT - REFER TO MECH.
25. METAL CHANNEL LETTERS
26. WOOD GUARDRAIL ON DECK
27. EXTERIOR METAL SOFFIT (MS-1)
28. CONCRETE STAIR AND RAILING
29. 3'-4" x 7'-4" KNOCK-OUT PANEL
30. CAST STONE SILL (CS-2) - REFER TO SECTION DETAILS FOR PROFILES
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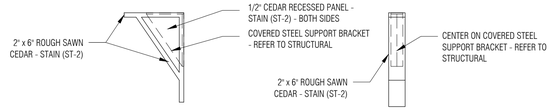
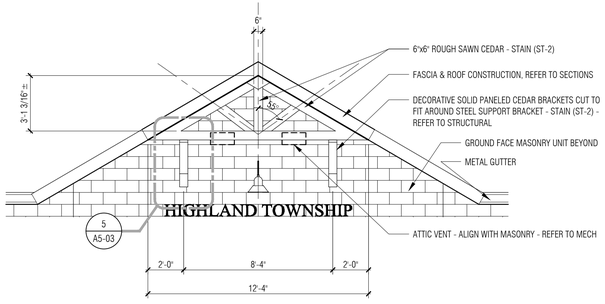
SHEET NAME

EXTERIOR
ELEVATIONS

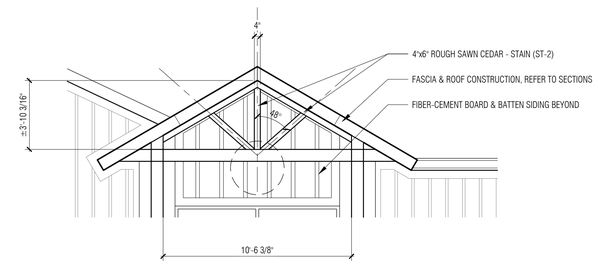
SHEET NO.
A5-02



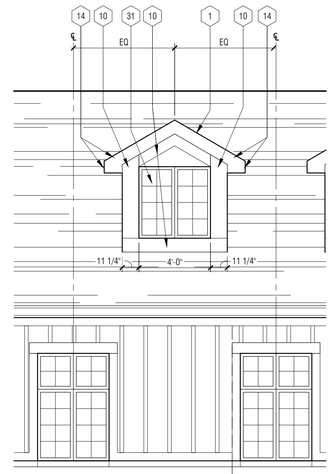
5 A5-03 Decorative Bracket Detail
1/4" = 1'-0"



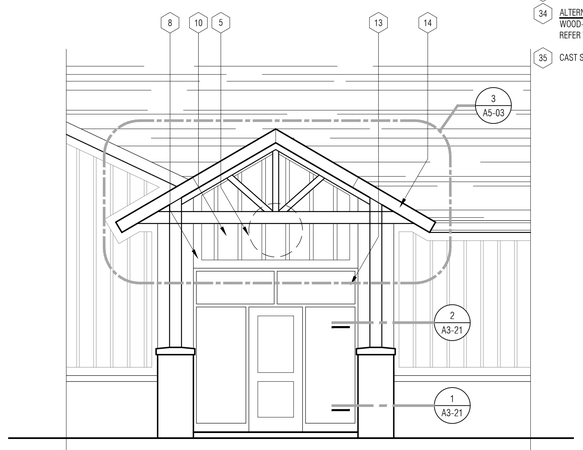
4 A5-01 Decorative King Post Bracket Elevation
1/4" = 1'-0"



3 A5-03 Decorative King Post Bracket Elevation
1/4" = 1'-0"



2 A5-01 Typ. Dormer Elevation
1/4" = 1'-0"



1 A3-01 North-East Entrance Elevation
1/4" = 1'-0"

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A. REFER TO MATERIAL FINISH / COLOR SCHEDULE (SPEC SECTION 000200) FOR ALL MATERIAL NOTES.
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11. FIBER-CEMENT SOFFIT (SD-4) - PAINT
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35. CAST STONE SILL CAP.

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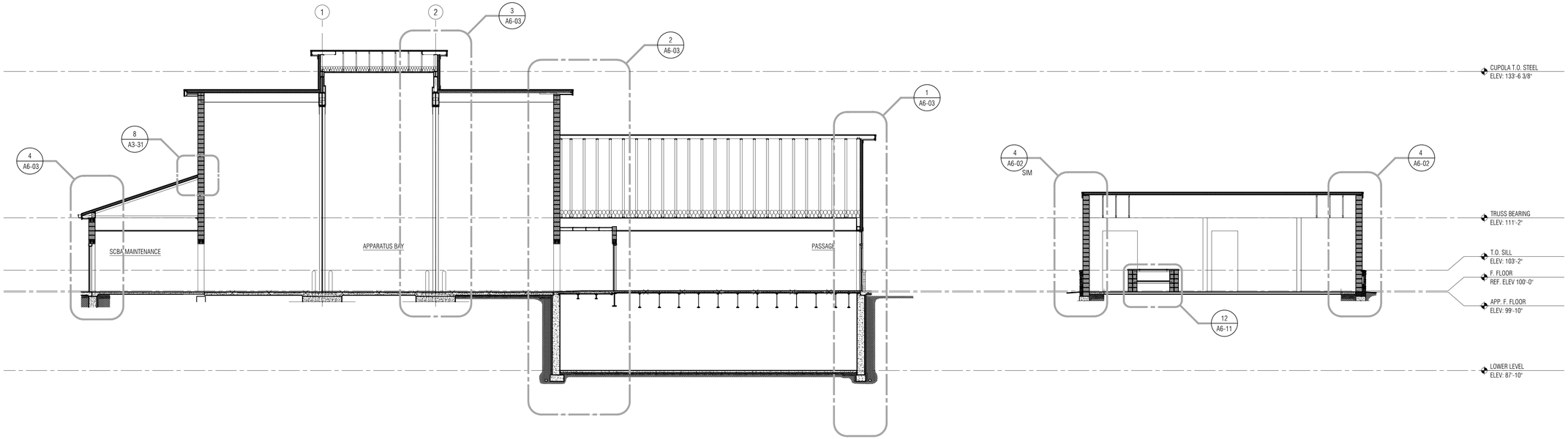
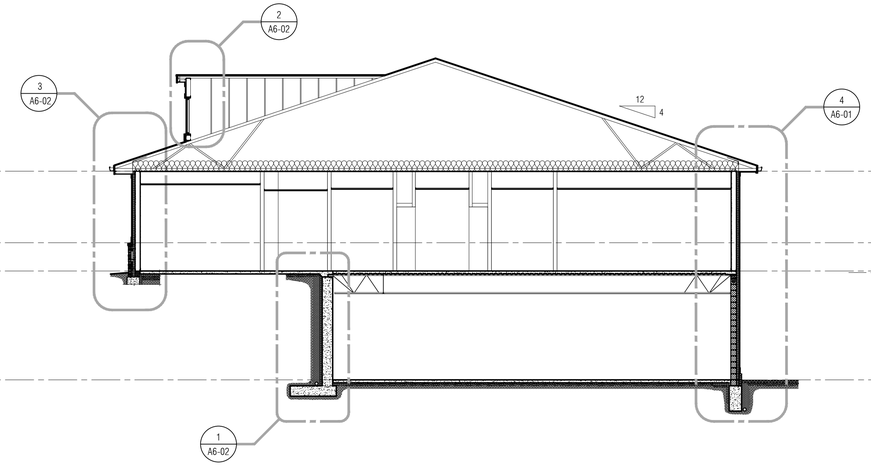
SHEET NAME
ENLARGED EXTERIOR ELEVATIONS

SHEET NO.
A5-03

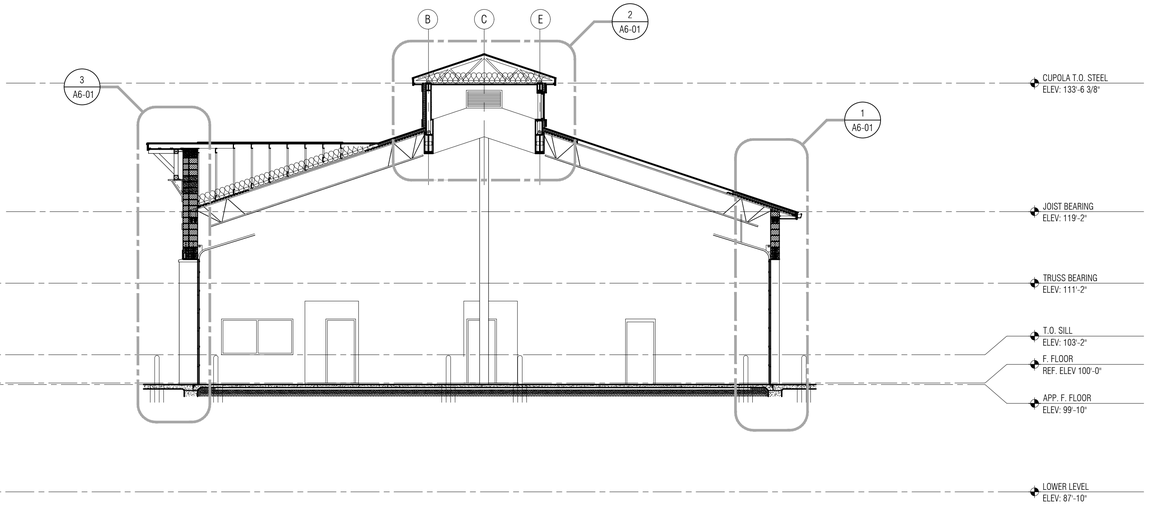


4 / A3-01 Building Section
1/8" = 1'-0"

3 / A3-01 Building Section
1/8" = 1'-0"



2 / A3-01 Building Section
1/8" = 1'-0"



1 / A3-01 Building Section
1/8" = 1'-0"

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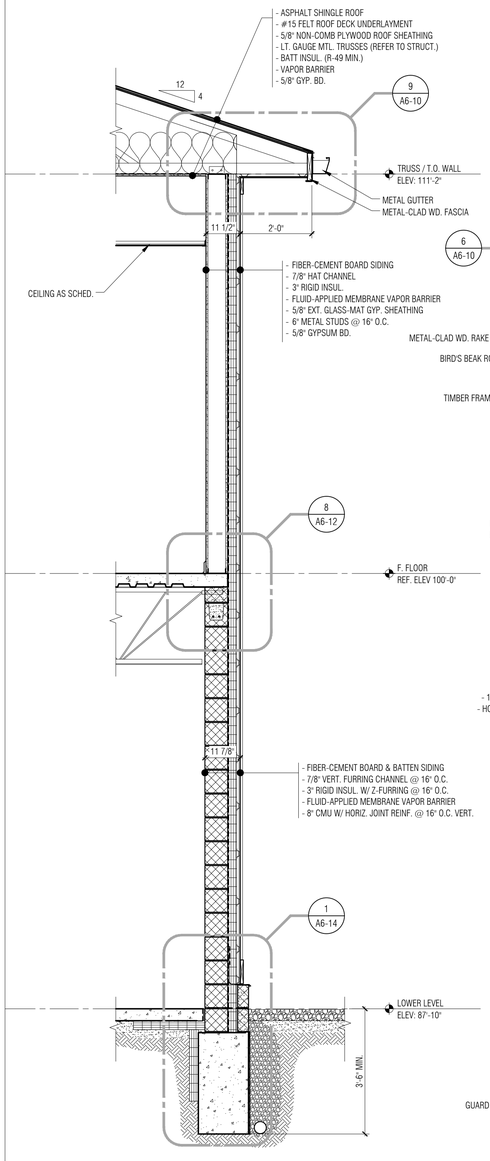
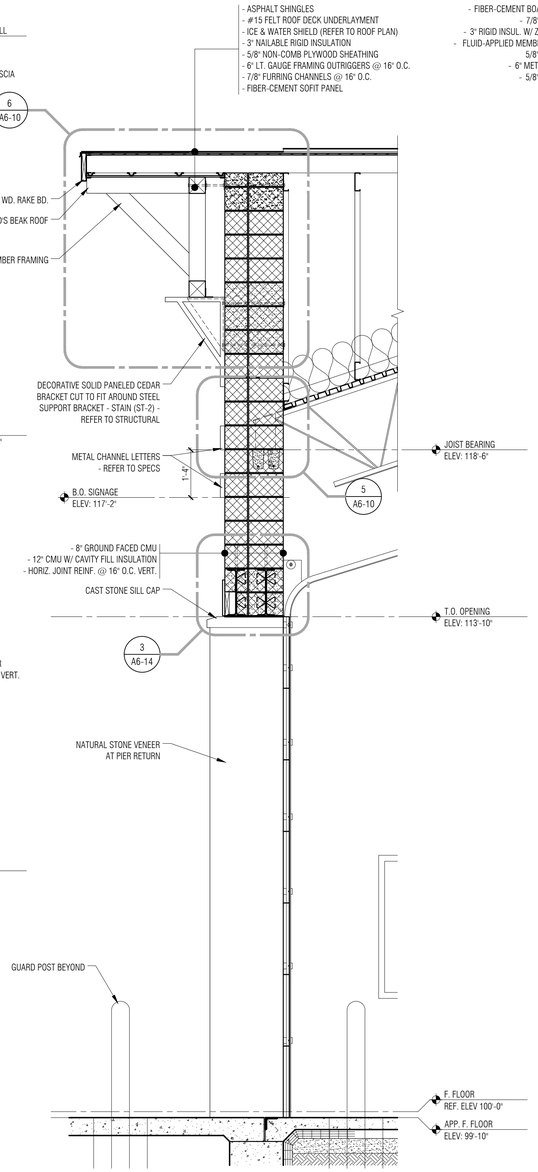
BUILDING
SECTIONS

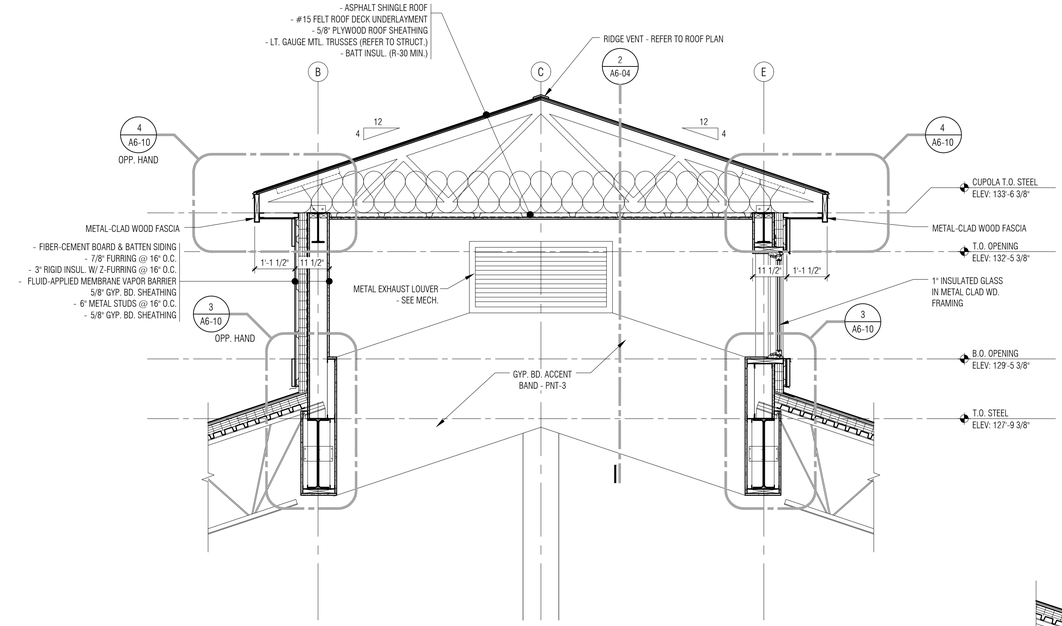
SHEET NO.
A5-10



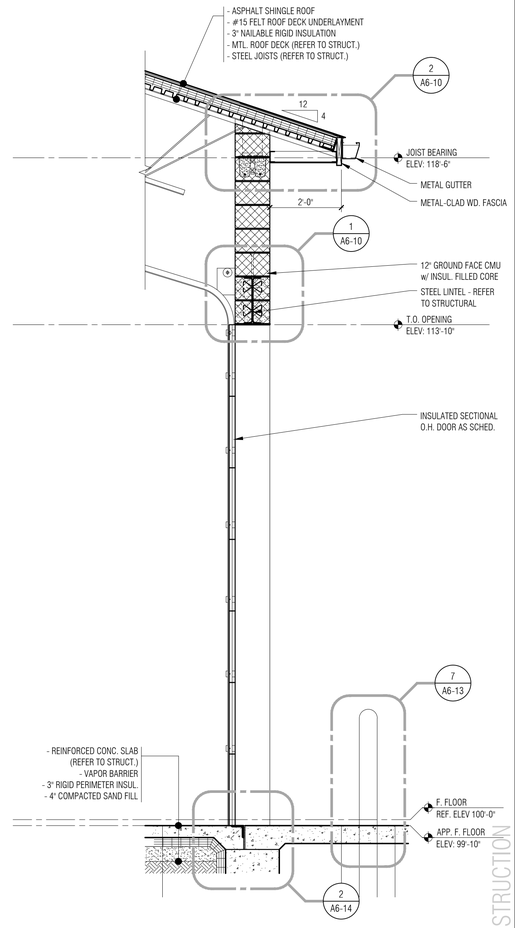
4 A5-10 Wall Section
1/2" = 1'-0"



3 A5-10 Wall Section
1/2" = 1'-0"



2 A5-10 Wall Section
1/2" = 1'-0"



1 A5-10 Wall Section
1/2" = 1'-0"

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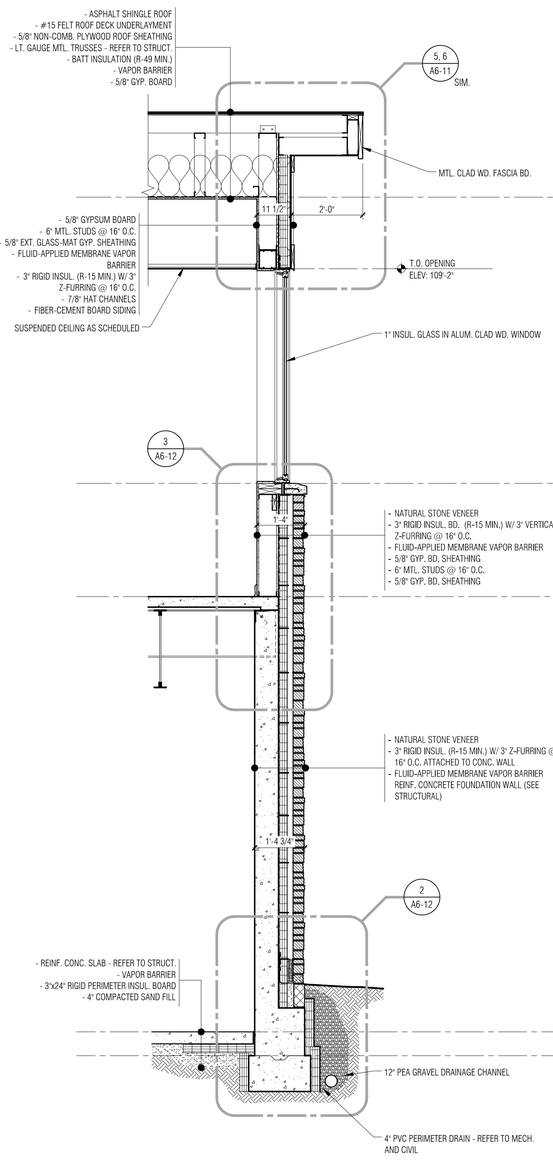
SHEET NAME

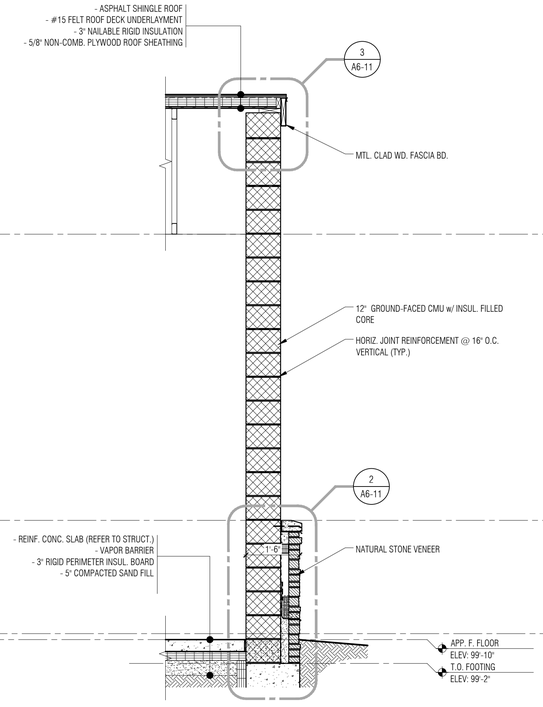
WALL SECTIONS

SHEET NO.

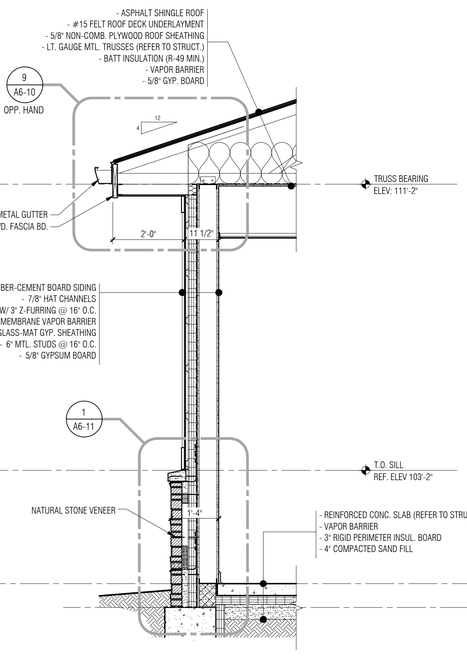
A6-01



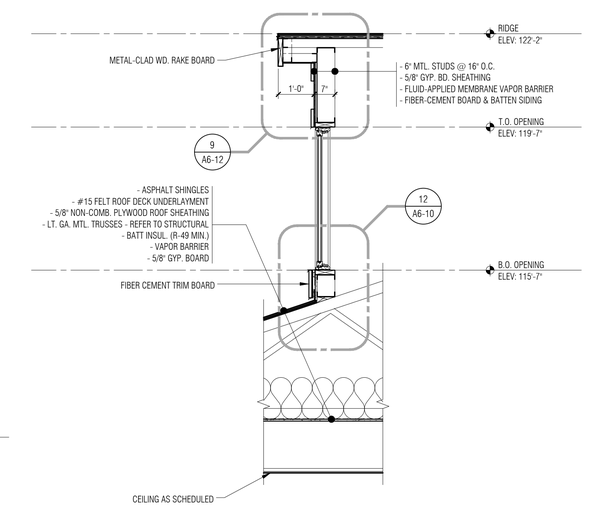
5 A3-01 Wall Section
1/2" = 1'-0"



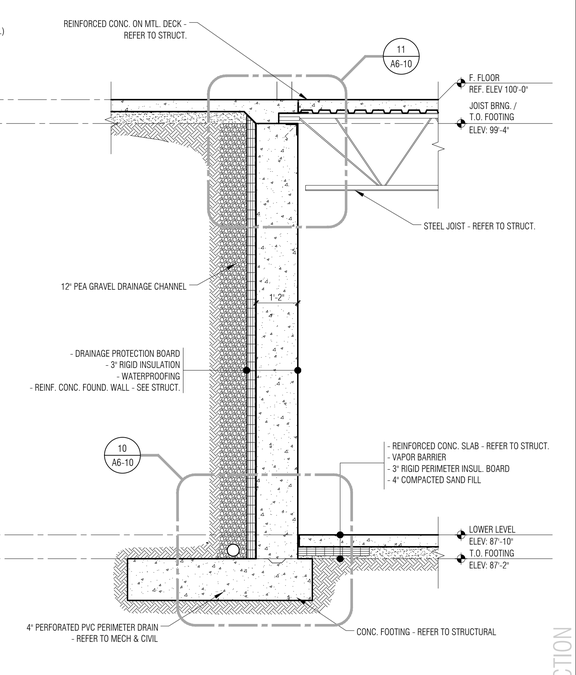
4 A5-10 Wall Section
1/2" = 1'-0"



3 A5-10 Wall Section
1/2" = 1'-0"



2 A5-10 Wall Section
1/2" = 1'-0"



1 A5-10 Wall Section
1/2" = 1'-0"

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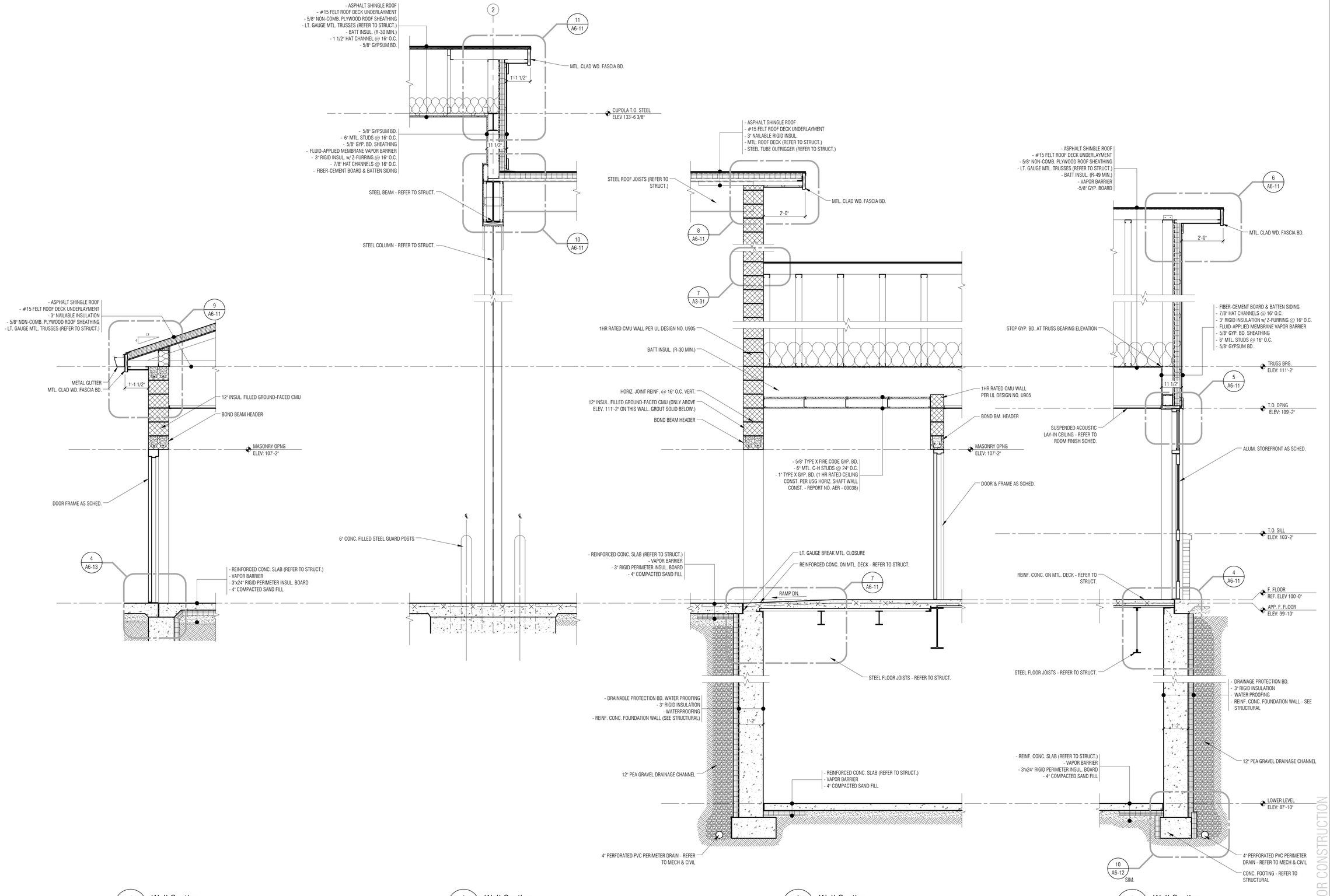
WALL SECTIONS

SHEET NO.

A6-02



4 / A5-10 Wall Section 1/2" = 1'-0"

3 / A5-10 Wall Section 1/2" = 1'-0"

2 / A5-10 Wall Section 1/2" = 1'-0"

1 / A5-10 Wall Section 1/2" = 1'-0"

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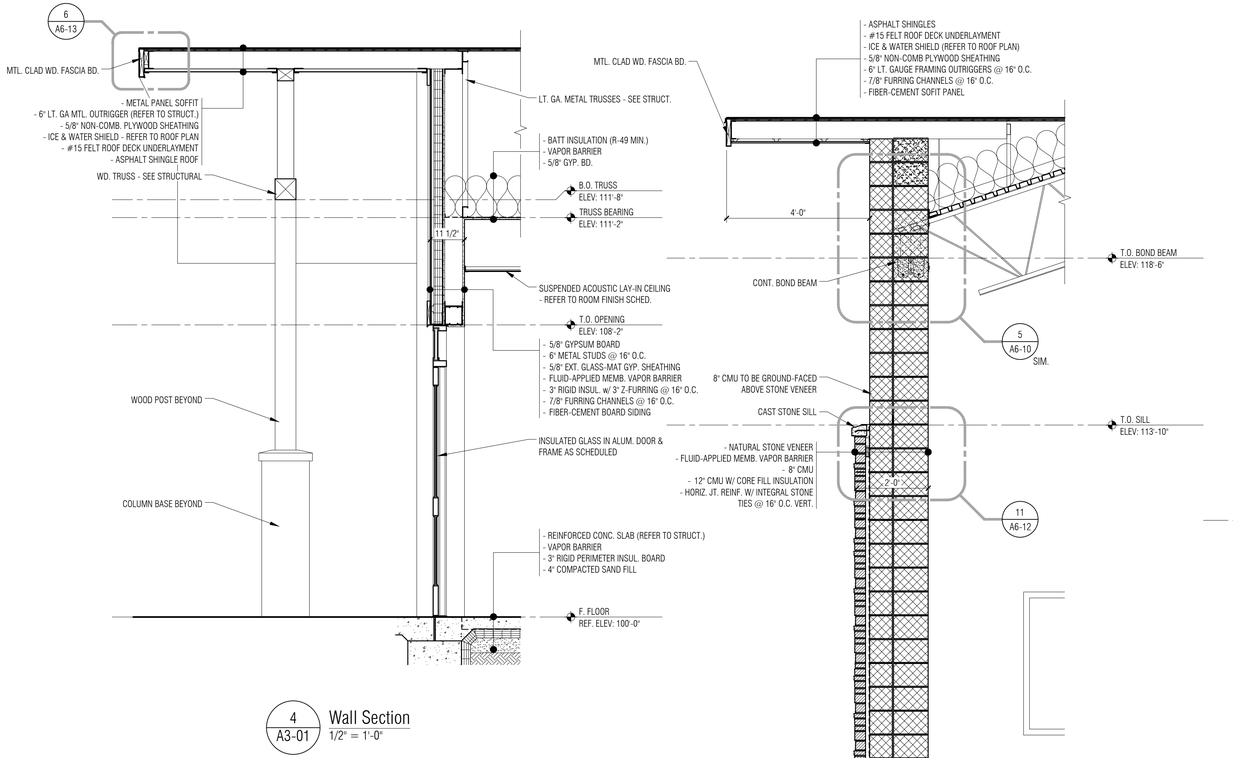
SHEET NAME

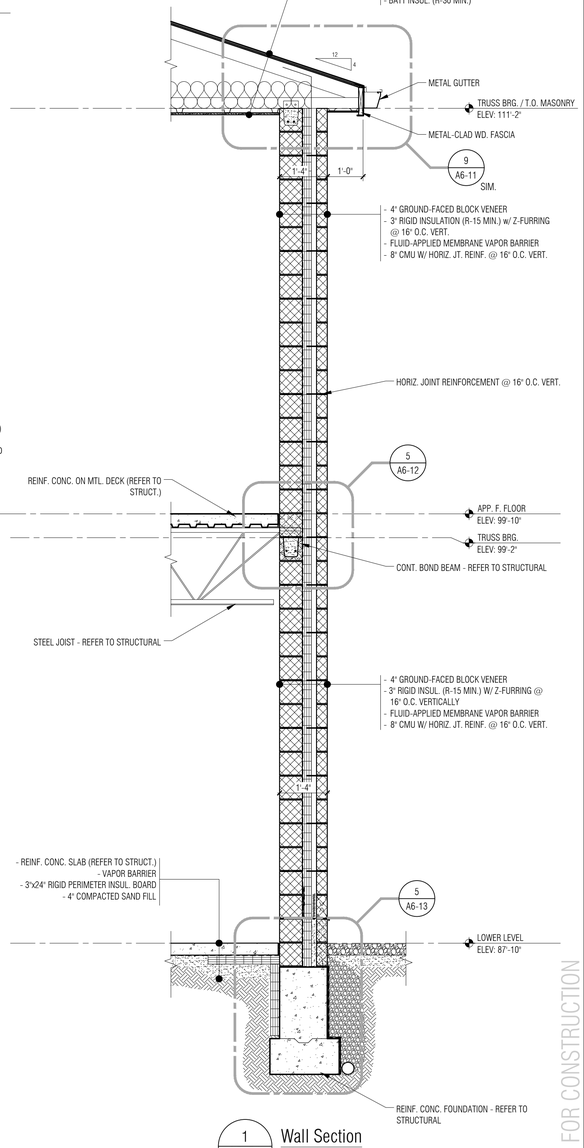
WALL SECTIONS

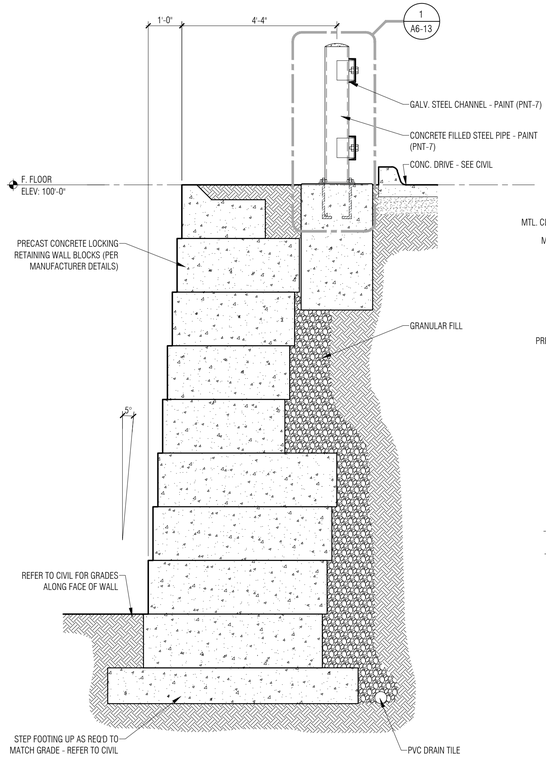
SHEET NO.

A6-03

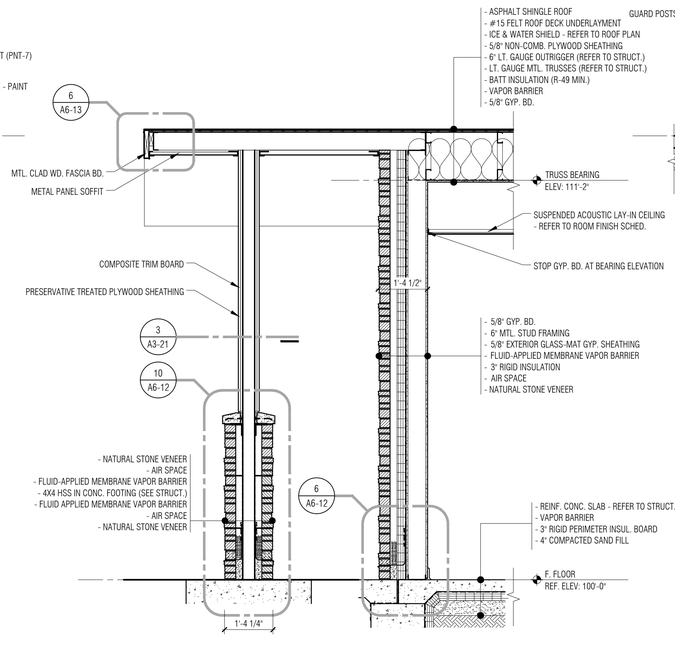


4 / A3-01 Wall Section
1/2" = 1'-0"

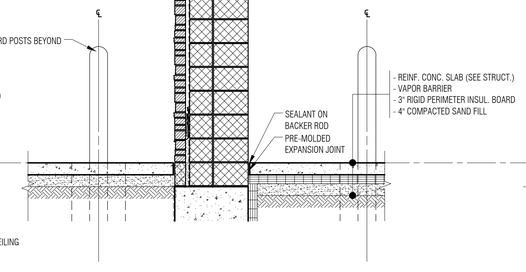




5 / A3-01 Wall Section
1/2" = 1'-0"



3 / A3-01 Wall Section
1/2" = 1'-0"



2 / A3-01 Wall Section
1/2" = 1'-0"

1 / A3-01 Wall Section
1/2" = 1'-0"

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CONSULTANT

KEY PLAN

OWNER
Highland Township Fire Department

PROJECT NAME
Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS
Bidding / Construction 08/27/2020

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AM / JV

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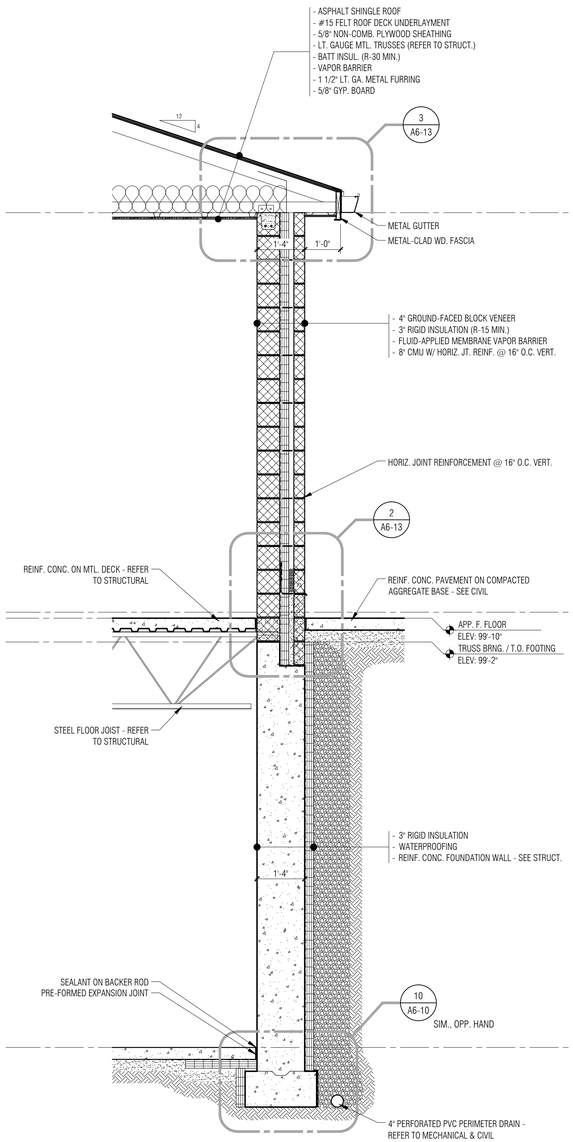
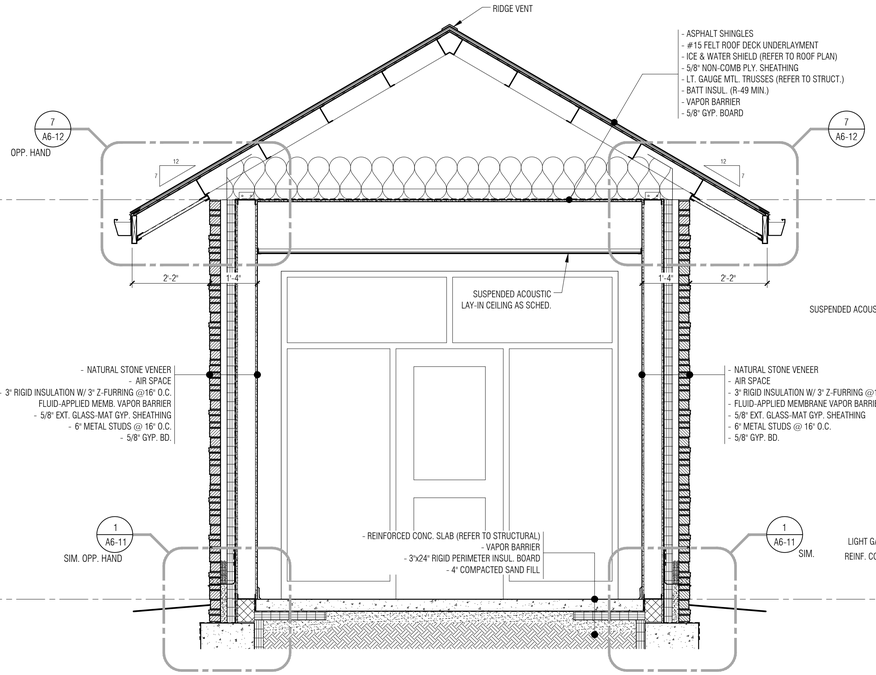
DWG

SHEET NAME
WALL SECTIONS

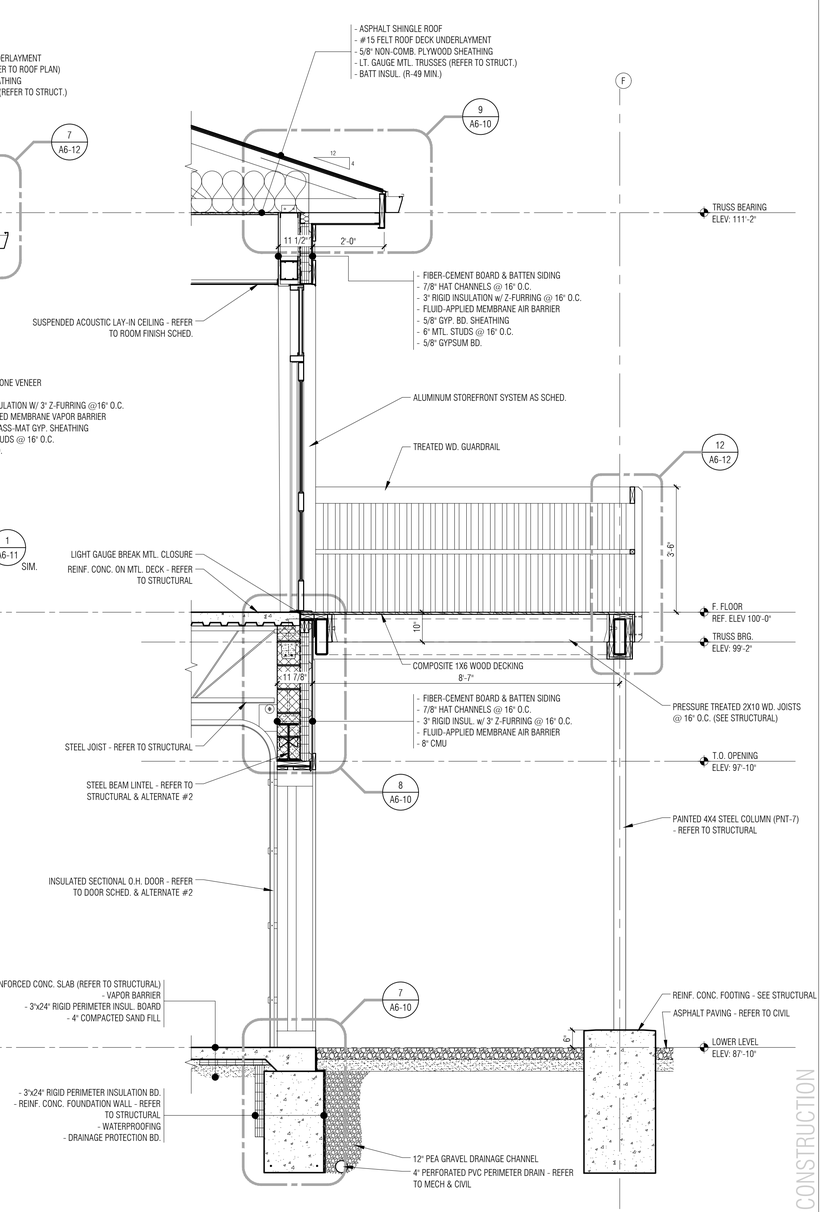
SHEET NO.
A6-04



3 / A3-01 Wall Section
1/2" = 1'-0"



2 / A3-01 Wall Section
1/2" = 1'-0"



1 / A3-01 Wall Section
1/2" = 1'-0"

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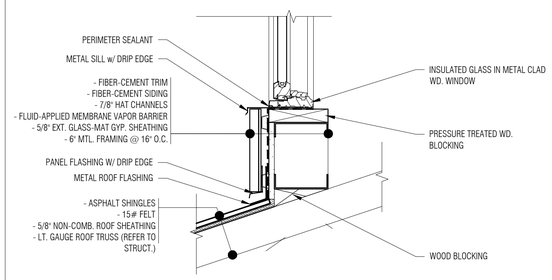
SHEET NAME

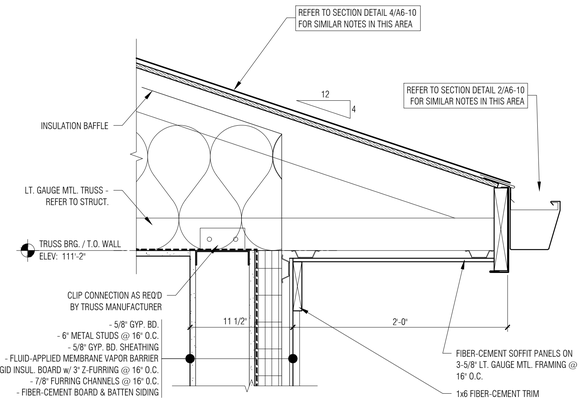
WALL SECTIONS

SHEET NO.

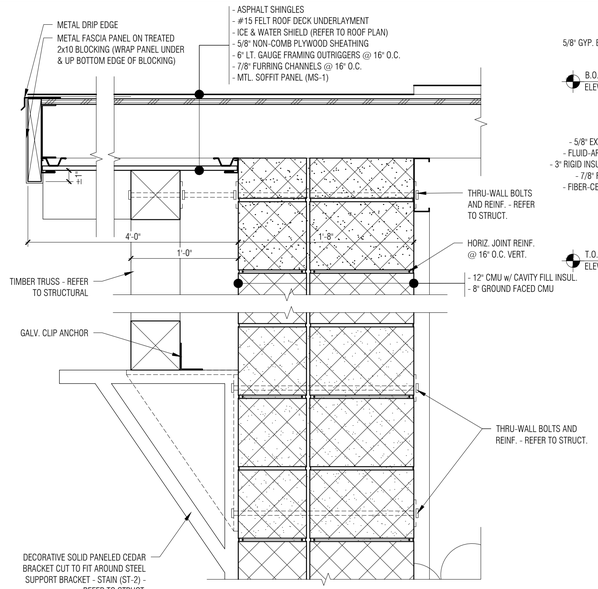
A6-05



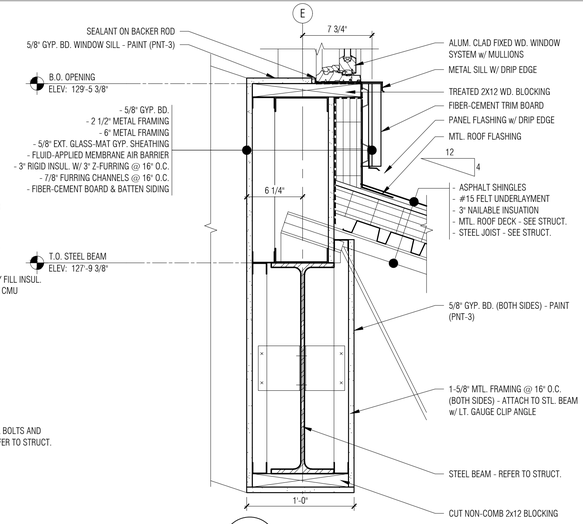
12 / A6-02 Section Detail
1 1/2" = 1'-0"



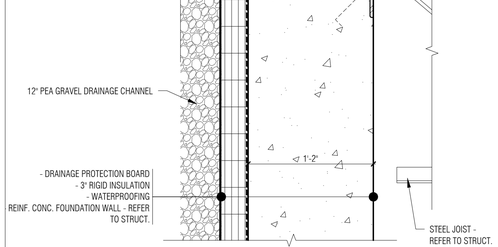
9 / A6-01 Section Detail
1 1/2" = 1'-0"



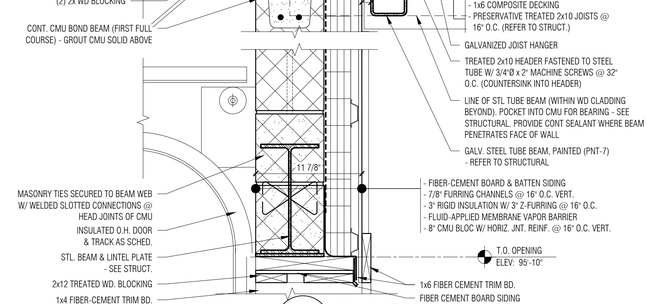
6 / A6-01 Section Detail
1 1/2" = 1'-0"



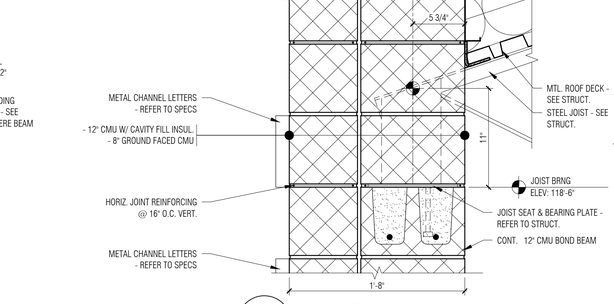
3 / A6-01 Section Detail
1 1/2" = 1'-0"



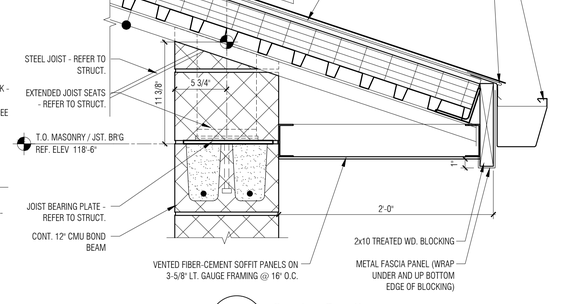
11 / A6-02 Section Detail
1 1/2" = 1'-0"



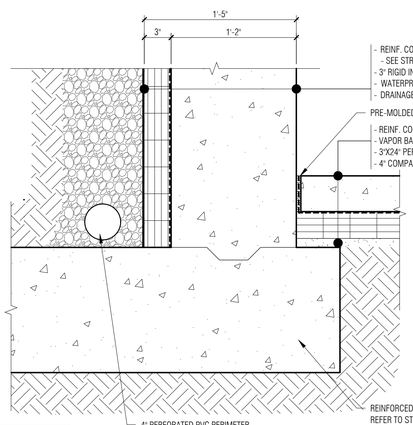
8 / A6-01 Section Detail
1 1/2" = 1'-0"



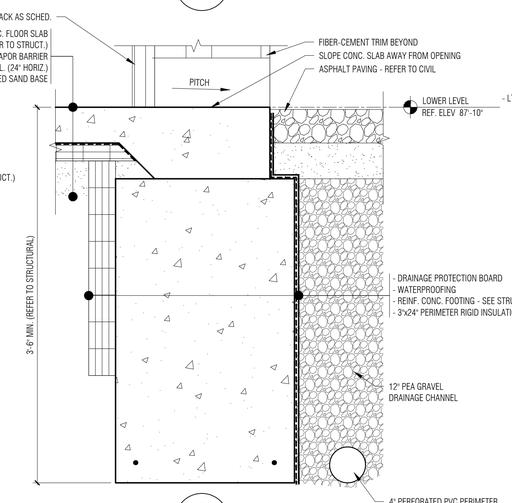
5 / A6-01 Section Detail
1 1/2" = 1'-0"



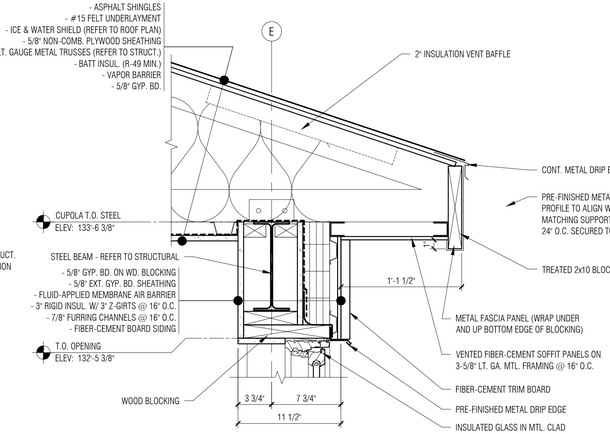
2 / A6-01 Section Detail
1 1/2" = 1'-0"



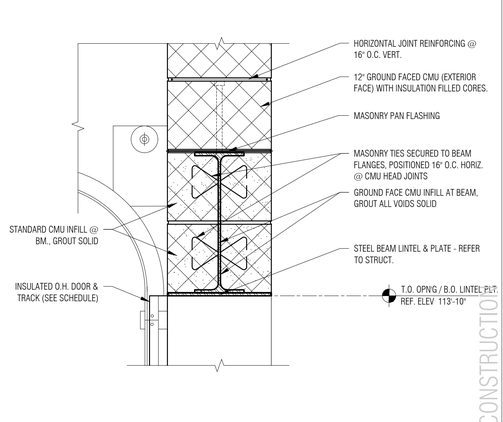
10 / A6-02 Section Detail
1 1/2" = 1'-0"



7 / A6-01 Section Detail
1 1/2" = 1'-0"



4 / A6-01 Section Detail
1 1/2" = 1'-0"



1 / A6-01 Section Detail
1 1/2" = 1'-0"

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CONSULTANT

KEY PLAN

OWNER
Highland Township
Fire Department

PROJECT NAME
Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS
Bidding / Construction 08/27/2020

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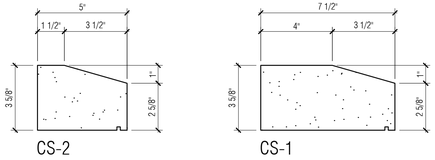
AM / JV

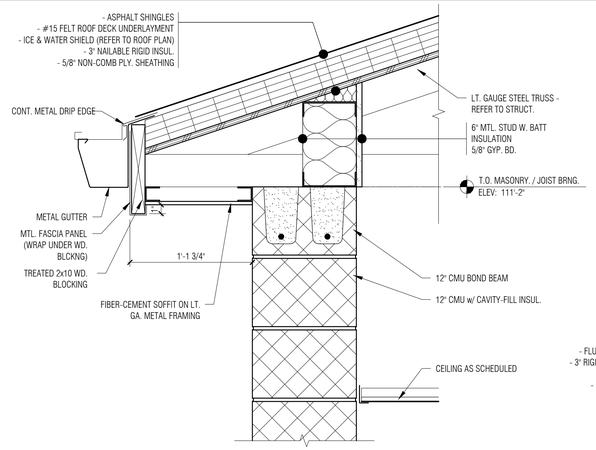
APPROVED BY
DWG

SHEET NAME
SECTION DETAILS

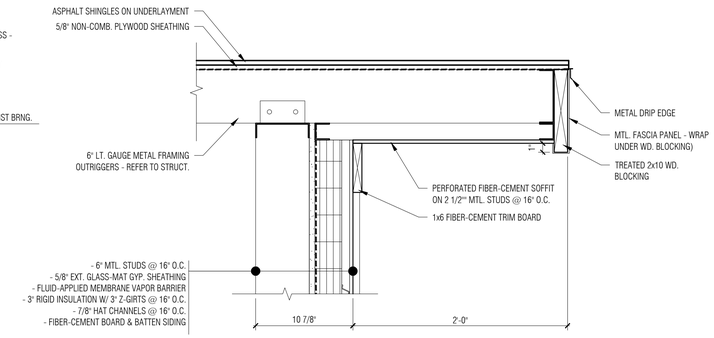
SHEET NO.
A6-10



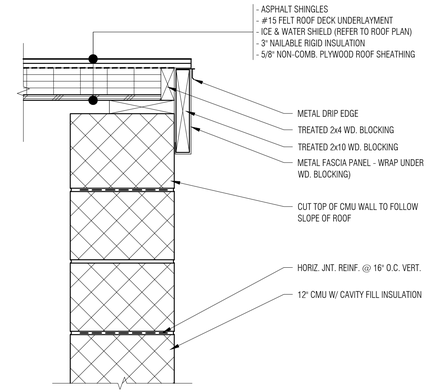
12 Sill Profiles
3" = 1'-0"



9 / A6-03 Section Detail
1 1/2" = 1'-0"

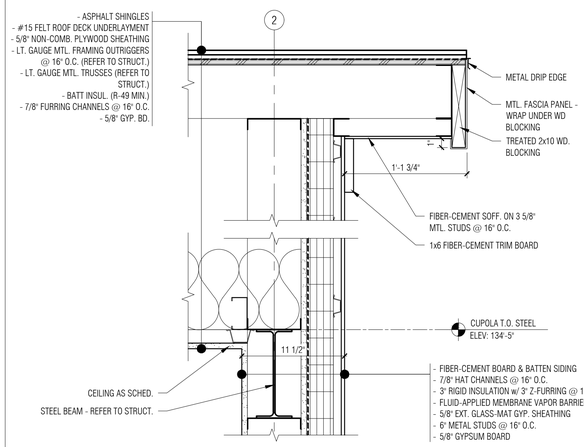


6 / A6-03 Section Detail
1 1/2" = 1'-0"

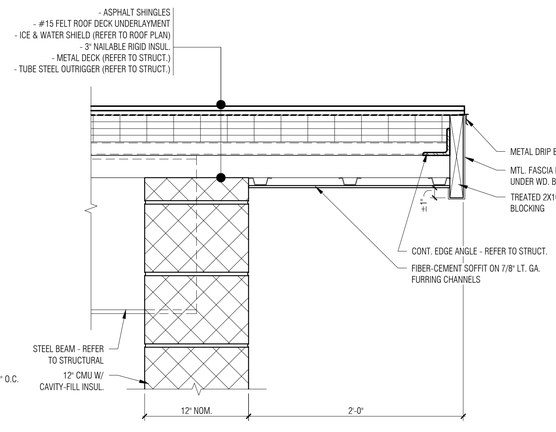


3 / A6-02 Section Detail
1 1/2" = 1'-0"

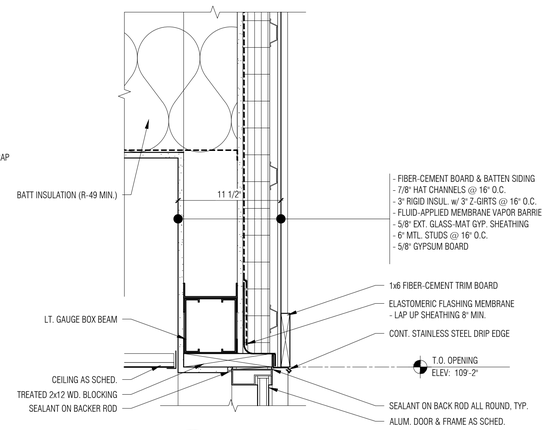
REFER TO DETAIL 2 THIS SHEET FOR SIMILAR NOTES IN THIS AREA



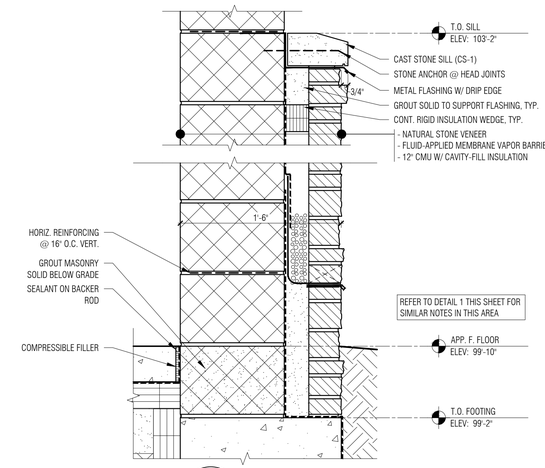
11 / A6-03 Section Detail
1 1/2" = 1'-0"



8 / A6-03 Section Detail
1 1/2" = 1'-0"

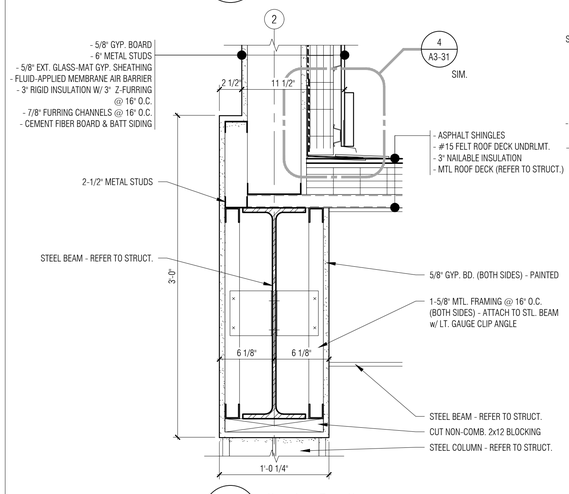


5 / A6-03 Section Detail
1 1/2" = 1'-0"

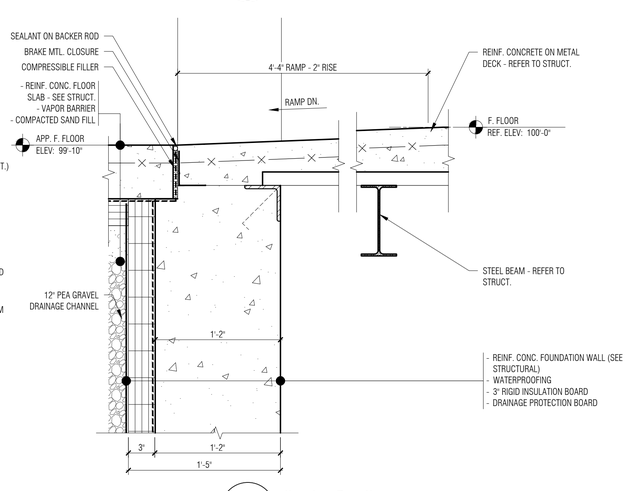


REFER TO DETAIL 1 THIS SHEET FOR SIMILAR NOTES IN THIS AREA

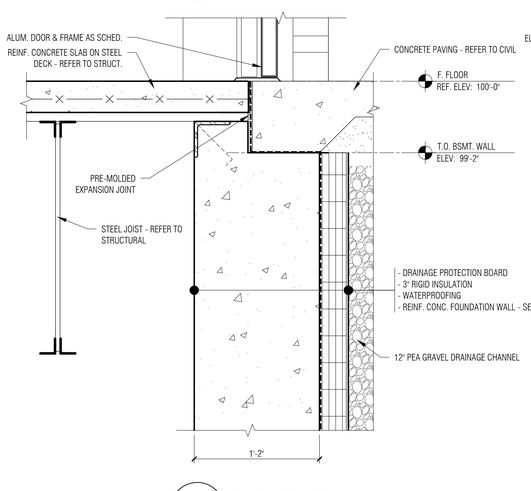
2 / A6-02 Section Detail
1 1/2" = 1'-0"



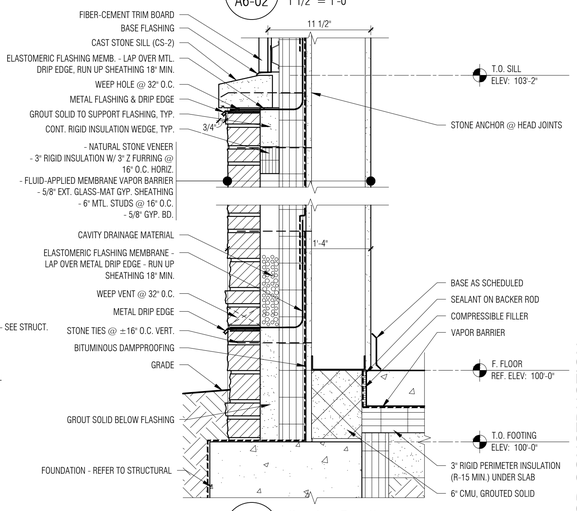
10 / A6-03 Section Detail
1 1/2" = 1'-0"



7 / A6-03 Section Detail
1 1/2" = 1'-0"



4 / A6-03 Section Detail
1 1/2" = 1'-0"



1 / A6-02 Section Detail
1 1/2" = 1'-0"

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CONSULTANT

KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding / Construction 08/27/2020

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AM / JV

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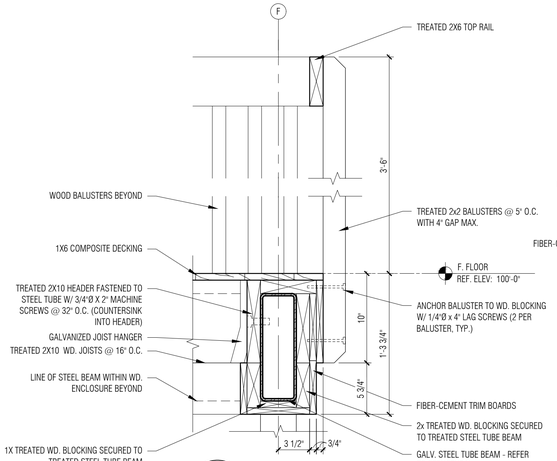
DWG

SHEET NAME

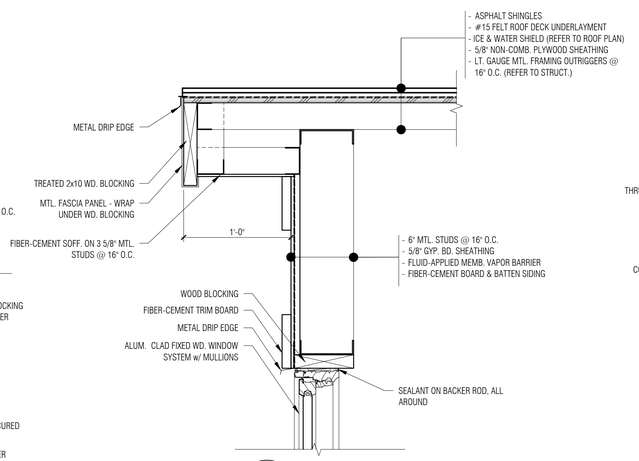
SECTION DETAILS

SHEET NO.

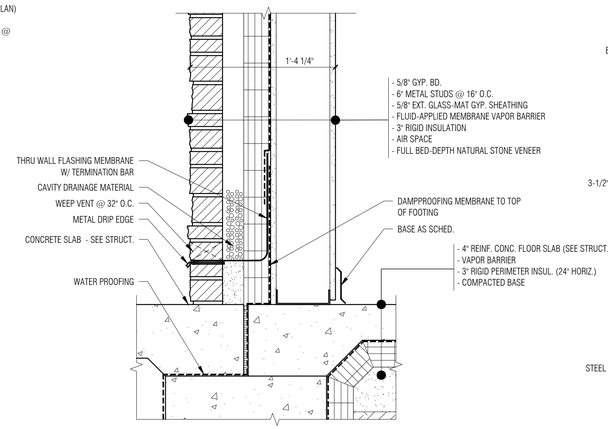
A6-11



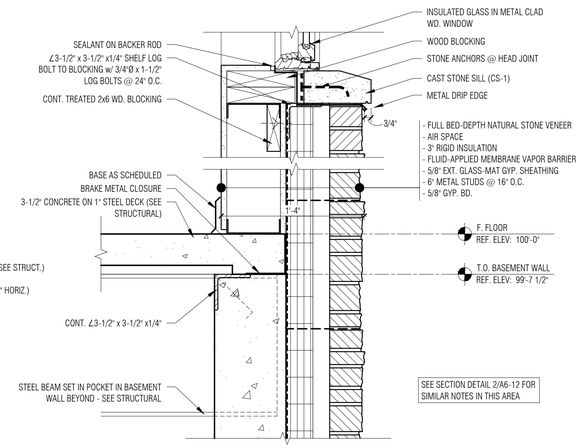
12 / A6-05 Section Detail
1 1/2" = 1'-0"



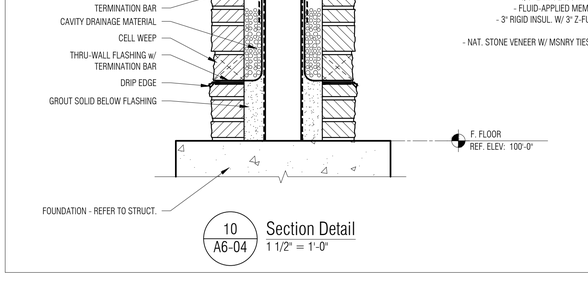
9 / A6-02 Section Detail
1 1/2" = 1'-0"



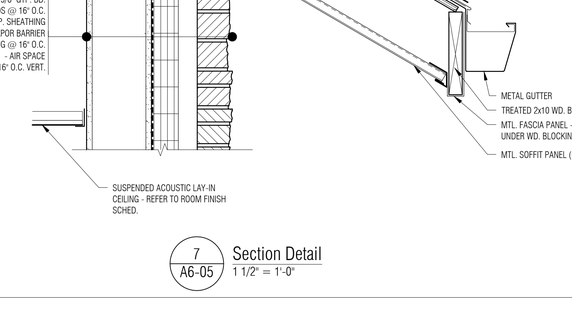
6 / A6-03 Section Detail
1 1/2" = 1'-0"



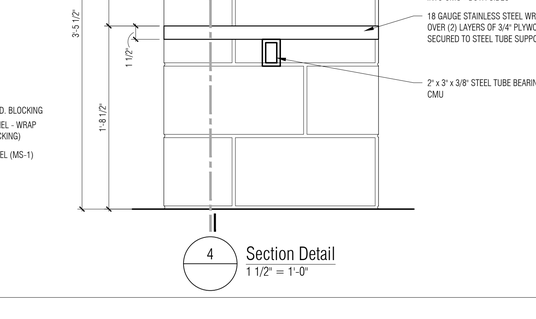
3 / A6-02 Section Detail
1 1/2" = 1'-0"



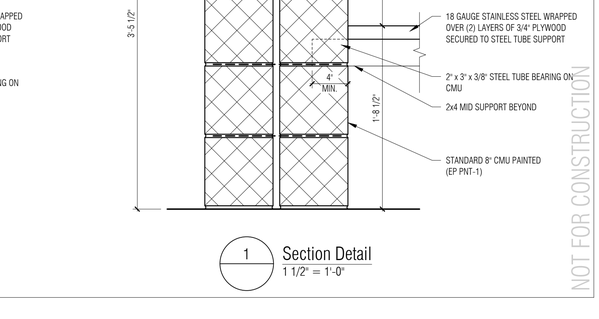
11 / A6-04 Section Detail
1 1/2" = 1'-0"



8 / A6-04 Section Detail
1 1/2" = 1'-0"



5 / A6-04 Section Detail
1 1/2" = 1'-0"



2 / A6-02 Section Detail
1 1/2" = 1'-0"

10 / A6-04 Section Detail
1 1/2" = 1'-0"

7 / A6-05 Section Detail
1 1/2" = 1'-0"

4 Section Detail
1 1/2" = 1'-0"

1 Section Detail
1 1/2" = 1'-0"

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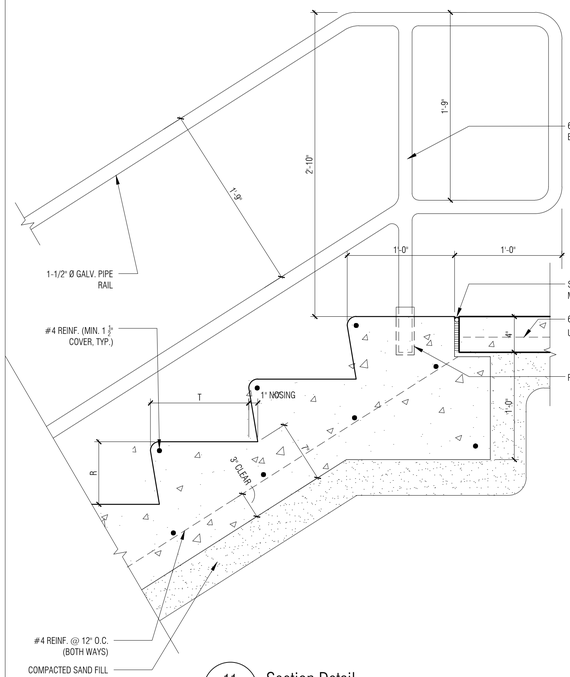
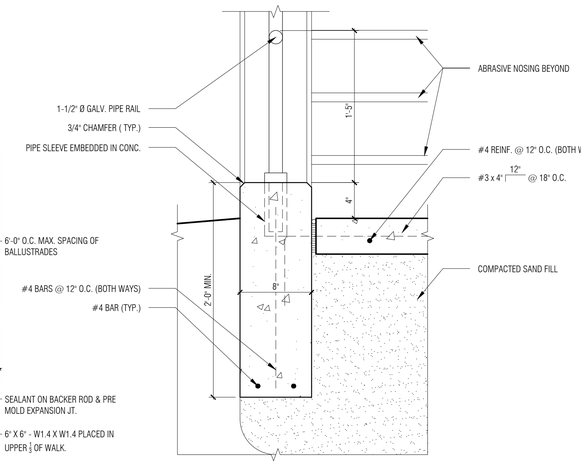
SHEET NAME
SECTION DETAILS

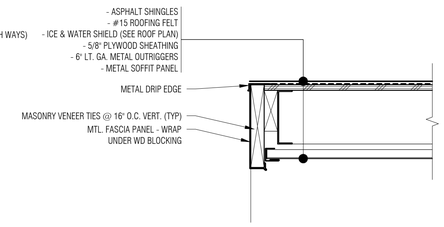
SHEET NO.
A6-12



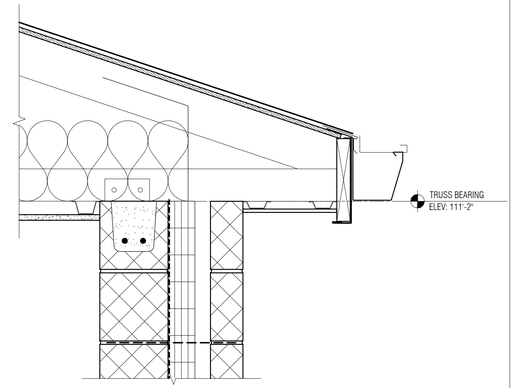
11 / A3-01 Section Detail
1 1/2" = 1'-0"



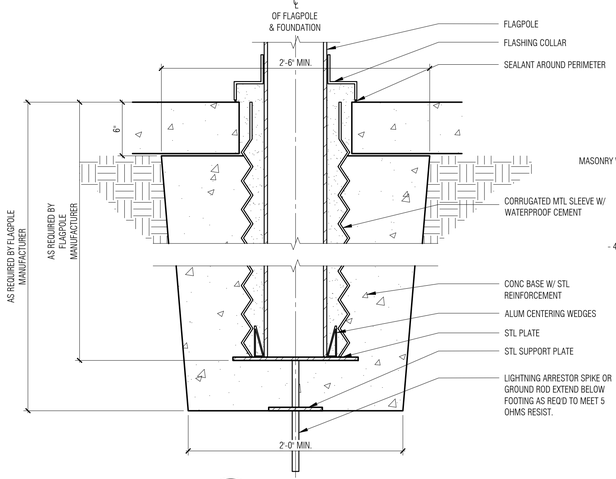
9 / A3-01 Section Detail
3/4" = 1'-0"



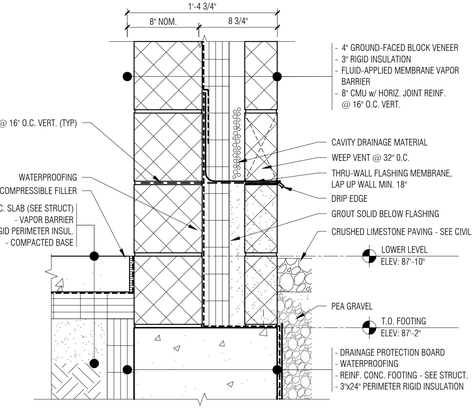
6 / A6-04 Section Detail
1 1/2" = 1'-0"



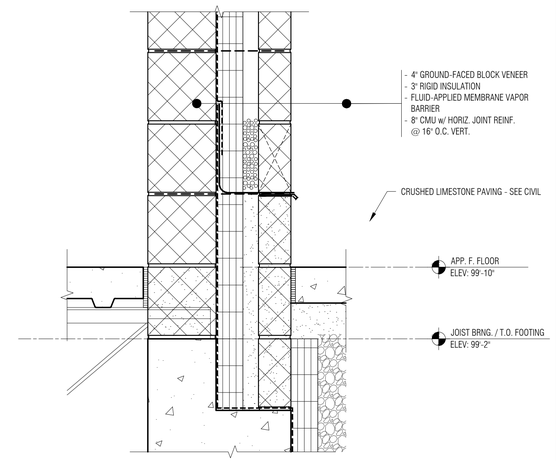
3 / A6-12 Section Detail
1 1/2" = 1'-0"



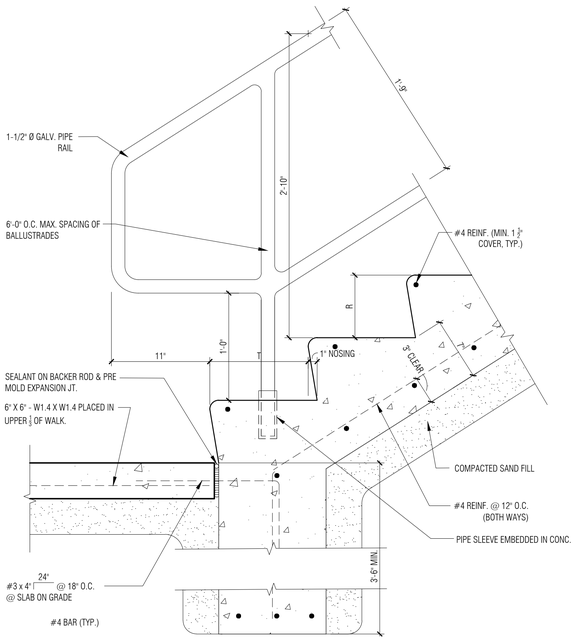
8 / A6-13 Section Detail
1 1/2" = 1'-0"



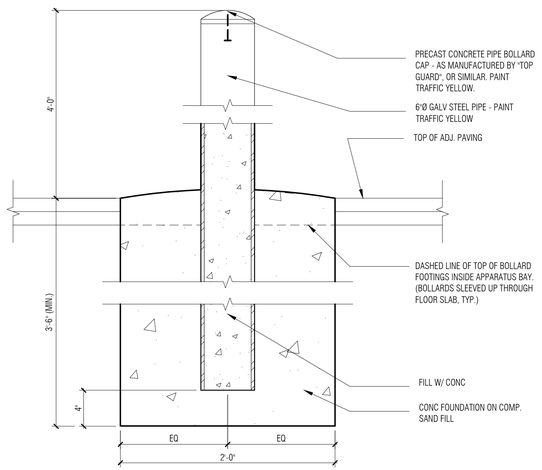
5 / A6-04 Section Detail
1 1/2" = 1'-0"



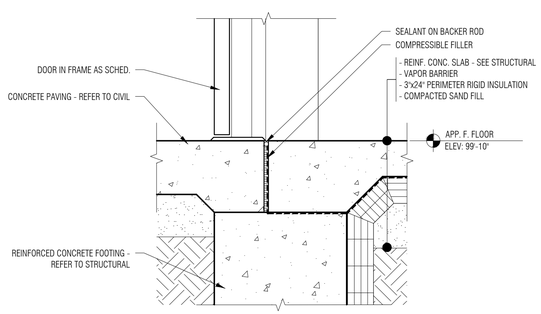
2 / A6-12 Section Detail
1 1/2" = 1'-0"



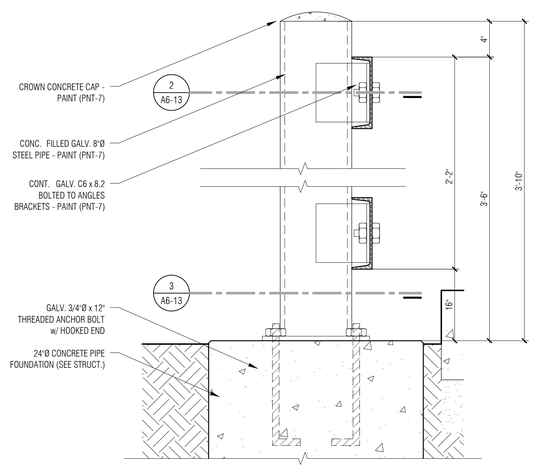
10 / A3-01 Section Detail
1 1/2" = 1'-0"



7 / A6-01 Section Detail
1 1/2" = 1'-0"



4 / A6-03 Section Detail
1 1/2" = 1'-0"



1 / A6-04 Section Detail
1 1/2" = 1'-0"

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PROJECT NAME

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Highland, MI 48356

PROJECT NO.

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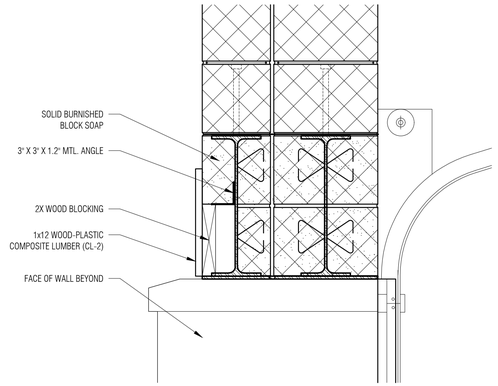
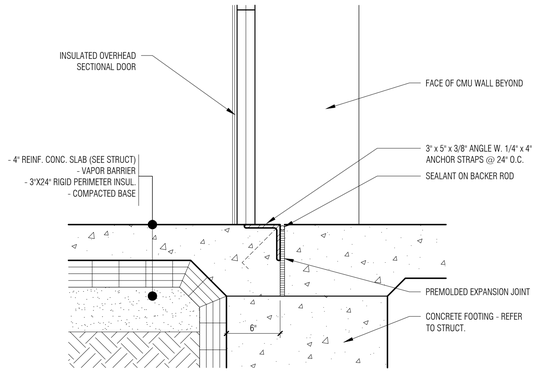
SECTION DETAILS

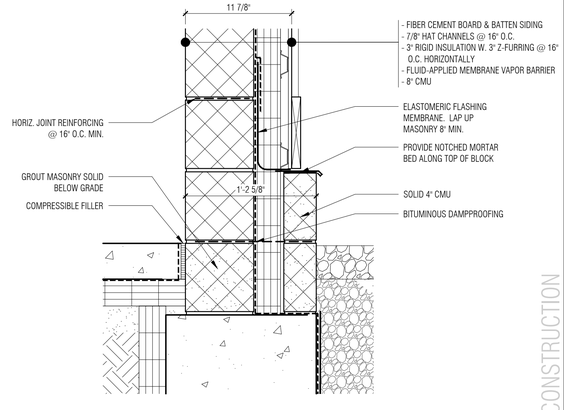
SHEET NO.
A6-13



3 / A6-01 Section Detail
1 1/2" = 1'-0"



2 / A6-01 Section Detail
1 1/2" = 1'-0"



1 / A6-01 Section Detail
1 1/2" = 1'-0"

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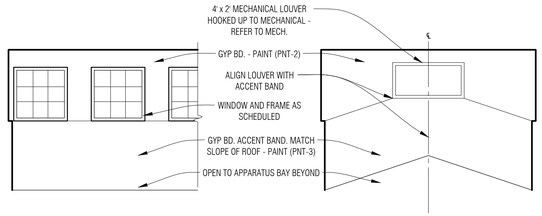
SECTION DETAILS

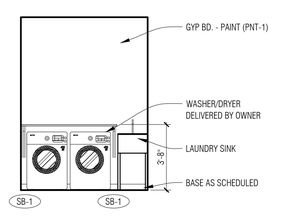
SHEET NO.

A6-14

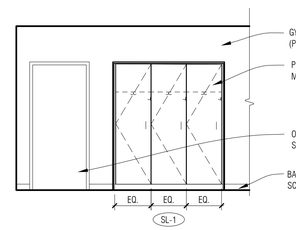


17 A3-01 Clerestory 201
1/4" = 1'-0"

16 A3-01 Clerestory 201
1/4" = 1'-0"

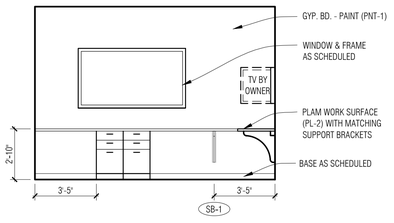


15 A3-01 Laundry 116
1/4" = 1'-0"

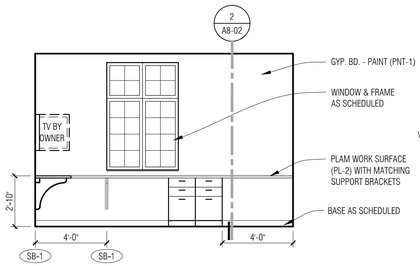


14 A3-01 Passage 113
1/4" = 1'-0"

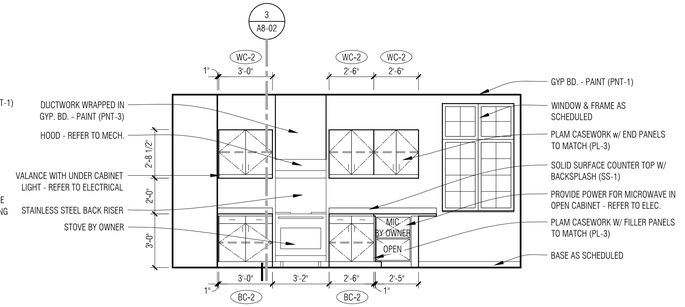
13 A3-01 Passage 102
1/4" = 1'-0"



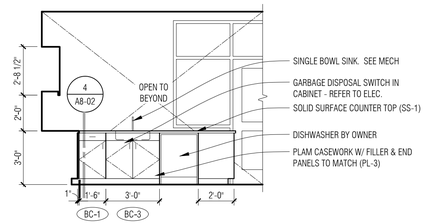
12 A3-01 Watch Desk 106
1/4" = 1'-0"



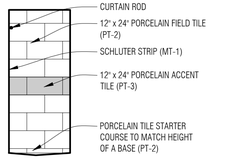
11 A3-01 Watch Desk 106
1/4" = 1'-0"



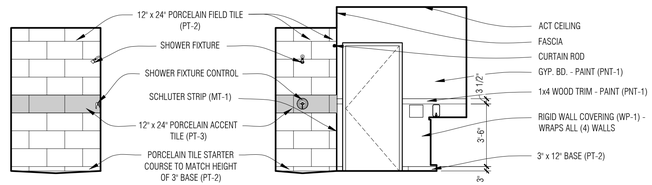
10 A3-01 Dayroom / Dining / Kitchen 120
1/4" = 1'-0"



9 A3-01 Dayroom / Dining / Kitchen 120
1/4" = 1'-0"

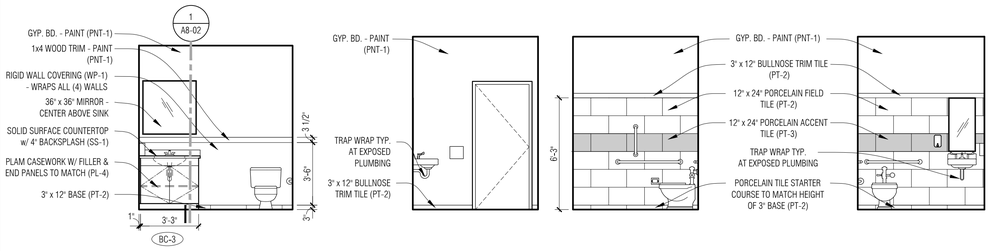


8 A3-01 Bath - 108, 110
1/4" = 1'-0"



7 A3-01 Bath - 108, 110
1/4" = 1'-0"

6 A3-01 Bath - 108, 110
1/4" = 1'-0"

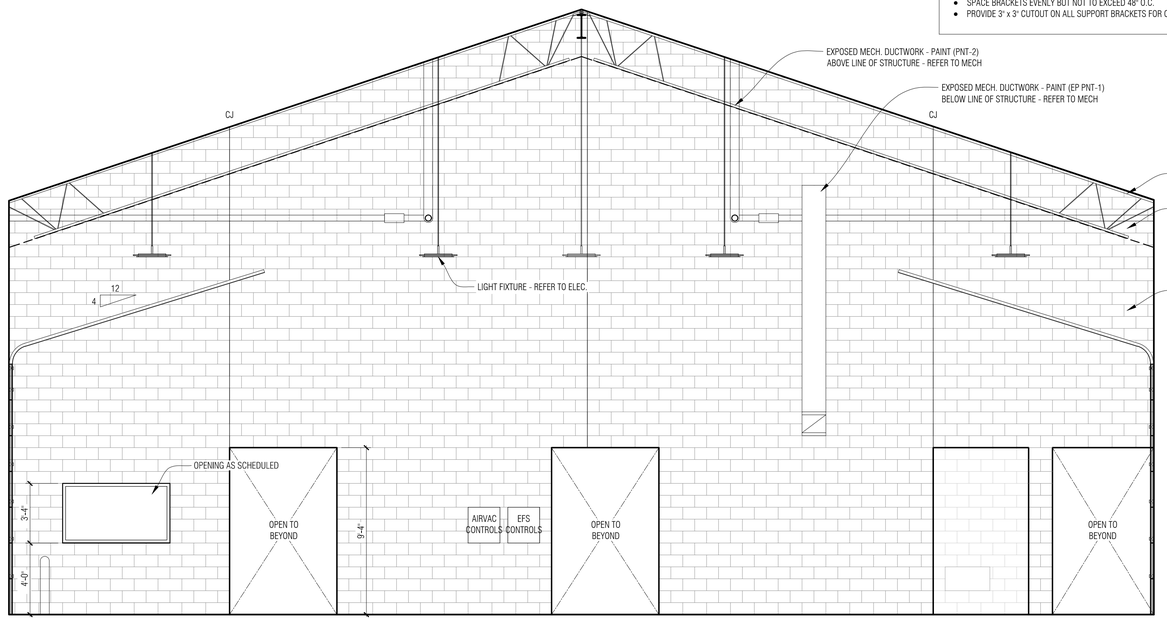


5 A3-01 Bath - 108, 110
1/4" = 1'-0"

4 A3-01 Restroom 104, 124 Sim.
1/4" = 1'-0"

3 A3-01 Restroom 104, 124 Sim.
1/4" = 1'-0"

2 A3-01 Restroom 104, 124 Sim.
1/4" = 1'-0"



1 A3-01 Apparatus Bay 121
1/4" = 1'-0"

CASEWORK LEGEND — CASEWORK MODEL NUMBERS ARE DERIVED FOR BASIS OF DESIGN FROM CASE SYSTEMS DESIGN CORPORATION

BASE CABINETS
- BC-1 DOOR/DRAWER STORAGE - B3110 / B3120
- BC-2 DOORS/DRAWERS STORAGE - B3100
- BC-3 SINK CABINET W/DOORS - B2100
- BC-4 FILE DRAWER STORAGE (THREE DRAWERS) - B4540
- BC-5 BLIND CORNER STORAGE W/DOOR - B0220

WALL CABINETS
- WC-1 STORAGE W/ DOOR - W0110 OR W0120
- WC-2 STORAGE W/ DOORS - W0100

STUDENT LOCKERS
- SL-1 THREE STUDENT LOCKER (L) - Z6210

SUPPORT BRACKETS
- SB-1 RADIUSED PLAM WALL MOUNT SUPPORT BRACKET - X0700/X0710/X0720

GENERAL NOTES:
1. SOME TAGS ARE NOT USED ON THIS SHEET
2. ALL EXPOSED DUCTWORK & GRILLS PAINTED TO MATCH ASSOCIATED WALLS/CEILINGS
3. REFER TO 7.8/A3-22 FOR CONTROL JOINT DETAILS.

GENERAL CASEWORK NOTES:
1. ALL EXPOSED SURFACES ARE TO BE FINISHED
2. PROVIDE FINISHED FILLER PANELS AS REQUIRED AT ALL SPACES BETWEEN CABINETS AND BETWEEN CASEWORK AND WALLS
3. CAULK AROUND ENTIRE PERIMETER OF ALL CABINETS AND COUNTERTOPS AT INTERSECTION OF DISIMILAR SURFACES
4. BASE CABINET DEPTH IS TO BE 24" DEEP NOMINAL (U.O.N.), WALL CABINET DEPTH IS TO BE 14" DEEP NOMINAL (U.O.N.)
5. REFER TO OTHER ELEVATIONS WITHIN THE SAME ROOM FOR SIMILAR APPLICABLE NOTES AND REQUIREMENTS
6. WHERE COUNTER TOP ABUTS WALL, PROVIDE PAINTED WOOD CLEAT
7. PROVIDE LIGHT VALANCES AT UPPER CABINETS WHERE UNDER CABINET LIGHTS ARE TO BE PROVIDED - COORD. W/ ELECTRICAL
8. REFER TO MATERIAL FINISH/COLOR SCHEDULE (SPEC SECTION 000200) FOR LAMINATE (PL-#) COLORS
9. SIZE ALL WALL MOUNT SUPPORT BRACKETS ACCORDING TO COUNTER DEPTH AND MANUFACTURER REQMENTS.
10. PROVIDE 3" x 3" CUTOUT ON ALL WALL MOUNT SUPPORT BRACKETS FOR CABLE MANAGEMENT

SUPPORT BRACKET - MANUFACTURER: CASE SYSTEMS
- CATOLOG No. X0700/X0710/X0720 (U.O.N.)
- DESCRIPTION: WALL MOUNT SUPPORT BRACKET
- SIZE ALL SUPPORT BRACKETS ACCORDING TO COUNTER DEPTH AND MANUF. REQUIREMENTS
- SPACE BRACKETS EVENLY BUT NOT TO EXCEED 48" O.C.
- PROVIDE 3" x 3" CUTOUT ON ALL SUPPORT BRACKETS FOR CABLE MANAGEMENT

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SHEET NAME
INTERIOR ELEVATIONS

SHEET NO.
A8-01

7 A8-02 PLAM Counter Edge Detail - Typ.
6" = 1'-0"

5 A8-02 Kitchen Section Detail
1-1/2" = 1'-0"

2 A8-01 Typical Section @ Countertop
3/4" = 1'-0"

6 A8-02 Solid Surface Counter Edge Detail - Typ.
6" = 1'-0"

4 A8-01 Kitchen Section
3/4" = 1'-0"

3 A8-01 Typical Casework Section
3/4" = 1'-0"

1 A8-01 Typical Section @ Sink
3/4" = 1'-0"

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SHEET NAME

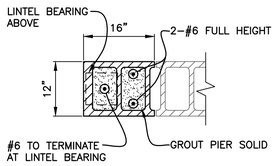
MILLWORK DETAILS

SHEET NO.

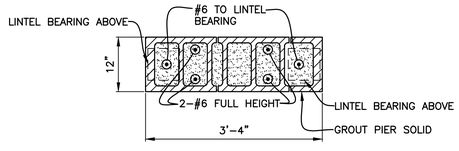
A8-02

FOUNDATION SCHEDULE

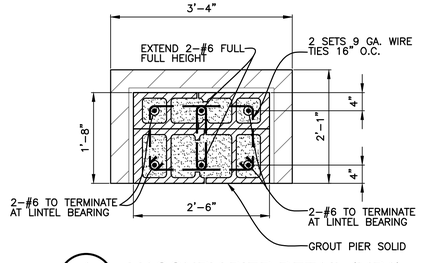
MARK	F1,F1A,F1B,F1C	F2	F3,F3A	F4,F4A	F5,F5A,F5B	F6	F7	F8
SIZE	2'–6"x2'–6"	3'–0"x3'–0"	3'–6"x3'–6"	4'–6"x4'–6"	5'–0"x5'–0"	3'–6"x6'–0"	4'–6"x7'–0"	5'–9"x5'–9"
THICKNESS	64"	12"	38"	16"	40"	38"	38"	16"
REINFORCING EACH WAY–BOTTOM UNLESS OTHERWISE NOTED	4–#4	4–#4	5–#4	6–#4	7–#4	4–#5 LONG WAY BOTTOM	5–#5 LONG WAY BOTTOM	7–#5
REMARKS	F1A: 88" THICKNESS F1B: 12" THICKNESS F1C: 36" THICKNESS		F3A: 12" THICKNESS	F4A: 12" THICKNESS	F5A: 68" THICKNESS F5B: 16" THICKNESS	CENTER FOOTING ON MASONRY PIER	CENTER FOOTING ON MASONRY PIER	



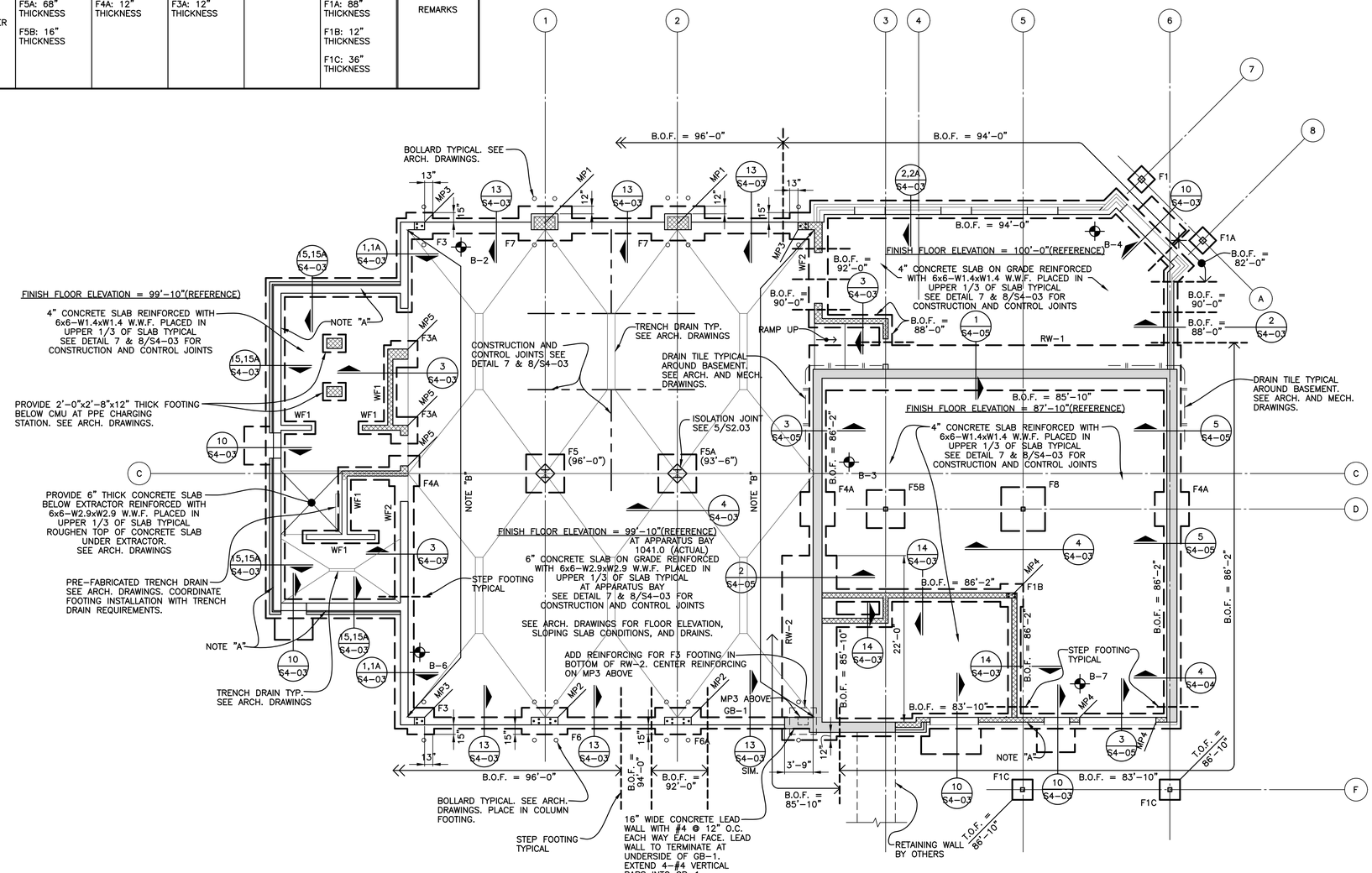
3 S3-01 MASONRY PIER DETAIL (MP3)
SCALE : 3/4" = 1'–0"



2 S3-01 MASONRY PIER DETAIL (MP2)
SCALE : 3/4" = 1'–0"



1 S3-01 MASONRY PIER DETAIL (MP1)
SCALE : 3/4" = 1'–0"



FOUNDATION PLAN
SCALE : 1/8" = 1'–0"

NORTH

SEE ARCH. DRAWINGS SHEETS A3–02 AND A3–03 FOR DIMENSIONS

INDICATES APPROXIMATE LOCATION OF SOIL BORING. SEE TESTING ENGINEERS & CONSULTANTS, INC TEC REPORT: 60006–4 JULY 27, 2020. SEE SOIL REPORT FOR SITE PREPARATIONS, AND FOUNDATION RECOMMENDATIONS.

NOTE: THE SOUTH SIDE OF THE APPARATUS BAY NEEDS TO BE RAISED WITH ENGINEERED FILL APPROXIMATELY 1'–0" TO 3'–0". SEE CIVIL DRAWINGS. THE SOIL ENGINEER IS TO VERIFY THE EXTENT OF TOPSOIL TO BE REMOVED AND MONITOR THE SUBGRADE PREPARATION AND PLACEMENT OF ENGINEERED FILL. PLEASE NOTE BORING B–3(3–3). THE SOIL REPORT NOTES THE SOILS ARE QUITE LOOSE AND RECOMMENDS THE SOIL BE REMOVED AND REPLACED WITH ENGINEERED FILL. THE BORING IS WITHIN THE LOWER LEVEL EXCAVATION. COORDINATE REQUIREMENTS OF REMOVAL OF LOOSE SOIL AND ENGINEERED FILL PLACEMENT IN THE FIELD WITH THE SOILS ENGINEER.

BOTTOM OF EXTERIOR FOOTING ELEVATION = 96'–0" UNLESS OTHERWISE NOTED (X'–X")

TOP OF FOOTING ELEVATION = 99'–2" AT APPARATUS BAY, PPE AND DECON SHOWER. TOP OF FOOTING ELEVATION = 99'–4" AT OFFICE, DORM, AND VESTIBULE AREAS (NON–BASEMENT AREAS) SEE PLAN FOR BOTTOM OF FOOTING AT LOWER LEVER AREA.

NOTE "A": REINFORCE EXTERIOR MASONRY WALLS AND INTERIOR MASONRY WALLS AS NOTED WITH #5 @ 48" O.C. FULL HEIGHT VERTICAL UNLESS OTHERWISE NOTED, GROUT REINFORCED CORES SOLID, DOWEL TO FOOTING. PLACE BARS AT CORNERS AND FACE OF OPENINGS AND EACH SIDE OF CONTROL JOINTS. SEE DETAILS 1, 2, 3, 4, 5 & 6/S4–02

NOTE "B": REINFORCE EXTERIOR MASONRY WALLS AND INTERIOR MASONRY WALLS AS NOTED WITH #6 @ 32" O.C. FULL HEIGHT VERTICAL UNLESS OTHERWISE NOTED, GROUT REINFORCED CORES SOLID, DOWEL TO FOOTING. PLACE BARS AT CORNERS AND FACE OF OPENINGS AND EACH SIDE OF CONTROL JOINTS. SEE DETAILS 1, 2, 3, 4, 5 & 6/S4–02

MP1, MP2, MP3: SEE DETAILS 1, 2, 3/S3–01

MP4: 8"x16" MASONRY PIER WITH 4–#5 VERTICAL & 9 GA. WIRE TIES 16" O.C. GROUT PIER SOLID. DOWEL REINFORCING TO FOOTING

MP5: 12"x16" MASONRY PIER WITH 4–#6 VERTICAL & 9 GA. WIRE TIES 16" O.C. GROUT PIER SOLID. DOWEL REINFORCING TO FOOTING

GB–1: 16" WIDEx38" DEEP GRADE BEAM WITH 3–#7 TOP AND BOTTOM WITH #3 @ 48" O.C. STIRRUPS. POUR MONOLITHICALLY WITH F6A FOOTING. GRADE BEAM TO SIT ON TOP OF LEAD WALL AT BASEMENT. TIE GRADE BEAM TO LEAD WITH WITH 4–#4 VERTICAL REINFORCING.

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KEY PLAN

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PROJECT NAME

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Highland, MI 48356

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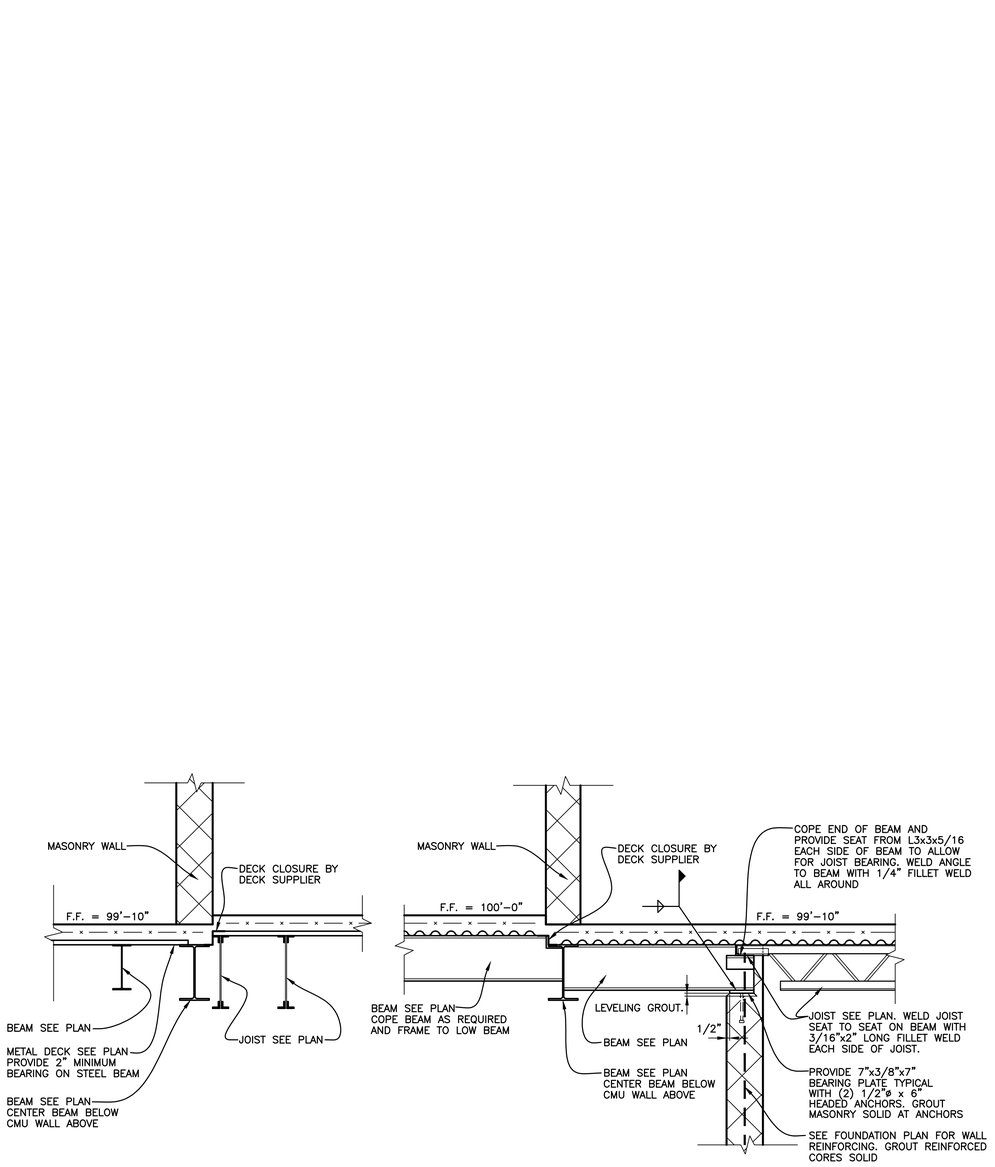
SHEET NAME

FOUNDATION PLAN

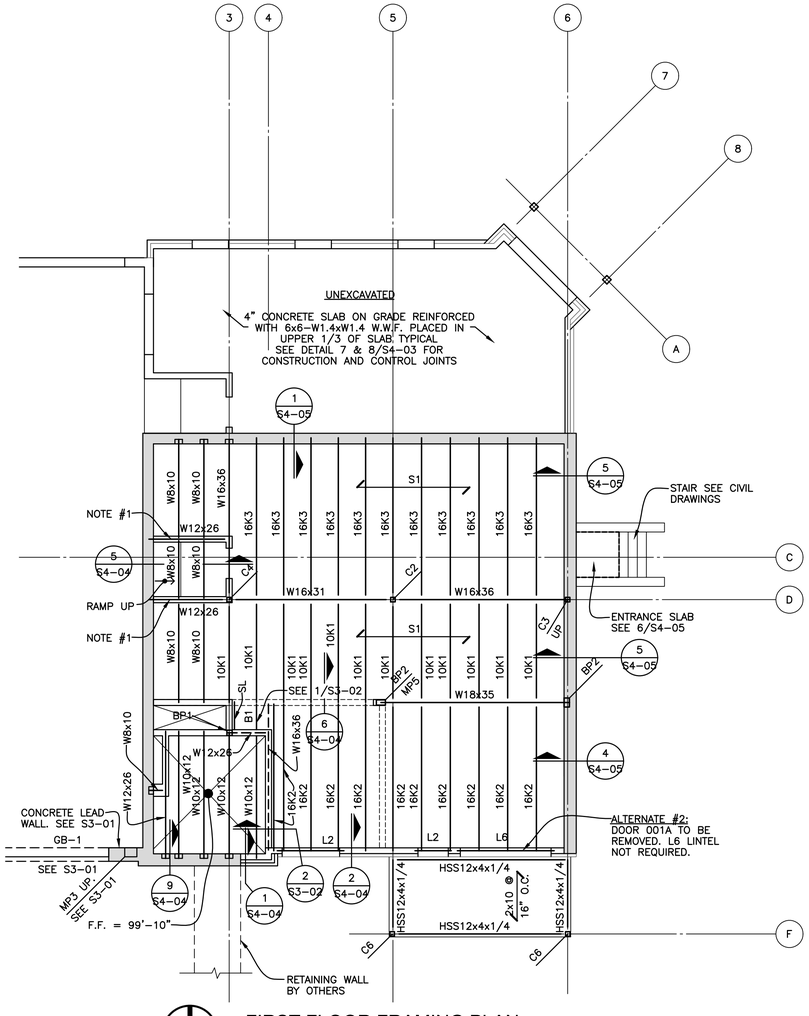
SHEET NO.

S3-01



2 / S3-02 SECTION
SCALE : 3/4" = 1'-0"

1 / S3-02 SECTION
SCALE : 3/4" = 1'-0"



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

B1: W10x12. LOCATE BEAM INLINE WITH 10K1. COPE END OF W10 AND PROVIDE SEAT FROM L3x3x5/16 EACH SIDE OF BEAM TO ALLOW FOR JOIST BEARING. WELD ANGLE ALL AROUND TO WEB OF BEAM WITH 1/4" FILLET WELD. SEE DETAIL 1/S3-02

NOTE #1: CENTER BEAM BELOW MASONRY WALL ABOVE.

S1 — 3 1/2" CONCRETE ON 1"-26 GA. (MIN.) GALVANIZED METAL FORM DECK (4 1/2" TOTAL SLAB) REINFORCED WITH 6x6-W2.1xW2.1 WWF PLACED AT MID-DEPTH OF CONCRETE

SEE SHEET S4-02 FOR COLUMN SCHEDULE

SEE SHEET S4-02 FOR LINTEL AND BEARING PLATE SCHEDULES

SEE ARCH. DRAWINGS SHEETS A3-02 AND A3-03 FOR DIMENSIONS

JOIST FRAMING NOTES:

1: JOIST SUPPLIER TO PROVIDE BRIDGING AS REQUIRED PER SJI

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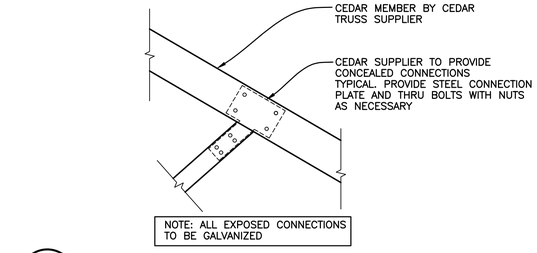
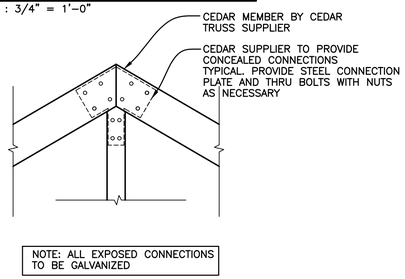
SHEET NAME
FIRST FLOOR FRAMING PLAN

SHEET NO.
S3-02



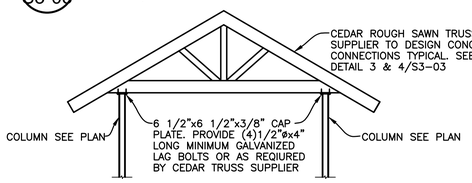
4 S3-03 TYPICAL CEDAR TRUSS CONNECTION

SCALE : 3/4" = 1'-0"



3 S3-03 TYPICAL CEDAR TRUSS CONNECTION

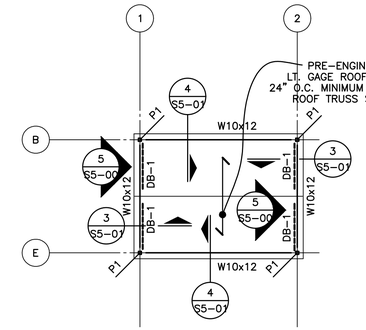
SCALE : 3/4" = 1'-0"



2 S3-03 TRUSS T1

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

NOTE: CEDAR FRAMING AND CEDAR TRUSS SUPPLIER SHALL SUBMIT DRAWINGS SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN MICHIGAN INDICATING ALL DESIGN LOADS AND MATERIALS INCLUDING VERIFYING ANY MEMBER SIZES SHOWN. DESIGN BY SUPPLIERS ENGINEER SHALL INCLUDE ALL CONNECTIONS AND MISCELLANEOUS MATERIALS AS NECESSARY. CEDAR BEAMS, AND TRUSSES TO BE DESIGNED FOR A MINIMUM OF 25 PSF DEAD LOAD AND A MINIMUM OF 25 PSF LIVE LOAD. DESIGN FOR ANY ADDITIONAL MECH. EQUIPMENT. COORDINATE WITH MECH. DRAWINGS



HIGH ROOF FRAMING PLAN

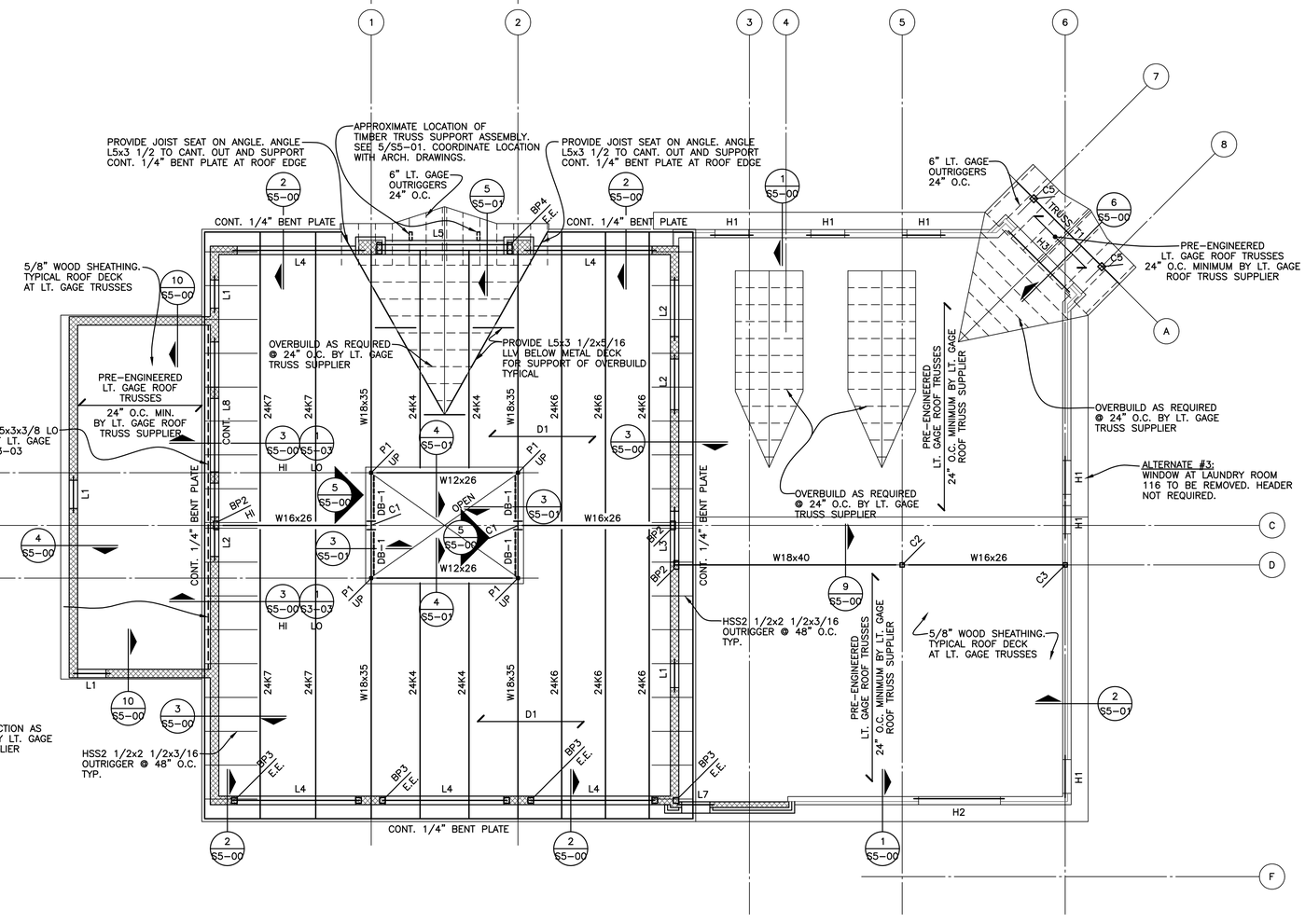
SCALE : 1/8" = 1'-0"

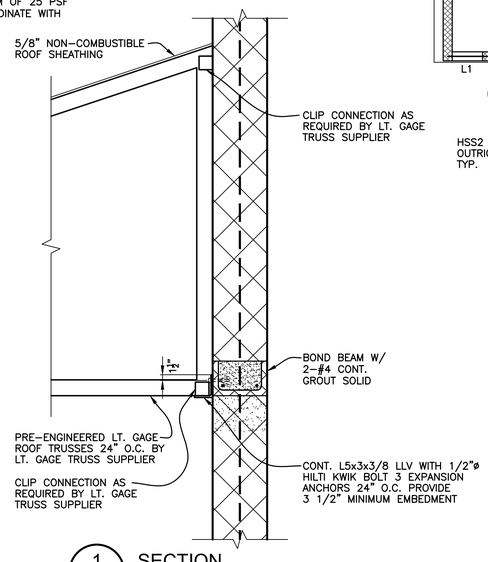
NORTH

INDICATES FULL MOMENT CONNECTION

P1: HSS4x4x3/8 POST COLUMN WITH 1/2" BASE PLATE & (4)3/4"ø BOLTS. PROVIDE 5/16" STIFFENER PLATE EACH SIDE OF BEAM BELOW

DB-1: HSS4x4x1/4 DIAGONAL BRACE. SEE 5/S5-00





1 S3-03 SECTION

SCALE : 3/4" = 1'-0"

ROOF FRAMING PLAN

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

NORTH

D1 — 1 1/2-22 GA. GALVANIZED WIDE RIB METAL DECK (3 SPAN MINIMUM)

SEE SHEET S4-02 FOR COLUMN SCHEDULE

SEE SHEET S4-02 FOR LINTEL AND BEARING PLATE SCHEDULES

SEE SHEET S4-02 FOR HEADER SCHEDULE

DB-1: HSS4x4x1/4 DIAGONAL BRACE. SEE 5/S5-00

LT. GAGE FRAMING NOTES

1. ALL LIGHT GAGE METAL MEMBERS AND CONNECTIONS SHALL BE DESIGNED BY LT. GAGE SUPPLIER-SUBMIT SHOP DRAWINGS FOR APPROVAL. DETAILS AND MEMBERS SIZES SHOWN ARE MINIMUM. PROVIDE SIGNED AND SEALED SHOP DRAWINGS AND CALCULATIONS. SEE LT. GAGE NOTES 1, 2, & 3/S4-00
2. ALL EXTERIOR WALL STUDS WITH NATURAL STONE VENEER TO BE 600S162-54 MINIMUM LT. GAGE STUDS @ 16" O.C.
3. EXTERIOR WALL STUDS WITH FIBER CEMENT BOARD(SOUTH WALL) TO BE 600S162-43 MINIMUM LT. GAGE STUDS @ 16" O.C.

JOIST FRAMING NOTES:

1: JOIST SUPPLIER TO PROVIDE BRIDGING AS REQUIRED PER SJI

2: JOIST SUPPLIER TO DESIGN ALL ROOF JOISTS FOR A NET UPLIFT OF 15 PSF (DO NOT REDUCE BY 0.6W).

SEE ARCH. DRAWINGS SHEETS A3-02 AND A3-03 FOR DIMENSIONS

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

Bidding/Construction 08/27/2020

DRAWN BY

CS

CHECKED BY

TS

APPROVED BY

TS

SHEET NAME

ROOF FRAMING PLAN

SHEET NO.

S3-03

G E N E R A L   N O T E S

GENERAL CONDITIONS

1. IF ANY GENERAL NOTE CONFLICTS WITH ANY DETAIL OR NOTE ON THE PLANS OR IN THE SPECIFICATIONS, THE STRICTEST PROVISION SHALL GOVERN.

2. THE STRUCTURAL DRAWINGS ARE FOR THE PLACEMENT AND SIZE OF STRUCTURAL COMPONENTS ONLY. O.S.H.A., LOCAL GOVERNMENT CODES AND SAFETY CODE REQUIREMENTS SHALL BE ADHERED TO BY THE CONTRACTOR.

3. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER IT IS FULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES PROVIDING TEMPORARY BRACING, SHORING, GUYS OR TIE- DOWNS. THESE TEMPORARY SUPPORTS WILL REMAIN IN PLACE UNTIL ALL STRUCTURAL COMPONENTS ARE IN PLACE AND COMPLETED.

4. USE OF ENGINEERING DRAWINGS AS ERECTION DRAWINGS BY THE CONTRACTOR IS STRICTLY PROHIBITED. DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR BUILDING LAYOUT AND LOCATION. SEE ARCHITECTURAL DRAWINGS AND SITE PLAN FOR THESE PURPOSES.

5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AT THE RATE OF NO MORE THAN 80 DRAWINGS PER WEEK. THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF SHOP DRAWINGS PRIOR TO SUBMITTAL. THE CONTRACTOR SHALL CHECK SHOP DRAWINGS PRIOR TO SUBMITTAL AND IS SOLELY RESPONSIBLE FOR ERRORS & OMISSION IN THE PREPARATION OF SHOP DRAWINGS TO CONFORM TO THE DESIGN DRAWINGS. SUBMIT NO MORE THAN ONE REPRODUCIBLE AND TWO PRINTS OF SHOP DRAWINGS FOR ENGINEER REVIEW. TWO COPIES WILL BE RETURNED TO THE ARCHITECT.

6. DO NOT BACK-FILL AGAINST BASEMENT WALLS UNTIL FIRST FLOOR AND BASEMENT SLABS ARE IN PLACE OR WALLS ARE ADEQUATELY, LATERALLY BRACED.

7. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL RELEVANT DIMENSIONS AND ELEVATIONS FOR EQUIPMENT INSTALLATIONS AGAINST PURCHASED MANUFACTURER'S CERTIFIED EQUIPMENT DRAWINGS. DIMENSIONS THAT DEPEND UPON SPECIFIC EQUIPMENT SUCH AS ELEVATOR OPENINGS, MECHANICAL EQUIPMENT SUPPORTS, ETC. SHALL BE COORDINATED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER. SUCH DIMENSIONS SHALL BE PROVIDED ON THE SHOP DRAWINGS BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER.

8. PRE-MANUFACTURED ITEMS SUCH AS CANOPIES, AWNINGS, SUNSHADES, ETC. SHALL BE DESIGNED BY SUPPLIER. SUPPLIER SHALL SUBMIT SIGNED AND SEALED SHOP DRAWINGS AND CALCULATIONS BY A REGISTERED ENGINEER IN THE STATE OF MICHIGAN FOR RECORD TO ARCHITECT. SHOP DRAWINGS SHALL INDICATE ALL DESIGN LOADS AND INCLUDE ALL CONNECTIONS AND MATERIAL NECESSARY FOR INSTALLATION OF PRE-MANUFACTURED ITEMS.

FOUNDATIONS

1. FOOTINGS SHALL BEAR ON FIRM, UNDISTURBED SOIL OR ENGINEERED FILL WITH A SAFE BEARING CAPACITY OF 2000 P.S.F. AT BASEMENT AREA FOOTINGS TO BEAR ON SOIL WITH A SAFE BEARING CAPACITY OF 3500 P.S.F. IF SOIL OF THIS CAPACITY IS NOT FOUND AT THE ELEVATIONS INDICATED, FOOTINGS SHALL BE ENLARGED OR LOWERED AT THE DIRECTION OF THE ARCHITECT. VERIFY FOUNDATION SOIL BEARING PRESSURE IN FIELD BY SOILS ENGINEER.

2. PROVIDE NECESSARY SHEETING SHORING BRACING, ETC. AS REQUIRED DURING EXCAVATIONS TO PROTECT SIDES OF EXCAVATIONS.

3. COMPLY FULLY WITH REQUIREMENTS OF OSHA AND OTHER REGULATORY AGENCIES FOR SAFETY PROVISIONS.

CONCRETE

1. MINIMUM CONCRETE STRENGTH TO BE 3000 P.S.I. @ 28 DAYS, U.O.N.; SLABS SHALL BE 3500 P.S.I. MIN. U.O.N. EXPOSED CONCRETE SHALL BE 4000 PSI WITH 6% + 1% ENTRAINED AIR U.O.N.

   A. PROVIDE 3000 P.S.I. 28-DAY COMPRESSIVE STRENGTH; W/C RATIO, 0.58 MAXIMUM (NON-AIR-ENTRAINED), 5.0 BAG CEMENT MIX FOR ALL FOUNDATION WORK UNLESS NOTED OTHERWISE.

   B. PROVIDE 3500 P.S.I. 28-DAY COMPRESSIVE STRENGTH; W/C RATIO, 0.53 MAXIMUM (NON-AIR-ENTRAINED), 5.5 BAG CEMENT MIX FOR ALL INTERIOR SLABS UNLESS NOTED OTHERWISE.

   C. PROVIDE 4000 P.S.I. 28-DAY COMPRESSIVE STRENGTH; W/C RATIO, 0.45 MAXIMUM (AIR-ENTRAINED), 6.0 BAG CEMENT MIX FOR ALL EXTERIOR CONCRETE UNLESS NOTED OTHERWISE.

2. FLYASH OR GROUND GRANULATED BLAST FURNACE SLAG MAY BE SUBSTITUTED UP TO 25% MAXIMUM OF MIX DESIGN CEMENT CONTENT IN NON-EXPOSED CONCRETE MIXES. DO NOT USE IN EXPOSED MIX DESIGNS.

3. ALL CONCRETE WORK AND PLACEMENT SHALL CONFORM TO THE LATEST RECOMMENDATIONS OF A.C.I.

4. ALL REINFORCING BARS, DOWELS AND TIES SHALL CONFORM TO A.S.T.M. A615 GRADE 60. REINFORCING STEEL SHALL BE CONTINUOUS AND SHALL HAVE MINIMUM 36 BAR DIAMETER LAP AND BE FABRICATED AND PLACED IN ACCORDANCE WITH A.C.I. - 315 LATEST EDITION.

5. REINFORCED CONCRETE WALLS AND WALL FOOTINGS SHALL HAVE CORNER BARS AT ALL INTERSECTIONS OF THE SAME SIZE AND SPACING AS THE MAIN HORIZONTAL REINFORCING. PROVIDE 2-#5 BARS EACH SIDE OF ALL OPENINGS AND 2-#5 X 4'-0" DIAGONAL BARS AT CORNERS OF OPENINGS.

6. WHERE SLAB REINFORCING RUNS PARALLEL TO A SUPPORTING BEAM, GIRDER SPANDREL, OR WALL, PROVIDE #4 @ 12" O.C. IN TOP OF SLAB AT RIGHT ANGLES TO MAIN REINFORCING. HOOK BARS AT EXTERIOR WALLS OR SPANDRELS.

7. ALL SLABS ON GROUND SHALL BE 4" THICK AND HAVE 6" X 6" W1.4 X W1.4 WELDED WIRE FABRIC IN THE TOP 1/3 OF THE SLAB, UNLESS OTHERWISE NOTED.

8. ALL WALLS SHALL HAVE #4 @ 12" O.C. BOTH WAYS, INSIDE FACE, AND #3 @ 12" O.C. BOTH WAYS, OUTSIDE FACE, EXCEPT AS NOTED, AND ALL HORIZONTAL WALL STEEL SHALL BEND 2'0" AROUND CORNERS. BEND VERTICAL WALL STEEL 2'0" INTO FLOOR SLAB.

10. CONCRETE CONTRACTOR SHALL INCLUDE IN HIS COST ADDITIONAL CONCRETE QUANTITY AS REQUIRED TO COMPENSATE FOR DEFLECTIONS OF METAL DECK AND UNSHORED COMPOSITE BEAMS AND TO PROVIDE A LEVEL CONCRETE SURFACE.

11. FIELD AND SHOP TESTING OF CONCRETE WORK SHALL INCLUDE INSPECTION OF REINFORCING STEEL PLACEMENT, REBARS, NUMBER, LOCATION, AND LAP SPLICE LENGTH.

13. PROVIDE DOWELS INTO FOUNDATION TO MATCH SIZE AND SPACING OF VERTICAL REINFORCEMENT AT ALL COLUMNS AND WALLS, UNLESS OTHERWISE NOTED.

14. UNLESS OTHERWISE SHOWN, PROVIDE THE FOLLOWING COVER FOR REINFORCING STEEL:

A.	UNFORMED SURFACES IN CONTACT WITH EARTH	-3 IN.
B.	UNFORMED SURFACES OVER MOISTURE BARRIERS	-2 IN.
C.	FORMED SURFACES EXPOSED TO EARTH OR WEATHER OR WATER PROOFING/DAMP PROOFING	
	#6 OR LARGER	-2 IN.
	#5 OR SMALLER	-1 1/2 IN.
D.	FORMED SURFACES NOT EXPOSED TO EARTH OR WEATHER	
	SLABS AND WALLS	-3/4 IN.
	COLUMNS	-1 1/2 IN.
	BEAMS AND GIRDERS	-1 1/2 IN.

MASONRY

1. THE MASONRY PORTIONS OF THIS STRUCTURE ARE DESIGNED ACCORDING TO THE LATEST ALLOWABLE STRESS DESIGN PROVISIONS OF THE MASONRY STANDARDS JOINT COMMITTEE (MSJC) BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES (ACI 530/ASCE 602) INCLUDING SECTIONS 2106 AND 2107 OF CHAPTER 21 IN THE MICHIGAN BUILDING CODE. MASONRY COMPONENTS HAVE BEEN DESIGNED ACCORDING TO THE PROVISIONS FOR SEISMIC DESIGN CATEGORY B.

2. ALL STRUCTURAL MASONRY IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST MASONRY STANDARDS JOINT COMMITTEE (MSJC) BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES (TMS 402/ACI 530/ASCE 5) AND SPECIFICATIONS FOR MASONRY STRUCTURES (TMS 602/ACI 530.1/ASCE 6) MASONRY SUBMITTALS ARE REQUIRED BY ACI 530.1/ASCE 6/TMS 602. SECTION 1.5 MASONRY TESTING AND INSPECTIONS ARE REQUIRED BY ACI 530.1/ASCE 6/TMS 602 SECTION 1.6, TABLE 5.

3. ALL STRUCTURAL MASONRY HAS BEEN ENGINEERED IN ACCORDANCE WITH CHAPTER 2 ALLOWABLE STRENGTH DESIGN. COMPRESSION STRENGTH SHALL BE DETERMINED ACCORDING TO THE UNIT STRENGTH METHOD FOR CONCRETE MASONRY MSJC SECTION 1.4. B.2.b.

4. ALL BLOCK SHALL CONFORM TO ASTM C90, TYPE I, WITH A MINIMUM UNIT NET AREA COMPRESSIVE STRENGTH OF 2800 PSI.

5. MASONRY COMPRESSIVE STRENGTH f'm = 2000 PSI MINIMUM.

6. MORTAR SHALL BE TYPE "S" (1800 PSI) CONFORMING TO ASTM C-270. USE MORTAR CEMENT WHERE EXTERIOR WALLS ARE UNREINFORCED.

7. PROVIDE HORIZONTAL WIRE TYPE REINFORCING WITH 9 GAUGE SIDE AND CROSS MEMBERS IN EVERY SECOND COURSE (16" O.C.), IN ALL MASONRY WALLS. WALLS WITH VERTICAL REINFORCING SHALL ONLY HAVE "LADDER" TYPE REINFORCING.

8. ALL REINFORCING BARS, DOWELS AND TIES SHALL CONFORM TO A.S.T.M. A615 GRADE 60. REINFORCING STEEL SHALL BE CONTINUOUS, FABRICATED AND PLACED IN ACCORDANCE WITH A.C.I. - 315 LATEST EDITION AND HAVE THE FOLLOWING MINIMUM LAP LENGTHS:

BAR SIZE	8" CMU	12" CMU
#3	18"	18"
#4	24"	24"
#5	30"	30"
#6	38"	36"
#7		42"
#8		50"

9. ALL MASONRY BEARING STEEL BEAMS AND LINTELS TO BEAR 8" MINIMUM ON 3 COURSES SOLID MASONRY, WITH 2-3/4" DIAMETER BOLTS EACH END, UNLESS OTHERWISE NOTED.

10. UNLESS OTHERWISE NOTED WHERE STEEL JOISTS BEAR ON MASONRY, PROVIDE A MINIMUM OF ONE COURSE OF SOLID BLOCK BELOW K-SERIES JOISTS AND A MINIMUM OF TWO COURSES SOLID BELOW LH SERIES JOISTS.

11. ALL MASONRY BELOW GRADE SHALL BE GROUTED SOLID.

12. MASONRY GROUT SHALL CONFORM TO ASTM C 476, WITH PEA GRAVEL AGGREGATE AND A MINIMUM STRENGTH OF 2000 PSI, BUT NOT LESS THAN SPECIFIED f'm.

13. UNLESS OTHERWISE NOTED, AT ALL MASONRY WALLS PROVIDE THE FOLLOWING LINTELS:

   8" WALLS

   (2) L4x3 1/2 x 5/16 LLV FOR OPENINGS UP TO 4'-0"
   (2) L5x3 1/2 x 5/16 LLV FOR OPENINGS UP TO 5'-4"
   W8x18 + 3/8" PLATE FOR OPENINGS UP TO 8'-0"
   W8x28 + 3/8" PLATE FOR OPENINGS UP TO 12'-4"

   12" WALLS:

   (3) L4x3- 1/2 x 5/16 LLV FOR OPENINGS UP TO 4'-0"
   (3) L5x3-1/2 x 5/16 LLV FOR OPENINGS UP TO 5'-4"
   W8x18 + 3/8" PLATE FOR OPENINGS UP TO 8'-0"
   W8x28 + 3/8" PLATE FOR OPENINGS UP TO 12'-4"

14. ALL DOUBLE ANGLE LINTELS SHALL BE WELDED BACK TO BACK WITH A MINIMUM 2 INCH STITCH WELD EVERY 8 INCHES.

15. UNLESS OTHERWISE NOTED, PROVIDE L5 X 3-1/2 X 5/16 L.L.V. LINTEL FOR EACH 4" OF MASONRY FOR SPANS UP TO 5'-0" MAX.

16. PROVIDE DOWELS INTO FOUNDATION TO MATCH SIZE AND SPACING OF VERTICAL REINFORCEMENT AT ALL COLUMNS AND WALLS, UNLESS OTHERWISE NOTED.

STRUCTURAL STEEL

1. STEEL DESIGN, FABRICATION AND ERECTION TO BE IN ACCORDANCE WITH THE LATEST A.I.S.C. MANUAL AND SPECIFICATION FOR STRUCTURAL STEEL FOR BUILDINGS. ALL WIDE FLANGE BEAMS AND COLUMNS SHALL CONFORM TO THE LATEST ASTM. SERIAL DESIGNATION A992, GR50; ALL MISCELLANEOUS STEEL PLATES, BARS, ANGLES, ETC., SHALL CONFORM TO ASTM A36; STEEL TUBING TO BE ASTM A500, GRADE B; STEEL PIPE ASTM. A-53, GRADE B. ANCHOR BOLTS TO BE ASTM F1554 GRADE 36 KSI MINIMUM UNLESS OTHERWISE NOTED

2. UNLESS OTHERWISE NOTED OR SHOWN, ALL BEAM CONNECTIONS TO HSS 5 X 5 OR SMALLER COLUMN,5"Ø OR SMALLER COLUMN, OR ANY TUBE COLUMN REGARDLESS OF SIZE WITH A WALL THICKNESS LESS THAN 3/8" SHALL BE MADE WITH THRU PLATES WELDED TO BOTH WALLS OF COLUMN.

3. ALL WELDED CONNECTIONS SHALL BE IN ACCORDANCE WITH THE LATEST AWS CODE, E70XX ELECTRODES, WITH WELDING PERFORMED BY QUALIFIED WELDERS.

4. BOLTED CONNECTIONS SHALL BE MADE WITH A-325 OR A-490 BOLTS. ALL BOLTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS FOR "STRUCTURAL JOINTS USING A.S.T.M. A-325 OR A-490 BOLTS." TYPICAL BOLTED CONNECTIONS ARE "BEARING TYPE" UNLESS NOTED OTHERWISE.

5. DESIGN CONNECTIONS FOR MINIMUM ONE-HALF THE TOTAL ALLOWABLE UNIFORM LOAD PER A.I.S.C. BEAM LOAD TABLES, UNLESS OTHERWISE NOTED. (MIN. 2 BOLTS EACH CONNECTION).

6. CONNECTIONS FOR COMPOSITE BEAMS SHALL BE DESIGNED FOR END REACTIONS NOTED ON DRAWINGS OR 2/3 OF TOTAL ALLOWABLE UNIFORM LOAD PER AISC BEAM LOAD TABLES, WHICHEVER IS GREATER, (MINIMUM OF TWO BOLTS PER WEB).

7. THE STRUCTURAL STEEL CONTRACTOR SHALL INCLUDE 2 TONS OF ADDITIONAL STEEL, INCLUDING FABRICATION AND ERECTION, TO BE USED AT THE DISCRETION OF THE STRUCTURAL ENGINEER. TONNAGE COST IS TO BE BASE ON TONNAGE PRICE PER JOB. ADDITIONAL STEEL NOT USED IS TO BE CREDITED BACK TO THE OWNER. GENERAL CONTRACTOR IS TO COORDINATE WITH STEEL FABRICATOR AND OWNER.

8. THE DESIGN, CONFIGURATION & ERECTION SAFETY OF ALL STRUCTURAL STEEL CONNECTIONS SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL STEEL FABRICATOR. REVIEW AND ACCEPTANCE OF THE SHOP DRAWINGS BY THE ENGINEER SHALL CONSTITUTE APPROVAL OF THE LOAD CARRYING ADEQUACY ONLY.

9. TYPE OF CONSTRUCTION PER ASCE A2.2 IS TYPE 2 "SIMPLE FRAMING" UNLESS NOTED OTHERWISE.

10. TEMPORARY ERECTION SEATS SHALL BE PROVIDED AS RECOMMENDED ON PAGE 3-59 OF THE A.I.S.C. PUBLICATION "ENGINEERING FOR STEEL CONSTRUCTION".

STRUCTURAL STEEL (CONT.)

11. STEEL JOISTS AND JOIST GIRDERS ARE TO BE FABRICATED BY A MEMBER OF THE STEEL JOIST INSTITUTE AND BE DESIGNED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS OF THE S.J.I.

12. ALL PROVISIONS OF THE RECOMMENDED CODE OF STANDARD PRACTICE FOR STEEL JOISTS AS ADOPTED BY THE STEEL JOIST INSTITUTE SHALL BE ADHERED TO.

13. STEEL JOIST BEARING ON STEEL BEAMS OR PLATES, TO BE WELDED TO STEEL WITH 2" LONG BEAD EACH SIDE OF BEARING.

14. STAGGER JOISTS AS REQUIRED TO ACHIEVE NECESSARY BEARING ON WALLS OR GIRDERS.

15. METAL DECK SHALL CONFORM TO ALL REQUIREMENTS OF "BASIC DESIGN SPECIFICATION" AS ADOPTED BY THE STEEL DECK INSTITUTE (S.D.I.). METAL ROOF DECK SHALL BE WIDE RIB WITH NESTING SIDE SEAMS OF DEPTH AND GAGE INDICATED ON THE DRAWINGS. DECK SHALL BE WELDED TO ALL SUPPORTING STEEL WITH PUDDLE WELDS (5/8" DIAMETER MINIMUM), AT 12" ON CENTER MAXIMUM SPACING AND 6" O/C (ALL FLUTES) AT END LAP SUPPORT POINTS AND BUILDING PERIMETER ATTACHMENTS. SIDE LAP CONNECTIONS SHALL BE MADE AT MAXIMUM 3'-0" ON CENTER.(AT MIDPOINT OF SPAN FOR SPAN LESS THAN 6'-0" AT THIRD POINTS OF SPAN FOR SPANS GREATER THAN 6'-0") WITH #10 TEK SCREW MIN. REFER TO SPECIFICATIONS FOR ADDITIONAL ERECTION PROCEDURES.

16. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL ANGLES, PLATES, BARS, CLIPS, ETC., ATTACHED TO STRUCTURAL STEEL.

17. UNLESS OTHERWISE NOTED, ALL FLOOR AND ROOF OPENINGS SHALL BE FRAMED WITH L 5 X 3-1/2 X 5/16 L.L.V. VERIFY EXACT SIZE AND LOCATION OF ALL FLOOR AND ROOF OPENINGS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS AND WITH CONTRACTOR INVOLVED.

18. THE ERECTION OF THE STEEL FRAME SHALL COMPLY WITH THE REQUIREMENTS CONTAINED IN AISC 303-10 AND IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE STEEL FRAME IS NOT SELF-SUPPORTING AND STABILITY OF THE COMPLETED STRUCTURE IS PROVIDED BY A COMBINATION OF MASONRY SHEAR WALLS. METAL DECK AT THE ROOF LEVEL SERVES AS HORIZONTAL DIAPHRAGM THAT DISTRIBUTE THE LATERAL WIND AND SEISMIC FORCES HORIZONTALLY TO THE VERTICAL LATERAL LOAD RESISTING ELEMENTS. THE MASONRY SHEAR WALLS CARRY THE APPLIED LATERAL LOADS TO THE BUILDING FOUNDATION.

19. THE DESIGN OF THE STEEL FRAMED STAIRS AND RAILINGS SHALL BE THE RESPONSIBILITY OF THE STEEL FABRICATOR. PROVIDE COMPLETE ENGINEERED STAIR ASSEMBLIES, CONFORMING TO THE ARCHITECTURAL INTENT (SHOP DRAWINGS), UNDER THE SEAL OF AN ENGINEER REGISTERED IN THE STATE OF MICHIGAN INCLUDING METAL FRAMING, HANGERS, MASONRY BEARING PLATES, COLUMNS, RAILING ASSEMBLIES, AND OTHER COMPONENTS NECESSARY TO SUPPORT THE STAIRS AND LANDINGS INCLUDING ANCHORAGE TO THE SUPPORTING STRUCTURE.

20. THE CONTRACTOR SHALL FURNISH ALL ACCESSORIES INCLUDING CLOSURES, "Z" CLOSURES, COLUMN CLOSURES, SCREED ANGLES AND GIRDER FILLERS AS REQUIRED.

21. FLOOR DECK SHALL HAVE GALVANIZED COATING CONFORMING TO ASTM A653-COATING DESIGNATION G-60 OR AS NOTED. ROOF DECK SHALL HAVE GALVANIZED COATING CONFORMING TO ASTM A653-COATING DESIGNATION G-60 OR AS NOTED.

22. NO LOADS SHALL BE PERMITTED TO BE HUNG FROM ANY ROOF DECK. ALL HANGERS FOR CEILINGS, DUCTWORK, ELECTRICAL CONDUIT, PIPING, ETC., SHALL BE HUNG DIRECTLY FROM STRUCTURAL STEEL WORK OR SUPPLEMENTARY MEMBERS.

23. MASONRY AND BRICK LINTELS SHALL BE GALVANIZED G90 PER ASTM A123.

24. PROVIDE L4X4X1/4 SEATS AT COLUMN WEBS WHERE REQUIRED FOR SUPPORT OF ROOF AND FLOOR DECKS. PROVIDE ANGLE OUTRIGGER FROM EXTERIOR COLUMNS FOR SLAB AND ROOF EDGE PLATE SUPPORT.

25. ALL BOLTED MOMENT CONNECTIONS REQUIRE SLIP CRITICAL BOLTS.

26. ALL WIDE FLANGE LINTELS TO HAVE MINIMUM 7"x3/8"x0'-7" BEARING PLATE, ALL WIDE FLANGE FLOOR OR ROOF BEAMS TO HAVE MINIMUM 7"x3/8"x0'-7" BEARING PLATE UNLESS OTHERWISE NOTED

COMPOSITE SLAB

1. REGULAR WEIGHT CONCRETE (MAX. DENSITY = 150 PCF) IS TO BE USED TO FILL COMPOSITE METAL DECK. IF KEYED CONSTRUCTION JOINTS ARE TO BE USED, PLACE AT MID-SPAN.

2. LIGHTWEIGHT CONCRETE (MAX DENSITY = 115 PCF) IS TO BE USED TO FILL COMPOSITE METAL DECK. IF KEYED CONSTRUCTION JOINTS ARE TO BE USED, PLACE AT MID-SPAN.

3. ALL COMPOSITE STUDS SHALL BE MINIMUM 3/4" DIAMETER NELSON TYPE AND OF APPROPRIATE SIZE TO PROVIDE A MINIMUM LENGTH OF 1-1/2" ABOVE DECK WHEN INSTALLED STUD QUANTITIES INDICATED ON DRAWINGS ARE TOTAL QUANTITY PER BEAM (OR BEAM SECTION) AND SHALL BE PLACED BY INSTALLING FROM EACH END IN ALTERNATE FLUTES (24" O.C.) THEN IN REMAINING FLUTES OR DOUBLING AS REQUIRED. PROVIDE ADDITIONAL STUDS AS REQUIRED SO THAT MAXIMUM STUD SPACING DOES NOT EXCEED 24".

4. SUPPORTED SLABS TO BE REINFORCED WITH 6 X 6 -W1.4 X W1.4 WWF PLACED AND HELD ON TOP OF STUDS. LAP SPLICE = 12" MIN.

5. COMPOSITE METAL DECK SHALL BE GALVANIZED AS DEFINED IN ASTM A653-94, G60 (Z180), AND AS RECOMMENDED BY SDI AS A MINIMUM FINISH COATING.

LIGHT GAGE FRAMING

1. LIGHT GAGE FRAMING SUPPLIER SHALL SUBMIT SHOP DRAWINGS AND CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MICHIGAN INDICATING ALL DESIGN LOADS AND MATERIALS INCLUDING VERIFYING ANY MEMBER SIZES SHOWN. DESIGN BY SUPPLIERS ENGINEER SHALL INCLUDE ALL CONNECTIONS AND MISCELLANEOUS MATERIALS NECESSARY FOR A COMPLETE STRUCTURE. THE FINAL MEMBER SIZES AND GAGES SHALL BE CALCULATED BY THE LIGHT GAGE ENGINEER. LIGHT GAGE SHOP DRAWINGS NOT SIGNED AND SEALED WILL BE REJECTED.

2. LIGHT GAGE MEMBERS SHALL BE DESIGNED, MANUFACTURED AND INSTALLED IN ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE AMERICAN IRON AND STEEL INSTITUTE (AISI) INCLUDING ANY REQUIRED CLIPS, STIFFENERS, AND BRACING.

3. MEMBER SIZES INDICATED ON DRAWINGS ARE MINIMUM DEPTH AND GAGE REQUIRED TO MEET THE DESIGN INTENT AND ARE BASED ON THE PROPERTIES AND MATERIALS LISTED IN THE STEEL STUD MANUFACTURERS ASSOCIATION (SSMA) PRODUCT CATALOG. ALTERNATE MANUFACTURERS ARE ACCEPTABLE IF THE PHYSICAL PROPERTIES ARE EQUAL OR BETTER THAN THOSE LISTED ACCEPTABLE TO THE PROJECT ARCHITECT AND ENGINEER, AND MEET OR EXCEED PERFORMANCE CRITERIA.

4. LIGHT GAGE DOCUMENTS SUBMITTED BY THE LIGHT GAGE FRAMING SUPPLIER IS A "DEFERRED SUBMITTAL" PER SECTION 107.3.4.1 OF THE MBC 2015

5. ALL LIGHT GAGE BACK UP STUDS FOR BRICK VENEER TO BE 16 GA. MINIMUM (54) AND BE DESIGNED FOR L/600 MINIMUM LATERAL DEFLECTION REQUIREMENT.

LIGHT GAGE TRUSSES

1. LIGHT GAGE TRUSSES: SHALL BE MANUFACTURED BY AN ACCEPTABLE TRUSS MANUFACTURER, RECOGNIZED BY THE GOVERNING BUILDING CODE. TRUSS MANUFACTURER SHALL SUPPLY ALL HANGERS, PLATES, BLOCKS, CLIPS, BRIDGING AND OTHER ITEMS RELATIVE TO THEIR UNITS. DESIGN CRITERIA ARE AS FOLLOWS:

   ROOF TRUSS

   TC LL = 25 PSF
   DL = 10 PSF
   BC DL = 10 PSF   LL = 10 PSF
   TL = 55 PSF

2. LIGHT GAGE TRUSS TOP CHORD MUST BE BRACED WITH ROOF SHEATHING OR CONTINUOUS LATERAL BRACING AT 3 -0" O.C. BOTTOM CHORD MUST BE BRACED WITH A RIGID CEILING OR CONTINUOUS BRACING AT 10'-0" O.C. PLYWOOD SHEATHING SHALL BE SCREWED TO TRUSS MEMBERS AT 6" O.C. MAXIMUM SPACING.

3. LIGHT GAGE GIRDER TRUSSES SHALL BE DESIGNED TO SUPPORT ALL LOADS FROM THEIR TRIBUTARY AREA.

4. LIGHT GAGE TRUSS MANUFACTURER SHALL PROVIDE SHOP DRAWINGS, WITH DESIGN LOADS, SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MICHIGAN. TRUSS MANUFACTURER SHALL VERIFY WITH ARCHITECT AND MECHANICAL CONTRACTOR SIZE, LOCATION & SUPPORT OF MECHANICAL UNITS. TRUSS FRAMING AND TRUSS TO TRUSS CONNECTIONS ARE TO BE DESIGNED BY TRUSS MANUFACTURER FOR ALL REQUIRED LOADS. SHOP DRAWINGS NOT SIGNED AND SEALED BY A REGISTERED ENGINEER IN THE STATE OF MICHIGAN WILL BE REJECTED. SEE MECHANICAL AND ARCHITECTURAL DRAWINGS FOR MECHANICAL LOADS AT ROOF AND FLOOR TRUSSES. TRUSS SUPPLIER TO DESIGN TRUSSES FOR SUPPORT OF ALL MECH. UNITS, PIPING, FIRE SUPPRESSION LINES, AND ALL UTILITIES. COORDINATE ADDITIONAL LOADING AND PIPE SUPPORT/UTILITY LOCATIONS WITH MECH. CONTRACTOR.

5. SEE MECHANICAL DRAWINGS FOR MECHANICAL LOADS AT ROOF AND FLOOR TRUSSES. TRUSS SUPPLIER TO DESIGN TRUSSES FOR SUPPORT OF ALL MECH. UNITS, PIPING, FIRE SUPPRESSION LINES, AND ALL UTILITIES. COORDINATE ADDITIONAL LOADING AND PIPE SUPPORT/UTILITY LOCATIONS WITH MECH. CONTRACTOR

6. ALL FABRICATION SHOPS SHALL BE APPROVED BY THE BUILDING DEPARTMENT AND ENGINEER PRIOR TO ANY WORK BEING PERFORMED. SUBMIT ALL CERTIFICATIONS AND DOCUMENTATION FOR THEIR REVIEW.

7. LIGHT GAGE TRUSS DOCUMENTS SUBMITTED BY THE LIGHT GAGE TRUSS TRUSS SUPPLIER IS A "DEFERRED SUBMITTAL" PER SECTION 107.3.4.1 OF THE MBC 2015

SPECIAL INSPECTION

1. WORK CONSTRUCTED SHALL BE INSPECTED BY AN INDEPENDENT TESTING AGENCY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS SHOWN ON THE DRAWINGS. INSPECTIONS REQUIRED BY CHAPTER 17 OF THE MICHIGAN BUILDING CODE; LOCAL BUILDING DEPARTMENTS AND THE CONTRACT DOCUMENTS SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY. SITE VISITS BY THE DESIGN ENGINEER DO NOT CONSTITUTE OR REPLACE INSPECTION

2. THE FOLLOWING ITEMS SHALL BE INSPECTED IN ACCORDANCE WITH MBC 2015 SEC. 1704 & 1705 BY A CERTIFIED SPECIAL INSPECTOR UNLESS NOTED OTHERWISE IN REMARKS COLUMN. ALL INSPECTION SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. ALL PRODUCTS WITH ICC APPROVALS SHALL BE INSTALLED PER THE APPROVAL AND PER MANUFACTURER'S RECOMMENDATIONS. FOR MATERIAL TESTING REQUIREMENTS, SEE SPECIFICATIONS AND/OR GENERAL NOTES. TESTING AGENCY SHALL SEND COPIES OF ALL STRUCTURAL TESTING AND INSPECTION REPORTS DIRECTLY TO THE ARCHITECT.

   INSPECTION OF FABRICATOR'S (SEC. 1704.2.5) *

   FABRICATION AND IMPLEMENTATION PROCEDURES 1704.2.5.1

   *SPECIAL INSPECTION IS NOT REQUIRED FOR FABRICATOR SHOP IF CERTIFICATE OF APPROVAL SUBMITTED BY FABRICATOR'S INSPECTION AGENCY PER EXCEPTION 1704.2.5.1

TABLE 1705.2.2
REQUIRED VERIFICATION AND
INSPECTION OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	NOT APPLICABLE	REFERENCED STANDARD
1. MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK:				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	-	X	-	APPLICABLE ASTM MATERIAL STANDARDS
b. MANUFACTURER'S CERTIFIED TEST REPORTS.	-	X	-	-
2. INSPECTION OF WELDING:				
a. COLD-FORMED STEEL DECK:				
1) FLOOR AND ROOF DECK WELDS.	-	X	-	AWS D1.3
b. REINFORCING STEEL:				
1) VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	-	X	-	AWS D1.4 ACI 318: SECTION 3.5.2
2) REINFORCING STEEL RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT.	X	-	-	
3) SHEAR REINFORCEMENT.	X	-	-	
4) OTHER REINFORCING STEEL.	-	X	-	

TABLE 1705.2.3
REQUIRED SPECIAL INSPECTIONS OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIOIDIC SPECIAL INSPECTION	REFERENCED STANDARD[a]
1. INSTALLATION OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS.			
a. END CONNECTIONS - WELDING OR BOLTED.	-	X	SJI SPECIFICATIONS LISTED IN SECTION 2207.1.
b. BRIDGING - HORIZONTAL OR DIAGONAL.	-		
1. STANDARD BRIDGING.	-	X	SJI SPECIFICATIONS LISTED IN SECTION 2207.1.
2. BRIDGING THAT DIFFERS FROM THE SJI SPECIFICATIONS LISTED IN SECTION 2207.1.		X	

FOR SI: 1 INCH = 25.4 MM.
a. WHERE APPLICABLE, SEE ALSO SECTION 1705.12, SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE.

O - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

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KEY PLAN

OWNER
Highland Township
Fire Department

PROJECT NAME
Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS
Bidding/Construction 08/27/2020

DRAWN BY
CS
CHECKED BY
TS
APPROVED BY
TS

SHEET NAME
GENERAL NOTES

SHEET NO.
S4-00

SPECIAL INSPECTION (CONT.)

TABLE N5.4-1
INSPECTION TASKS PRIOR TO WELDING

INSPECTION TASKS PRIOR TO WELDING	QC	QA	NOT APPLICABLE
WELDING PROCEDURE SPECIFICATIONS (WPSs) AVAILABLE	P	P	-
MANUFACTURER CERTIFICATION FOR WELDING CONSUMABLES AVAILABLE	P	P	-
MATERIAL IDENTIFICATION (TYPE/GRADE)	O	O	-
WELDER IDENTIFICATION SYSTEM†	O	O	-
FIT-UP OF GROOVE WELDS (INCLUDING JOINT GEOMETRY) • JOINT PREPARATION • DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOT FACE, BEVEL) • CLEANLINESS (CONDITION OF STEEL SURFACES) • TACKING (TACK WELD QUALITY AND LOCATION) • BACKING TYPE AND FIT (IF APPLICABLE)	O	O	-
CONFIGURATION AND FINISH OF ACCESS HOLES	O	O	-
FIT-UP OF FILLET WELDS • DIMENSIONS (ALIGNMENT, GAPS AT ROOF) • CLEANLINESS (CONDITION OF STEEL SURFACES) • TACKING (TACK WELD QUALITY AND LOCATION)	O	O	-
CHECK WELDING EQUIPMENT	O	-	-

†THE FABRICATOR OR ERECTOR, AS APPLICABLE, SHALL MAINTAIN A SYSTEM BY WHICH A WELDER WHO HAS WELDED A JOINT OR MEMBER CAN BE IDENTIFIED. STAMPS, IF USED, SHALL BE THE LOW-STRESS TYPE.

TABLE N5.4-2
INSPECTION TASKS DURING WELDING

INSPECTION TASKS DURING TO WELDING	QC	QA	NOT APPLICABLE
USE OF QUALIFIED WELDERS	O	O	-
CONTROL AND HANDLING OF WELDING CONSUMABLES • PACKAGING • EXPOSURE CONTROL	O	O	-
NO WELDING OVER CRACKED TACK WELDS	O	O	-
ENVIRONMENTAL CONDITIONS • WIND SPEED WITHIN LIMITS • PRECIPITATION AND TEMPERATURE	O	O	-
WPS FOLLOWED • SETTINGS ON WELDING EQUIPMENT • TRAVEL SPEED • SELECTED WELDING MATERIALS • SHIELDING GAS TYPE/FLOW RATE • PREHEAT APPLIED • INTERPASS TEMPERATURE WAINTAINED (MIN./MAX.) • PROPER POSITION (F, V, H, OH)	O	O	-
WELDING TECHNIQUES • INTERPASS AND FINAL CLEANING • EACH PASS WITHIN PROFILE LIMITATIONS • EACH PASS MEETS QUALITY REQUIREMENTS	O	O	-

TABLE N5.4-3
INSPECTION TASKS AFTER WELDING

INSPECTION TASKS AFTER WELDING	QC	QA	NOT APPLICABLE
WELDS CLEANED	O	O	-
SIZE, LENGTH AND LOCATION OF WELDS	P	P	-
WELDS MEET VISUAL ACCEPTANCE CRITERIA • CRACK PROHIBITION • WELD/BASE-METAL FUSION • CRATER CROSS SECTION • WELD PROFILES • WELD SIZE • UNDERCUT • POROSITY	P	P	-
ARC STRIKES	P	P	-
K-AREA†	P	P	-
BACKING REMOVED AND WELD TABS REMOVED (IF REQUIRED)	P	P	-
REPAIR ACTIVITIES	P	P	-
DOCUMENT ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER	P	P	-

†WHEN WELDING OF DOUBLER PLATES, CONTINUITY PLATES OF STIFFENERS HAS BEEN PERFORMED IN THE K-AREA, VISUALLY INSPECT THE WEB K-AREA FOR CRACKS WITHIN 3 IN. (75MM) OF THE WELD.

TABLE N5.6-1
INSPECTION TASKS PRIOR TO BOLTING

INSPECTION TASKS PRIOR TO BOLTING	QC	QA	NOT APPLICABLE
MANUFACTURER'S CERTIFICATIONS AVAILABLE FOR FASTENER MATERIALS	O	P	-
FASTENERS MARKED IN ACCORDANCE WITH ASTM REQUIREMENTS	O	O	-
PROPER FASTENERS SELECTED FOR THE JOINT DETAIL (GRADE, TYPE, BOLT LENGTH IF THREADS ARE TO BE EXCLUDED FROM SHEAR PLANE)	O	O	-
PROPER BOLTING PROCEDURE SELECTED FOR JOINT DETAIL	O	O	-
CONNECTING ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION AND HOLE PREPARATION, IF SPECIFIED, MEET APPLICABLE REQUIREMENTS	O	O	-
PRE-INSTALLATION VERIFICATION TESTING BY INSTALLATION PERSONNEL OBSERVED AND DOCUMENTED FOR FASTENER ASSEMBLIES AND METHODS USED	P	O	-
PROPER STORAGE PROVIDED FOR BOLTS, NUTS, WASHERS AND OTHER FASTNER COMPONENTS	O	O	-

TABLE N5.6-2
INSPECTION TASKS DURING BOLTING

INSPECTION TASKS DURING BOLTING	QC	QA	NOT APPLICABLE
FASTENERS ASSEMBLIES, OF SUITABLE CONDITION, PLACED IN ALL HOLES AND WASHERS (IF REQUIRED) ARE POSITIONED AS REQUIRED	O	O	-
JOINT BROUGHT TO THE SNUG-TIGHT CONDITION PRIOR TO THE PRETENSIONING OPERATION	O	O	-
FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	O	O	-
FASTENERS ARE PRETENSIONED IN ACCORDANCE WITH THE RCSC SPECIFICATION, PROGRESSING SYSTEMATICALLY FROM THE MOST RIGID POINT TOWARD THE FREE EDGES	O	O	-

TABLE N5.6-3
INSPECTION TASKS AFTER BOLTING

INSPECTION TASKS AFTER BOLTING	QC	QA	NOT APPLICABLE
FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	O	O	-

O - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

SPECIAL INSPECTION (CONT.)

REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION (LEVEL B QUALITY ASSURANCE)

MINIMUM TESTS
VERIFICATION OF SLUMP FLOW AND VISUAL STABILITY INDEX (VSI) AS DELIVERED TO THE PROJECT SITE IN ACCORDANCE WITH SPECIFICATION ARTICLE 1.5 B.1.b.3 FOR SELF-CONSOLIDATING GROUT
VERIFICATION OF f'_m AND f'_{AAC} IN ACCORDANCE WITH SPECIFICATION ARTICLE 1.4B PRIOR TO CONSTRUCTION, EXCEPT WHERE SPECIFICALLY EXEMPTED BY THIS CODE

MINIMUM INSPECTION						
INSPECTION TASK	FREQUENCY (a)			REFERENCE FOR CRITERIA		
	CONTINUOUS	PERIODIC	NOT APPLICABLE	IBC SECTION	TMS 402/ACI 530/ASCE 5	TMS 602/ACI 530.1/ASCE 6
1. VERIFY COMPLIANCE WITH THE APPROVED SUBMITTALS		X				ART. 1.5
2. AS MASONRY CONCSTRUCTION BEGINS, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:						
a. PROPORTIONS OF SITE-PREPARED MORTAR.		X				ART. 2.1, 2.6A
b. CONSTRUCTION OF MORTAR JOINTS.		X				ART. 3.3B
c. GRADE AND SIZE OF PRESTRESSING TENDONS AND ANCHORAGES.		X				ART. 2.4B, 2.4H
d. LOCATION OF REINFORCEMENT, CONNECTORS, PRESTRESSING TENDONS AND ANCHORAGES.		X				ART. 3.4, 3.6A
e. PRESTRESSING TECHNIQUE.		X				ART. 3.6B
f. PROPERTIES OF THIN-BED MORTAR FOR AAC MASONRY	X(b)	X(c)				ART. 2.1C
3. PRIOR TO GROUTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:						
a. GROUT SPACE		X				ART. 3.2D, 3.2F
b. GRADE, TYPE AND SIZE OF REINFORCEMENT AND ANCHOR BOLTS, AND PRESTRESSING TENDONS AND ANCHORAGES		X		SEC. 1.16		ART. 2.4, 3.4
c. PLACEMENT OF REINFORCEMENT, CONNECTORS, AND PRESTRESSING TENDONS AND ANCHORAGES		X		SEC. 1.16		ART. 3.2E, 3.4, 3.6A
d. PROPORTIONS OF SITE-PREPARED GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS.						
e. CONSTRUCTION OF MORTAR JOINTS.		X				ART. 3.3B
4. VERIFY DURING CONSTRUCTION:						
a. SIZE AND LOCATION OF STRUCTURAL ELEMENTS		X				ART. 3.3F
b. TYPE, SIZE, AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES, OR OTHER CONSTRUCTION		X			SEC. 1.16,4.3, 1.17.1	
c. WELDING OF REINFORCEMENT	X				SEC. 2.1.7,7.2.3.3.3.4(c), 8.3.3.4(b),	
d. PREPARATION, CONSTRUCTION, AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F (4.4°C) OR HOT WEATHER (TEMPERATURE ABOVE 90°F (32.2°C)		X				ART. 1.8C, 1.8D
e. APPLICATION AND MEASUREMENT OF PRESTRESSING FORCE	X					ART. 3.6B
f. PLACEMENT OF GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS IS IN COMPLIANCE	X					ART. 3.5, 3.6C
g. PLACEMENT OF AAC MASONRY UNITS AND CONSTRUCTION OF THIN-BED MORTAR JOINTS	X(b)	X(c)				ART. 3.3 B.8
5. OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS		X				ART. 1.4 B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B.4

(a). FREQUENCY REFERS TO THE FREQUENCY OF INSPECTION, WHICH MAY BE CONTINUOUS DURING THE TASK LISTED OR PERIODICALLY DURING THE LISTED TASK, AS DEFINED IN THE TABLE.

(b). REQUIRED FOR THE FIRST 5000 SQUARE FEET (465 SQUARE METERS) OF ACC MASONRY.

(c). REQUIRED AFTER THE FIRST 5000 SQUARE FEET (465 SQUARE METERS) OF ACC MASONRY.

TABLE 1705.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	NOT APPLICABLE	REFERENCED STANDARD a	IBC REFERENCE
1. INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT.	-	X	-	ACI 318 CH. 20, 25.2, 25.3, 26.6.1-26.6.3	1908.4
2. REINFORCING BAR WELDING:					
a. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706;	-	X	-	AWS D1.4 ACI 318: 26.6.4	-
b. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16" AND	-	X	-		
c. INSPECT ALL OTHER WELDS.	x	-	-		
3. INSPECT ANCHORS CAST IN CONCRETE	-	X	-	ACI 318: 17.8.2	-
4. INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS.b					
a. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENTION LOADS.	X	-	-	ACI 318: 17.8.2.4	-
b. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4.a.	-	X	-	ACI 318: 17.8.2	
5. VERIFY USE OF REQUIRED DESIGN MIX.	-	X	-	ACI 318: CH.19. 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	X	-	-	ASTM C172 ASTM C31 ACI 318: 26.4,26.12	1908.10
7. INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X	-	-	ACI 318: 26.5	1908.6, 1908.7, 2908.8
8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	-	X	-	ACI 318: 26.5.3-26.5.5	1908.9
9. INSPECT PRESTRESSED CONCRETE FOR:					
a. APPLICATION OF PRESTRESSING FORCES; AND	X	-	-	ACI 318: 26.10	-
b. GROUTING OF BONDED PRESTRESSING TENDONS.	X	-	-		
10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS.	-	X	-	ACI 318: CH. 26.8	-
11. VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.	-	X	-	ACI 318: 26.11.2	-
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	-	X	-	ACI 318: 26.11.1.2(b)	-

FOR SI: 1 INCH = 25.4 MM

a. WHERE APPLICABLE, SEE ALSO SECTION 1705.12, SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE.

b. SPECIFIC REQUIREMENTS FOR SPECIAL INSPECTION SHALL BE INCLUDED IN THE RESEARCH REPORT FOR THE ANCHOR ISSUED BY AN APPROVED SOURCE IN ACCORDANCE WITH 17.8.2 IN ACI 318, OR OTHER QUALIFICATION PROCEDURES. WHERE SPECIFIC REQUIREMENTS ARE NOT PROVIDED, SPECIAL INSPECTION REQUIREMENTS SHALL BE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL AND SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF THE WORK.

TABLE 1705.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

VERIFICATION AND INSPECTION TASK	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	NOT APPLICABLE
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	-	X	
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	-	X	
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	-	X	
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X	-	
5. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	X	

SPECIAL INSPECTION (CONT.)

DESIGN CRITERIA
CODE: MBC 2015 THE STRUCTURE IS DESIGNED FOR THE FOLLOWING LIVE LOADS, IN ADDITION TO THE LATERAL LOADS, SUPER-IMPOSED DEAD LOADS, & SELF WEIGHT OF THE STRUCTURE. WHERE APPLICABLE LIVE LOADS ARE REDUCED IN ACCORDANCE WITH THE PROVISIONS OF THE BUILDING CODE. A. AMERICAN CONCRETE INSTITUTE BUILDING CODE (ACI-318). B. MANUAL OF STEEL CONSTRUCTION BY AMERICAN INSTITUTE OF STEEL CONSTRUCTION (LATEST EDITION). C. LATEST MASONRY STANDARDS JOINT COMMITTEE (MSJC) BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES (TMS 402/ACI 530/ASCE 5) AND SPECIFICATIONS FOR MASONRY STRUCTURES (TMS 602/ACI 530.1/ASCE 6) D. AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC) STANDARDS AND SPECIFICATIONS. E. NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION (NDS) AS PUBLISHED BY AMERICAN FOREST AND PAPER ASSOCIATION.

		CODE REFERENCE
BUILDING OCCUPANCY CATEGORY	IV	MBC-Table 1604.5 ASCE Table 1.5-1

FLOOR LIVE LOADS		
		CODE REFERENCE
STAIRS	100 PSF	ASCE Table 4-1
FIRST FLOOR ABOVE LOWER LEVEL	100 PSF	

NOTE: HANDRAILS AND GUARDS TO BE DESIGNED TO RESIST A LINEAR LOAD OF 50 POUNDS PER LINEAR FOOT. PER SECTION 1607.8.1 OF THE MBC BUILDING CODE AND A CONCENTRATED LOAD OF 200 POUNDS CONCENTRATED LOAD PER SECTION 1607.8.1.1 OF THE MBC BUILDING CODE.

NOTE: GRAB BARS SHALL BE DESIGNED TO RESIST A SINGLE CONCENTRATED LOAD OF 250 POUNDS PER SECTION 1607.8.2 PER MBC BUILDING CODE

SNOW LOADS/ROOF LIVE LOADS		
SNOW CRITERIA		CODE REFERENCE
GROUND SNOW LOAD	Pg = 25 PSF	MBC FIG. 1608.2 ASCE Fig. 7-1
FLAT ROOF SNOW LOAD	Pf = 21 PSF (MINIMUM)	ASCE Sec. 7.3
EXPOSURE FACTOR	Ce = 1.0	ASCE Table 7-2
IMPORTANCE FACTOR	I = 1.2	ASCE Table 1.5-2
THERMAL FACTOR	Ct = 1.0 AT APPARATUS BAY, Ct = 1.1 AT LT. GAGE TRUSSES	ASCE Table 7-3
ROOF LIVE LOADS	Lr = 20 PSF	ASCE Table 4-1
NOTE: SNOW LOADS ADJACENT VERTICAL PROJECTIONS, ON LOWER ROOFS, ADJACENT TO HIGH ROOFS, ON SLOPED ROOFS ARE INCREASED FOR THE EFFECT OR DRIFTING		

WIND LOADS		
WIND CRITERIA		CODE REFERENCE
BASIC WIND SPEED (3 SEC. GUST)	V = 120 MPH	ASCE FIG. 26.5-1A, 26.5-1B, 26.5-1C
RISK FACTOR	IV	ASCE Table 1.5-1
EXPOSURE CATEGORY	B	ASCE Sec. 26.7.3
INTERNAL PRESSURE COEFFICIENT	± 0.18 (ENCLOSED)	ASCE TABLE 26.11-1
MWFRS ANALYSIS PROCEDURE	DIRECTIONAL PROCEDURE	ASCE CHAP. 27
COMPONENTS AND CLADDING	± 33 PSF WINIMUM ULTIMATE AND PER CODE REQUIREMENTS BASED ON ABOVE INFORMATION	ASCE Sec. 30.2.2

SEISMIC LOADS		
SEISMIC CRITERIA		CODE REFERENCE
SEISMIC RISK CATEGORY	IV	ASCE Table 1.5-1
SEISMIC IMPORTANCE FACTOR	I = 1.5	ASCE Table 1.5-2
0.2 SEC MAPPED SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING) Ss	Ss = .089	ASCE Sec. 11.4
1.0 SEC MAPPED SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING) S1	S1 = .045	ASCE Sec. 11.4
SOIL SITE CLASS	D	ASCE Sec. 11.4.2
SEISMIC DESIGN CATEGORY	B	ASCE Sec. 11.6
SEISMIC FORCE RESISTING SYSTEM	BEARING WALL SYSTEM WITH INTERMEDIATE REINFORCED MASONRY SHEAR WALL, LT. FRAMED WALLS WITH SHEAR PANELS	ASCE Table 12.2-1
RESPONSE MODIFICATION FACTOR	R = 3.5	ASCE Table 12.2-1
DEFLECTION AMPLIFICATION FACTOR	Cd = 2.25	ASCE Table 12.2-1
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE	ASCE Sec. 12.8

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

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SHEET NAME

GENERAL NOTES

SHEET NO.

S4-01

BEARING PLATE SCHEDULE

MARK	DESCRIPTION	REMARKS
BP1	7"x3/8"x0'-7"	
BP2	7"x3/8"x1'-0"	
BP3	8"x3/8"x0'-8"	
BP4	8"x3/8"x1'-6"	

HEADER SCHEDULE

MARK	DESCRIPTION	TRACK
H1	LT. GAGE HEADER BY LT. GAGE SUPPLIER	
H2	LT. GAGE HEADER BY LT. GAGE SUPPLIER	
H3	LT. GAGE HEADER BY LT. GAGE SUPPLIER	

HEADERS NOTES:
1. HEADERS WILL HAVE Fy = 50 KSI UNLESS OTHERWISE NOTED
2. HEADERS REQUIRE WEB STIFFENERS AT END SUPPORTS
3. PROVIDE TWO CRIPPLE STUDS AT EACH END OF HEADER UNLESS OTHERWISE NOTED (SEE PLAN)
4. HEADERS INDICATED IN HEADER SCHEDULE ARE MINIMUM SIZES. FINAL SIZES TO BE DETERMINED BY LT. GAGE SUPPLIER. REFER TO LIGHT GAGE NOTES 1, 2, & 3/S4-00.

LINTEL SCHEDULE

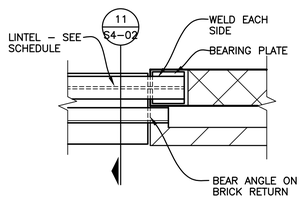
8" BEARING EACH END-U.N.O.

MARK	DESCRIPTION	
L1	12"WIDEx8" DEEP MASONRY LINTEL WITH 2-#5 BOTTOM	
L2	W8x18 + 5/16" PLATE	PROVIDE BP1 EACH END
L3	W8x24 + 5/16" PLATE	PROVIDE BP2 EACH END
L4	W16x45 + 3/8" PLATE	PROVIDE BP3 EACH END
L5	(2)W16x40 + 3/8" PLATE	SEE DETAIL 5/S5-01 PROVIDE BP4 EACH END
L6	W12x26 + 5/16" PLATE	PROVIDE BP1 EACH END
L7	W8x10 + 3/8" PLATE + L4x3 1/2x5/16 LLV	SEE 11 & 12/S4-02
L8	CONT. W16x36 + 5/16" PLATE.	PROVIDE BP3 EACH END AND AT INTERMEDIATE PIERS.

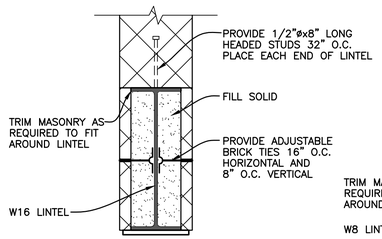
LINTEL NOTES:
1. PLATES ON LINTELS EXTEND WIDTH OF MASONRY OPENINGS ONLY. (SEE ARCH. DRAWINGS)
2. HOLD EDGE OF PLATE ON LINTEL BACK FROM EACH FACE OF MASONRY 1/4"
3. WELD 1/2"ø8" HEADED STUDS 32" O.C. TO TOP FLANGE OF ALL WIDE FLANGE LINTELS
4. ALL EXTERIOR LINTELS TO BE GALVANIZED G90 PER ASTM 123
5. SEE MASONRY NOTE 15 ON SHEET S4-00 FOR MISC. LINTELS.

COLUMN SCHEDULE

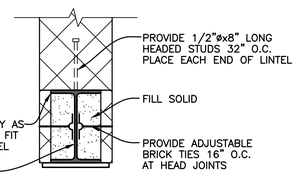
			C6	C5	C4	C3	C2	C1	MARK
									HIGH ROOF
								W10x49	LOW ROOF
				HSS4x4x1/4		HSS4x4x1/4			1ST FLOOR
			GALVANIZED HSS4x4x1/4		HSS5x5x3/8		HSS5x5x3/8		BASEMENT
			10"x3/4"0'-10"	10"x3/4"0'-10"	11"x1"x0'-11"	3/4" PLATE (4)3/4"ø BOLTS	11"x1"x0'-11"	16"x3/4"x1'-4"	BASE PLATE
			(4)3/4"ø x1'-4" HEADED ANCHOR	(4)3/4"ø x1'-4" HEADED ANCHOR	(4)3/4"ø x1'-4" HEADED ANCHOR		(4)3/4"ø x1'-4" HEADED ANCHOR	(4)3/4"ø x1'-4" HEADED ANCHOR	ANCHOR BOLTS
				SEE 2/S3-03		SEE 3/S4-04			REMARKS



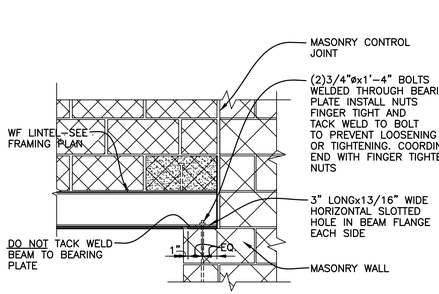
12 S4-02 TYPICAL PLAN DETAIL AT LINTEL BEARING WITH BRICK VENEER
SCALE : 3/4" = 1'-0"



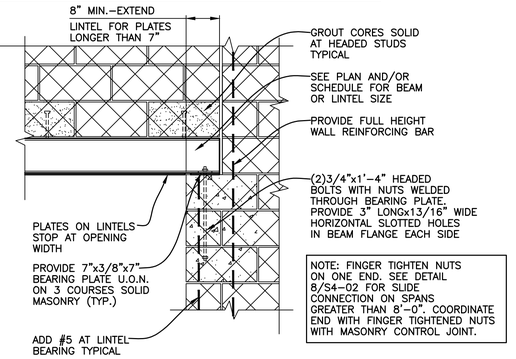
10 S4-02 TYPICAL LINTEL DETAIL AT W16 BEAM
SCALE : 1 1/2" = 1'-0"



9 S4-02 TYPICAL LINTEL DETAIL AT W8 BEAM
SCALE : 1 1/2" = 1'-0"



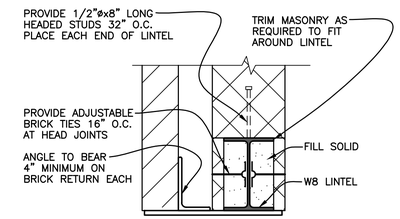
8 S4-02 TYPICAL SLIDE CONNECTION LINTEL DETAIL
SCALE : 3/4" = 1'-0"



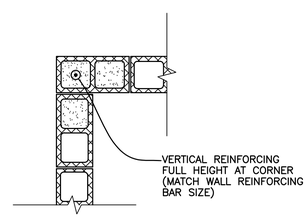
NOTE: FINGER TIGHTEN NUTS ON ONE END. SEE DETAIL 8/S4-02 FOR SLIDE CONNECTION ON SPANS GREATER THAN 8'-0". COORDINATE END WITH FINGER TIGHTENED NUTS WITH MASONRY CONTROL JOINT.

7 S4-02 TYPICAL LINTEL BEARING ON MASONRY DETAIL
SCALE : 3/4" = 1'-0" (LINTEL PARALLEL TO WALL)

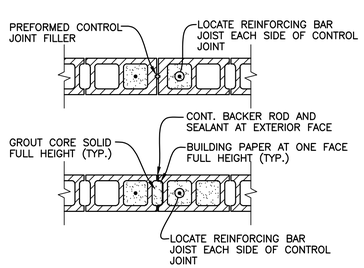
NOTE: PLACE LINTEL BEAMS CENTERED IN CMU WALLS UNLESS NOTED OTHERWISE



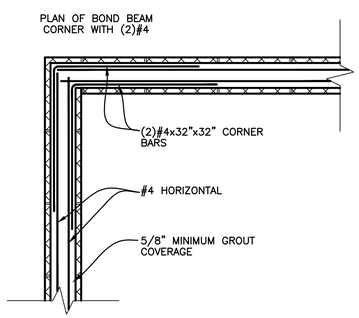
11 S4-02 TYPICAL LINTEL DETAIL AT W8 BEAM
SCALE : 1 1/2" = 1'-0"



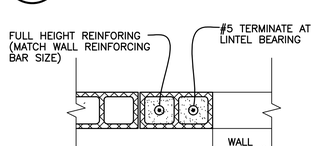
4 S4-02 TYPICAL REINFORCING AT CORNERS
SCALE : 3/4" = 1'-0"



6 S4-02 TYPICAL MASONRY WALL CONTROL JOINTS
SCALE : 3/4" = 1'-0"

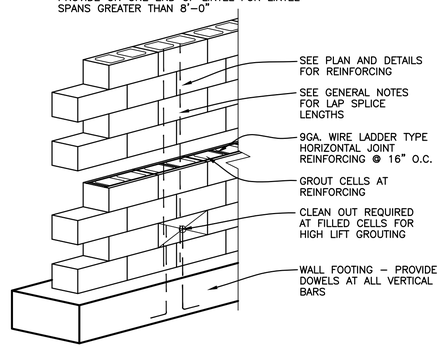


5 S4-02 TYPICAL BOND BEAM CORNER DETAIL
SCALE : 3/4" = 1'-0"



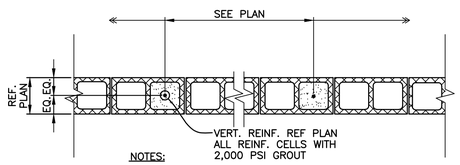
3 S4-02 TYPICAL REINFORCING ALONG SIDE OPENING
SCALE : 3/4" = 1'-0"

PROVIDE ON ONE END OF LINTEL FOR LINTEL SPANS GREATER THAN 8'-0"



GROUT INSTRUCTIONS :
1. CONSTRUCT WALL TO HEIGHT OF 4'-0" - ALLOW MORTAR TO SET SUFFICIENTLY TO WITHSTAND GROUT PRESSURE.
2. INSPECT UNITS FOR ALIGNMENT, CLEAN OUT CELLS TO BE FILLED.
3. FILL CELLS TO 8" BELOW TOP COURSE WITH 2,000 PSI CONCRETE GROUT.
4. DELAY 3 - 5 MINUTES PRIOR TO CONSOLIDATING TO ALLOW WATER TO BE ABSORBED BY MASONRY.

2 S4-02 REINFORCED MASONRY CONSTRUCTION DETAIL
SCALE : NONE



NOTES:
1. PROVIDE CLEANOUTS AT BOTTOM OF EACH REINFORCED CELL IN ACCORDANCE WITH THE SPECIFICATIONS
2. PROVIDE HORIZONTAL JOINT REINF. PER GENERAL NOTES @ 16" O.C. MAX. U.N.O.

MASONRY REINF. LAP LENGTH		
BAR SIZE	8" WALL	12" WALL
4	24"	24"
5	30"	30"
6	38"	36"
7		42"

1 S4-02 TYPICAL WALL REINFORCING DETAIL
SCALE : 3/4" = 1'-0"

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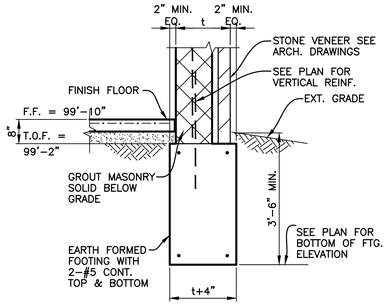
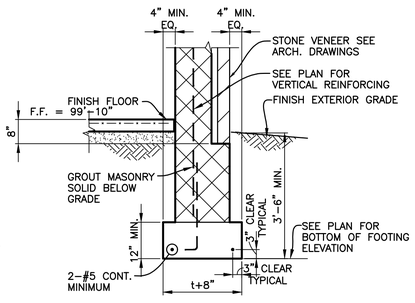


15A S4-03 ALTERNATE EXTERIOR COMPOSITE WALL FOOTING

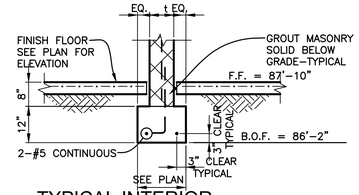
SCALE : 1/2" = 1'-0" (CONTRACTOR OPTION)

NOTE : THIS DETAIL MAY BE USED IN LIEU OF DETAIL 15 AT CONTRACTOR'S OPTION IF FIELD CONDITIONS ALLOW AND IF ACCEPTABLE TO THE SOILS ENGINEER



15 S4-03 TYPICAL EXTERIOR COMPOSITE WALL PAD FOOTING

SCALE : 1/2" = 1'-0"



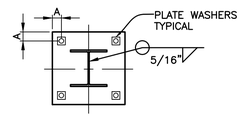
14 S4-03 TYPICAL INTERIOR WALL FOOTING AT LOWER LEVEL

SCALE : 1/2" = 1'-0"

TABLE 14-2
RECOMMMENDED MAXIMUM SIZES FOR ANCHOR-ROD HOLES IN BASE PLATES

ANCHOR ROD DIAMETER, in.	MAX. HOLE DIAMETER, in.	MIN. WASHER SIZE, in.	MIN. WASHER THICKNESS
3/4	1 5/16	2	1/4
7/8	1 9/16	2 1/2	5/16
1	1 13/16	3	3/8
1 1/4	2 1/16	3	1/2

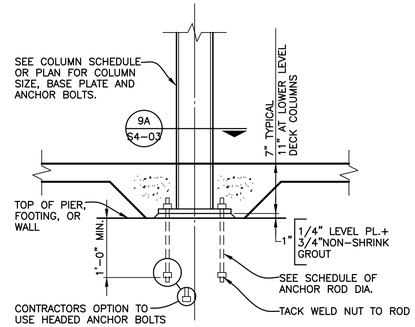
NOTES:
1. CIRCULAR OR SQUARE WASHERS MEETING THE SIZE ARE ACCEPTIBLE.
2. CLEARANCE MUST BE CONSIDERED WHEN CHOOSING AN APPROPRIATE ANCHOR ROD HOLE LOCATION, NOTING EFFECTS SUCH AS THE POSITION OF THE ROD IN THE HOLE WITH RESPECT TO THE COLUMN, WELD SIZE, AND OTHER INTERFERENCES.
3. WHEN BASE PLATES ARE LESS THAN 1 1/4 in. THICK, PUNCHING OF HOLES MAY BE AN ECONOMICAL OPTION. IN THIS CASE, 3/4-in. ANCHOR RODS AND 1 1/16-in. – DIAMETER PUNCHED HOLES MAY BE USED WITH ASTM F844 (USS STANDARD) WASHERS IN PLACE OF FABRICATED PLATE WASHERS.



9A S4-03 TYPICAL BASE PLATE DETAIL WITH OVER SIZED HOLES FOR ANCHOR BOLTS

SCALE : NONE

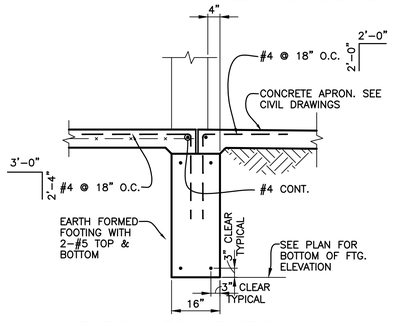
1. PROVIDE PLATE WASHERS PER TABLE 14-2 OF THE FOURTEENTH EDITION OF STEEL CONSTRUCTION MANUAL IF USING OVER SIZED HOLES ON THE BASE PLATES FOR ANCHOR RODS.
2. IF USING OVER SIZED HOLES AT MOMENT FRAMES OR BRACED BAYS, WELD THE PLATE WASHERS TO TOP OF BASE PLATE WITH 1/4" FILLET WELD ALL AROUND.



NOTE: ANCHOR RODS MUST BE INSTALLED WITHIN AISC TOLERANCES BEFORE PLACEMENT OF CONCRETE

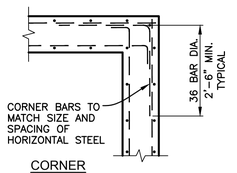
9 S4-03 TYPICAL COLUMN BASE DETAIL

SCALE : 3/4" = 1'-0"



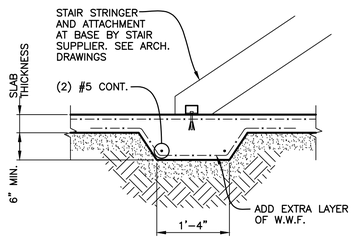
13 S4-03 TYPICAL FOUNDATION DETAIL AT OVERHEAD DOORS

SCALE : 1/2" = 1'-0"



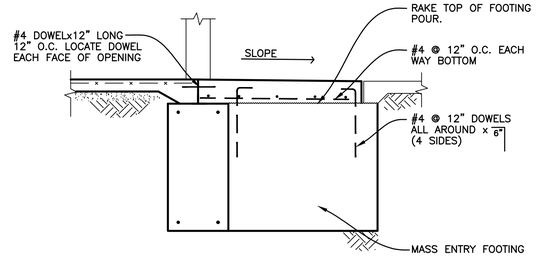
12 S4-03 TYPICAL WALL REINFORCING DETAILS

SCALE : 1/2" = 1'-0"



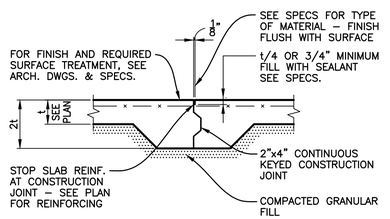
11 S4-03 TYPICAL THICKENED SLAB DETAIL

SCALE : 3/4" = 1'-0"



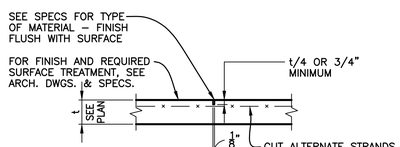
10 S4-03 TYPICAL MASS ENTRANCE SLAB

SCALE : 1/2" = 1'-0"



8 S4-03 TYPICAL FLOOR CONSTRUCTION JOINT

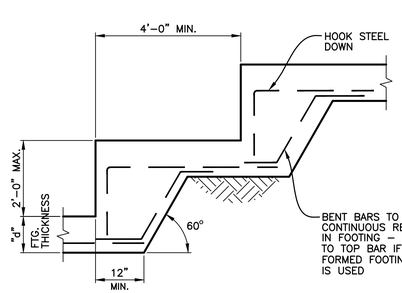
SCALE : 1" = 1'-0"



(15'-0" O.C. EACH WAY MAXIMUM)

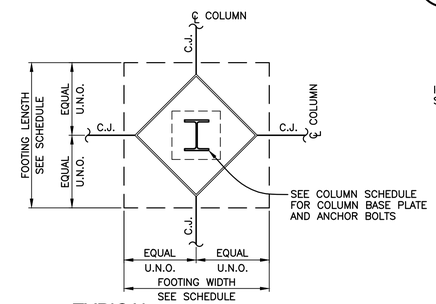
7 S4-03 TYPICAL FLOOR CONTROL JOINT

SCALE : 1" = 1'-0"



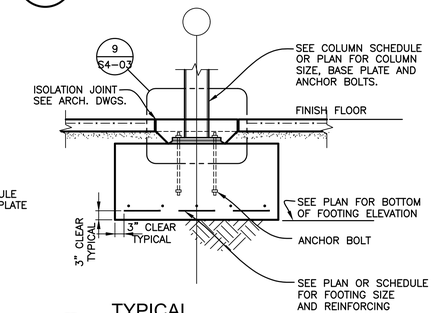
6 S4-03 TYPICAL STEP FOOTING DETAIL

SCALE : NONE (IF REQUIRED)



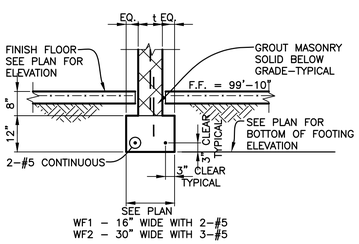
5 S4-03 TYPICAL ISOLATION JOINT AT COLUMN

SCALE : 1/2" = 1'-0"



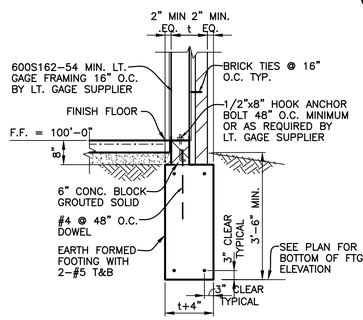
4 S4-03 TYPICAL COLUMN FOOTING

SCALE : 1/2" = 1'-0"



3 S4-03 TYPICAL INTERIOR WALL FOOTING

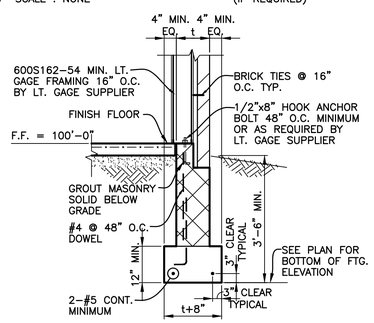
SCALE : 1/2" = 1'-0"



2A S4-03 TYPICAL ALTERNATE EXTERIOR WALL FOOTING

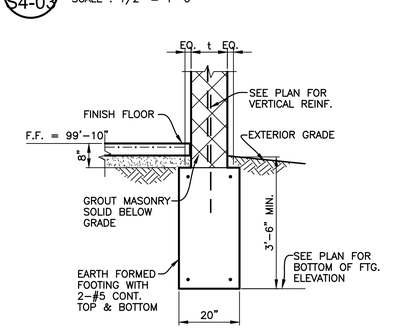
SCALE : 1/2" = 1'-0" (CONTRACTOR OPTION)

NOTE : THIS DETAIL MAY BE USED IN LIEU OF DETAIL 2 AT CONTRACTOR'S OPTION IF FIELD CONDITIONS ALLOW AND IF ACCEPTABLE TO THE SOILS ENGINEER



2 S4-03 TYPICAL EXTERIOR WALL PAD FOOTING

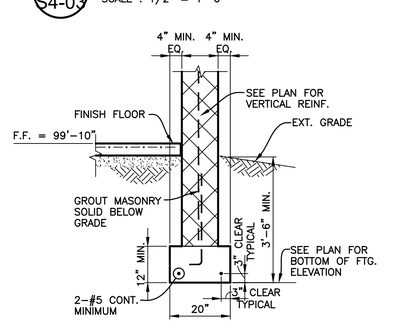
SCALE : 1/2" = 1'-0"



1A S4-03 ALTERNATE EXTERIOR MASONRY WALL FOOTING

SCALE : 1/2" = 1'-0" (CONTRACTOR OPTION)

NOTE : THIS DETAIL MAY BE USED IN LIEU OF DETAIL 1 AT CONTRACTOR'S OPTION IF FIELD CONDITIONS ALLOW AND IF ACCEPTABLE TO THE SOILS ENGINEER



1 S4-03 TYPICAL EXTERIOR MASONRY WALL PAD FOOTING

SCALE : 1/2" = 1'-0"

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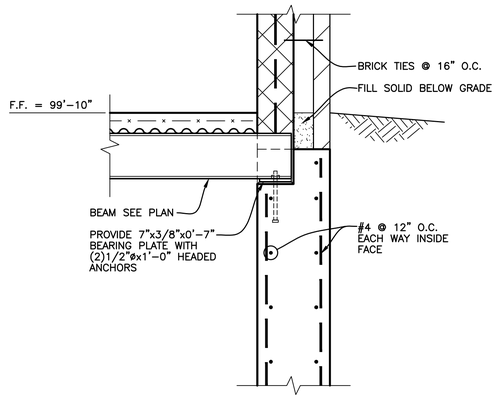
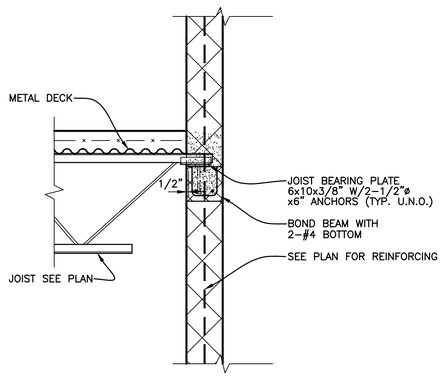
SHEET NO.

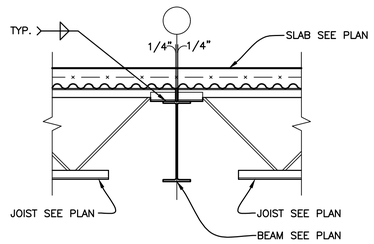
S4-03



9 S4-04 **SECTION**
SCALE : 3/4" = 1'-0"



8 S4-04 **TYPICAL JOIST BEARING ON MASONRY WALL**
SCALE : 3/4" = 1'-0"



7 S4-04 **TYPICAL JOIST BEARING ON BEAM**
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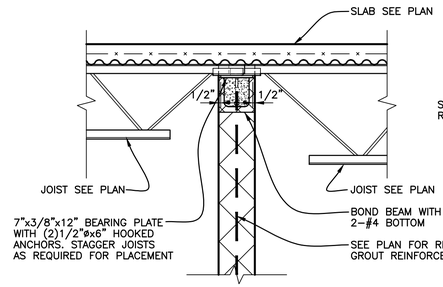
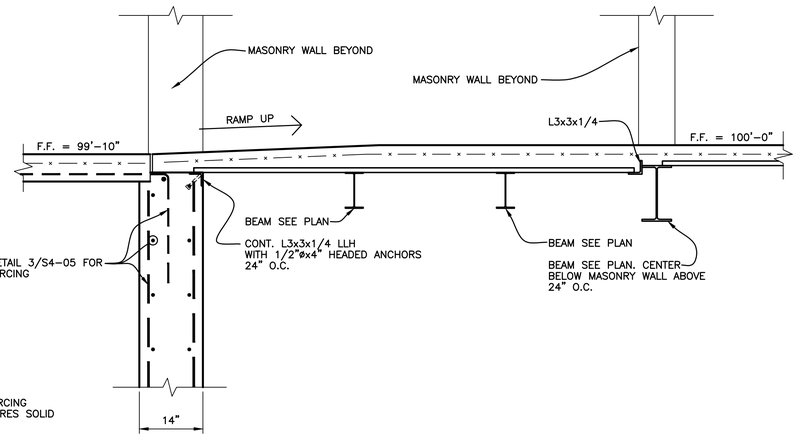


6 S4-04 **TYPICAL JOIST BEARING BOTH SIDES OF 8" CMU AT FLOOR**
SCALE : 3/4" = 1'-0"



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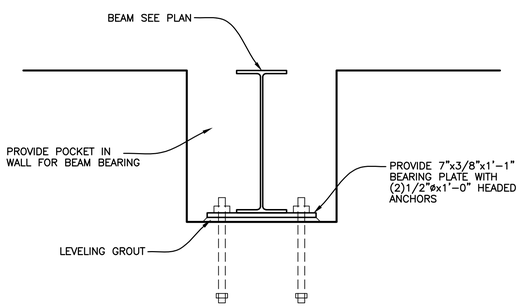

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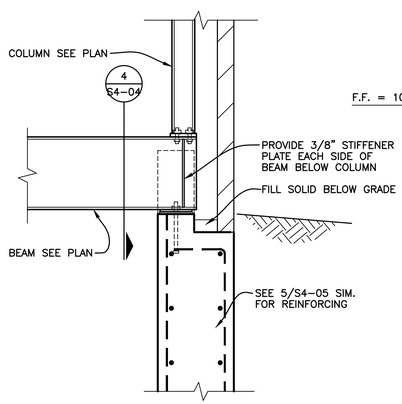

3 S4-04 **SECTION**
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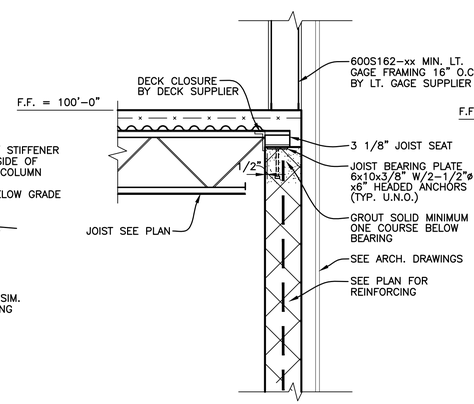

2 S4-04 **SECTION**
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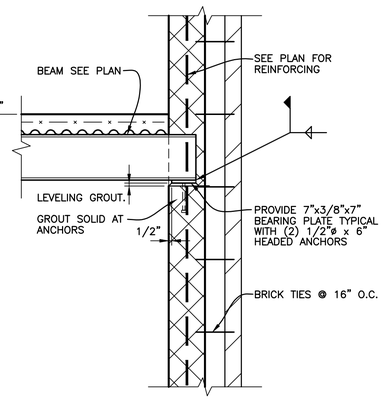

1 S4-04 **SECTION**
SCALE : 3/4" = 1'-0"

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KEY PLAN

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PROJECT NAME
Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

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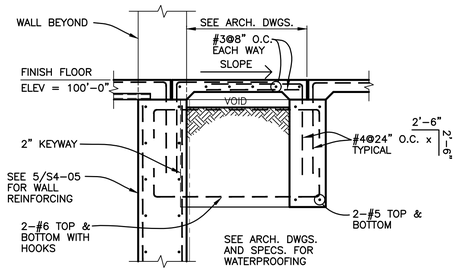
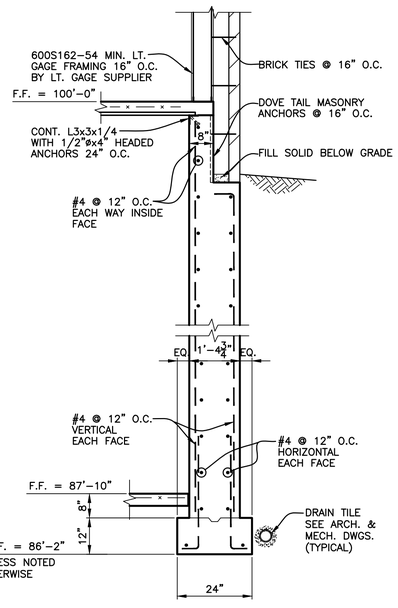
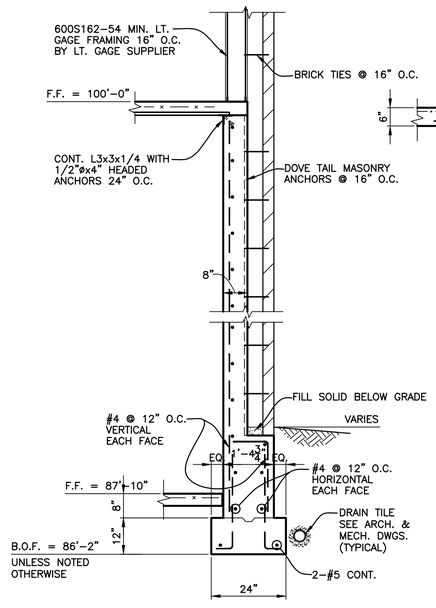


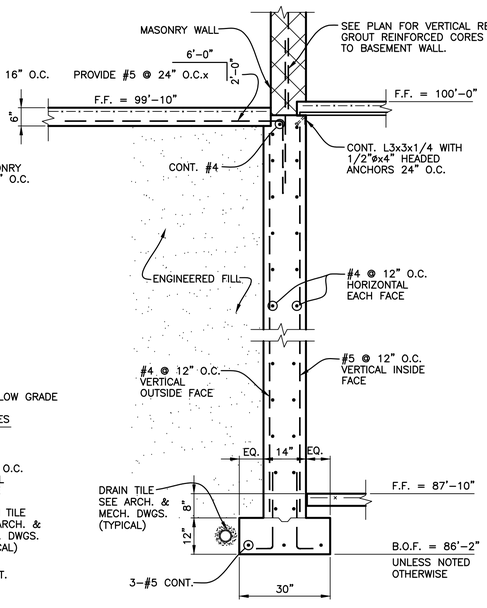
6 S4-05 TYPICAL ENTRANCE SLAB AT BASEMENT WALL
SCALE : 1/2" = 1'-0"



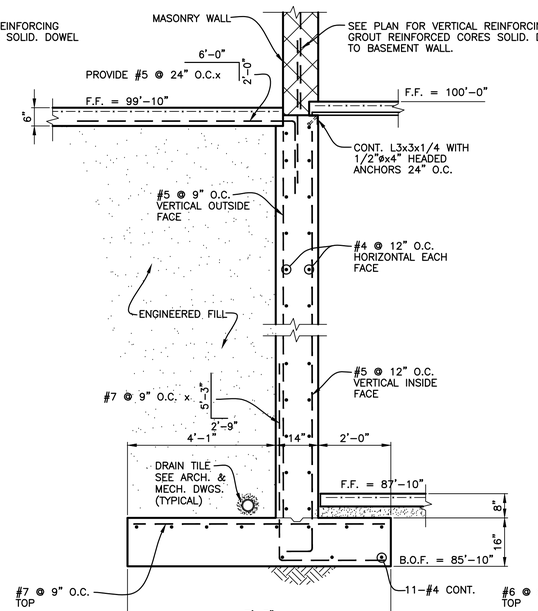
5 S4-05 TYPICAL BASEMENT WALL FOOTING DETAIL
SCALE : 1/2" = 1'-0"



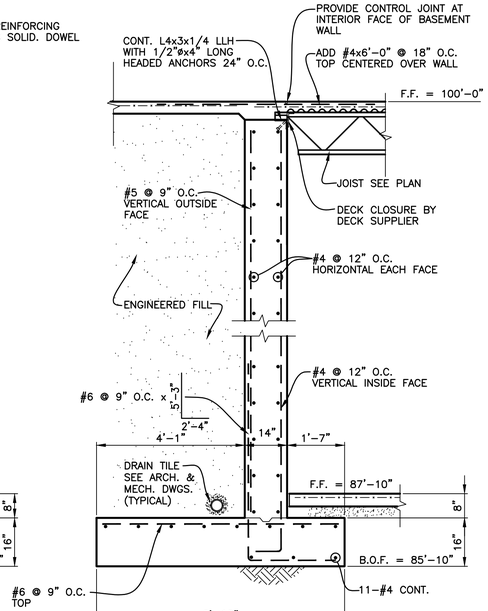
4 S4-05 TYPICAL SLAB BEARING ON EXTERIOR BASEMENT WALL
SCALE : 1/2" = 1'-0"



3 S4-05 TYPICAL BASEMENT WALL FOOTING DETAIL
SCALE : 1/2" = 1'-0"



2 S4-05 SECTION AT RW-2
SCALE : 1/2" = 1'-0"



1 S4-05 SECTION AT RW-1
SCALE : 1/2" = 1'-0"

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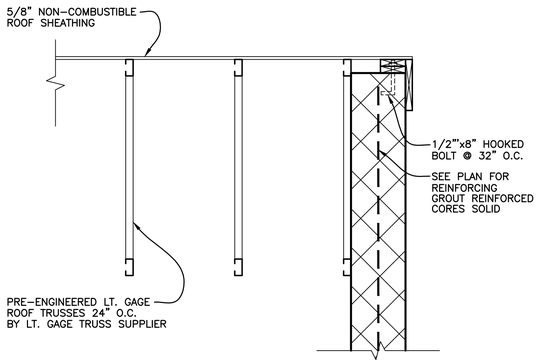
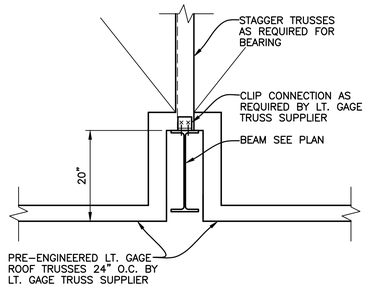
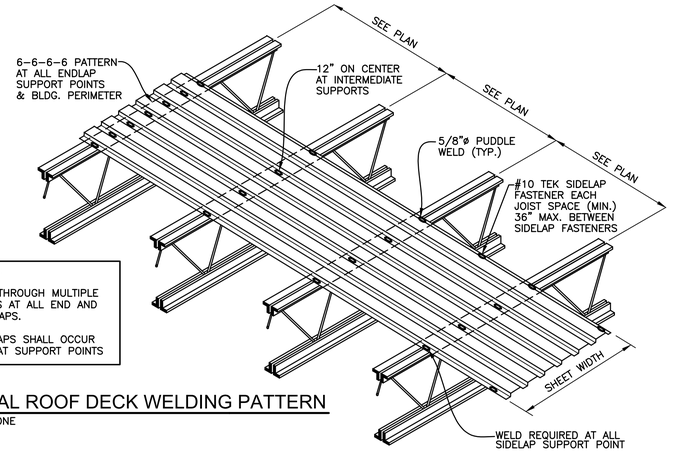


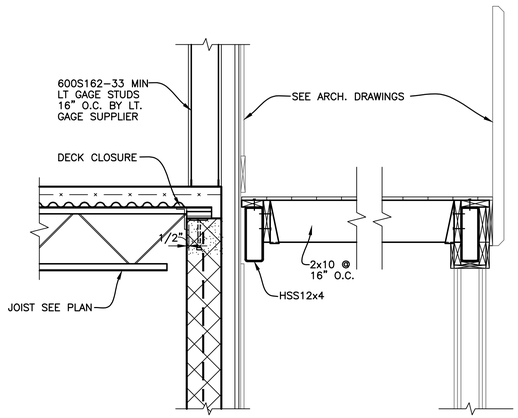
10 S5-00 SECTION
SCALE : 3/4" = 1'-0"



9 S5-00 TRUSS BEARING DETAIL
SCALE : 3/4" = 1'-0"



8 S5-00 TYPICAL ROOF DECK WELDING PATTERN
SCALE : NONE



7 S5-00 SECTION
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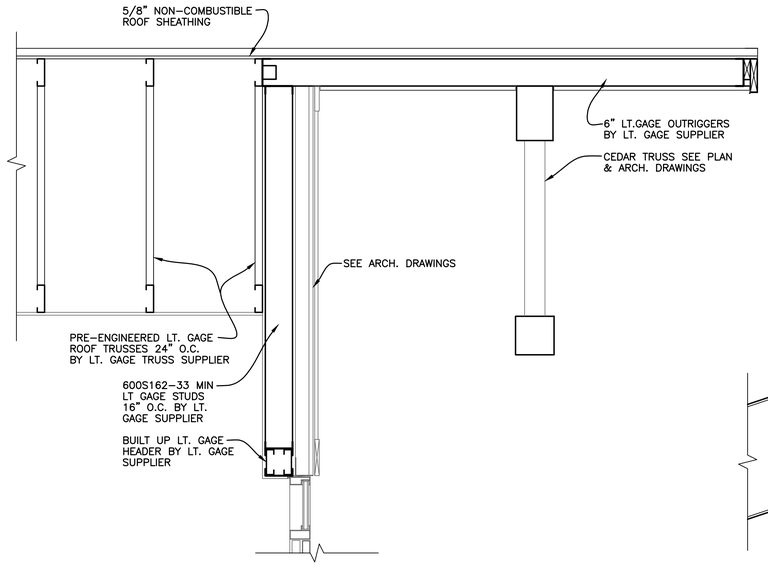

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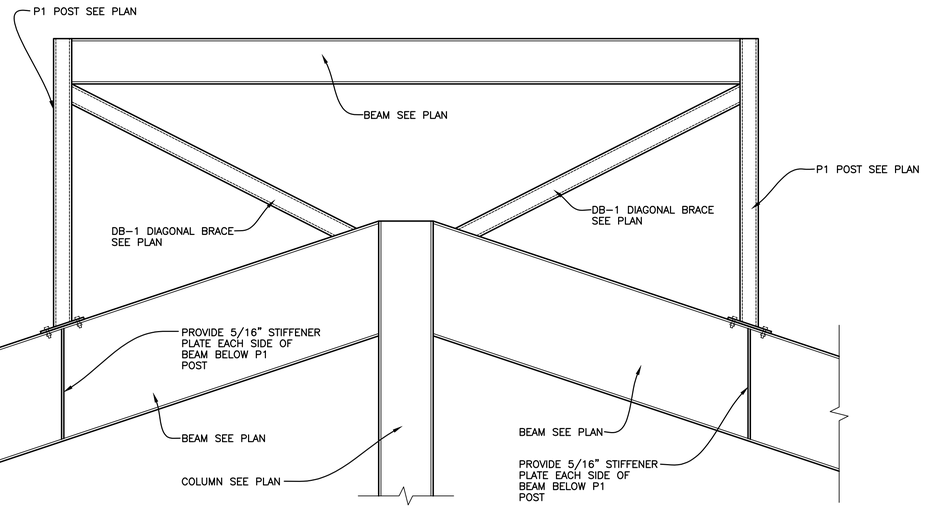
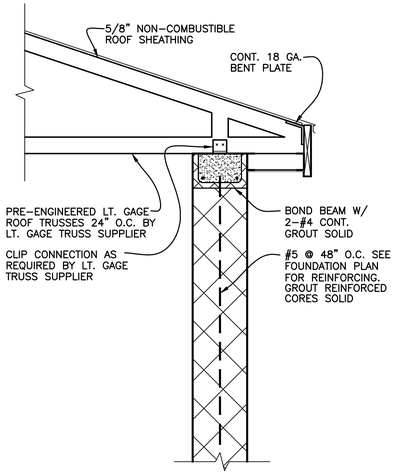


5 S5-00 ELEVATION AT DB-1 DIAGONAL BRACE
SCALE : 3/4" = 1'-0"



4 S5-00 SECTION
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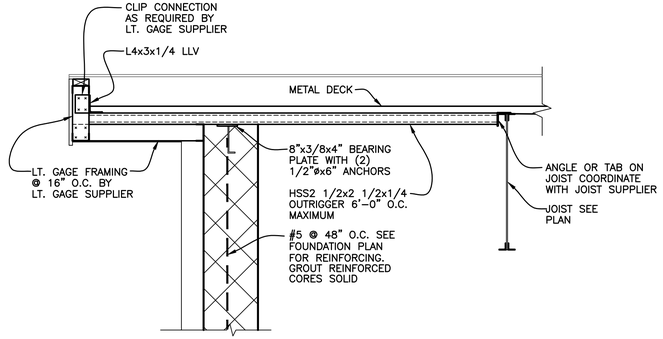
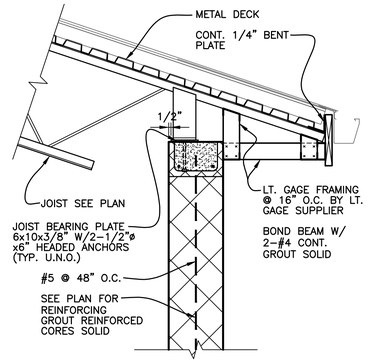


3 S5-00 TYPICAL OUTRIGGER DETAIL AT MASONRY WALL
SCALE : 3/4" = 1'-0"



2 S5-00 SECTION
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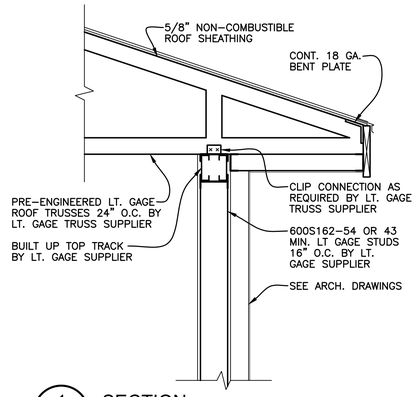

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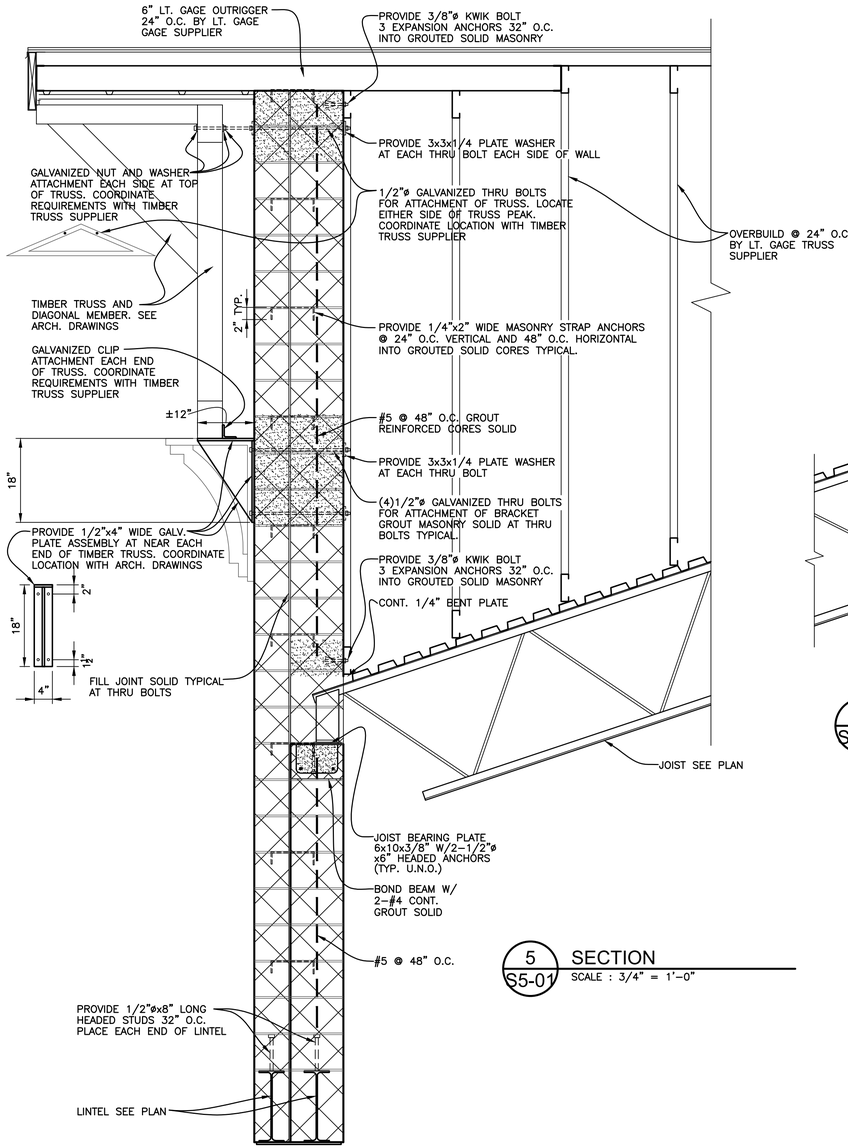

5 S5-01 SECTION
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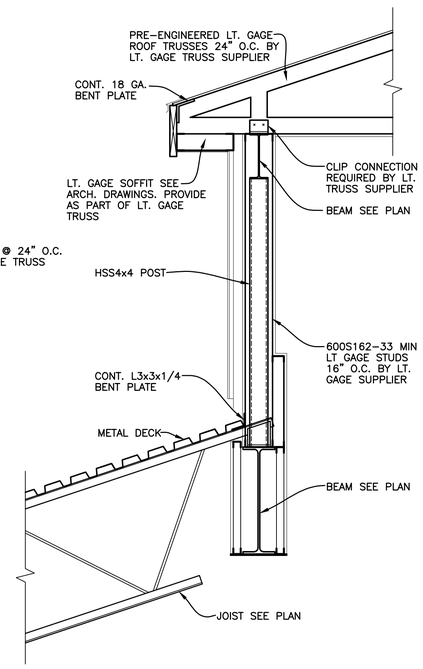

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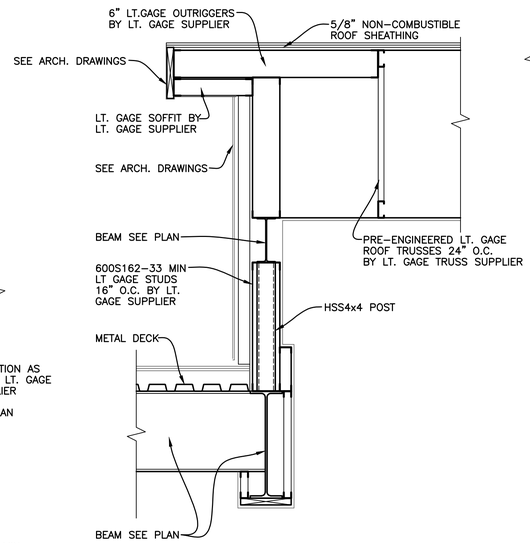

3 S5-01 SECTION
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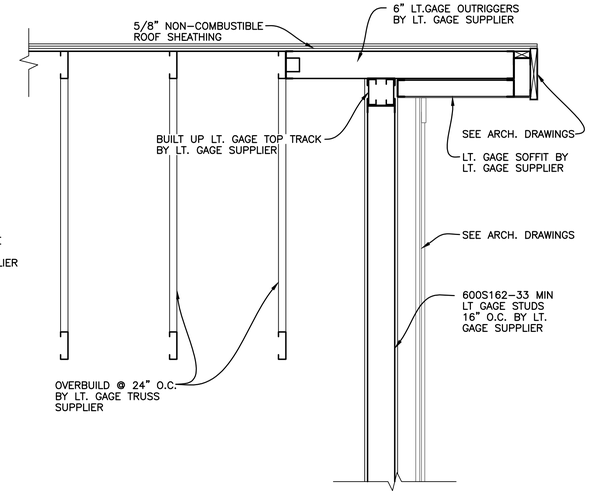

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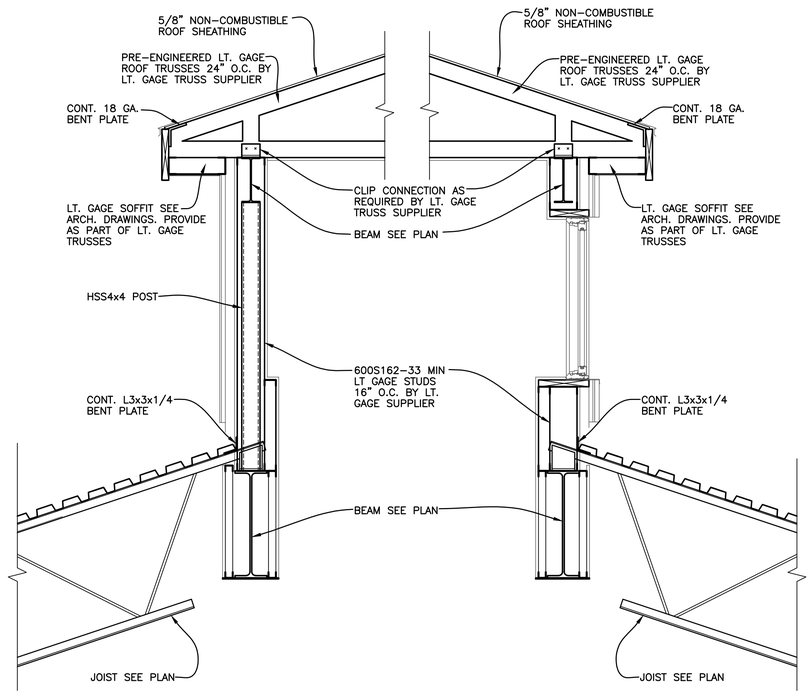

1 S5-01 SECTION
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S5-01

ABBREVIATIONS

ACCU	AIR CONDITIONING CONDENSING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AP	ACCESS PANEL
ASR	AUTOMATIC SPRINKLER RISER
BTU	BRITISH THERMAL UNIT
CC	COOLING COIL
CF	CENTRIFUGAL FAN
CFM	CUBIC FEET PER MINUTE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CI	CAST IRON
CO	CLEAN OUT
COND	CONDENSATE
CONT.	CONTINUATION
CUH	CABINET UNIT HEATER
CW	COLD WATER
Db	DRY BULB TEMPERATURE, °F
dB	DECIBELS
DDC	DIRECT DIGITAL CONTROL
DET	DETAIL
DIA	DIAMETER
DN.	DOWN
DS	DOWNSPOUT
DWG.	DRAWING
EA	EXHAUST AIR
ECUH	ELECTRIC CABINET UNIT HEATER
EF	EXHAUST FAN
ELEV.	ELEVATION
ESP	EXTERNAL STATIC PRESSURE
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EX.	EXISTING
EXH	EXHAUST
EXIST	EXISTING

F	FAHRENHEIT
FEC	FIRE EXTINGUISHER CABINET
FD	FLOOR DRAIN
FLR.	FLOOR
FPM	FEET PER MINUTE
FR	FIRE RISER
FS	FLOW SWITCH
FT.	FEET
FGCO	FINISHED GROUND CLEAN OUT
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HO	HUB OUTLET
HP	HORSEPOWER
HW	HOT WATER (POTABLE)
IN	INCHES
INL	INLET
INV	INVERT
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LBS/HR	POUNDS PER HOUR
LWT	LEAVING WATER TEMPERATURE
MAX.	MAXIMUM
MBH	1000 BTU/HR
MECH	MECHANICAL
MIN.	MINIMUM
MISC	MISCELLANEOUS
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM.	NOMINAL
OA	OUTSIDE AIR
P	PUMP
PD	PRESSURE DROP (FEET OF WATER)
PSI	POUNDS PER SQUARE INCH
PRV	PRESSURE REDUCING VALVE

RA	RETURN AIR
RD/SP	ROOF DRAIN/STAND PIPE
BAL.	BALANCE
RET	RETURN
RF	RETURN FAN
RH	REHEAT COIL
Rh	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SAN	SANITARY WASTE
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SG	SPECIFIC GRAVITY
SP	STATIC PRESSURE (INCHES OF WATER)
SP	STAND PIPE
SPR	SPRINKLER
SPR/STP	SPRINKLER STANDPIPE
SPS	STATIC PRESSURE SENSOR
STK	STACK
TP	TOTAL PRESSURE
TYP	TYPICAL
TDC	TRENCH DRAIN CONNECTION
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
V	VENT
VA	VALVE
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VE	VOLUME EXTRACTOR
VTR	VENT THRU ROOF
W	WASTE
WG	WATER GAUGE
WH	WALL HYDRANT

PLUMBING, PIPING & FIRE

- DEMOLITION WORK
- EXISTING WORK
- NEW WORK
- ISOLATION VALVE
- CHECK VALVE
- WATER FLOW SWITCH (FS)
- VALVE IN RISER
- STRAINER
- PIPE ANCHOR
- EXPANSION JOINT – SLIDING
- ALIGNMENT GUIDE
- UNION
- SPRINKLER HEAD (PENDANT)
- SPRINKLER HEAD (UPRIGHT)
- CO — CLEANOUT
- FCO — CLEANOUT FLOOR
- WCO — CLEANOUT WALL
- GCO — CLEANOUT GRADE
- FLOOR DRAIN (FD)
- REDUCER – CONCENTRIC
- PRESSURE GAUGE WITH COCK
- THERMOMETER
- CAP OR PLUG
- ELBOW – TURNED DOWN
- ELBOW – TURNED UP
- TEE OUTLET – DOWN
- TEE OUTLET – UP
- DIRECTION OF FLOW

- BALANCING VALVE
- TWO-WAY MODULATING CONTROL VALVE
- THREE-WAY MODULATING CONTROL VALVE
- MANUAL AIR VENT
- TEST PLUG (PRESSURE/TEMPERATURE)
- NEW CONNECTION
- SAN — SANITARY LINE ABOVE GRADE
- SAN — SANITARY LINE UNDERGROUND
- VENT PIPE
- COLD WATER PIPING
- HOT WATER PIPING
- HOT WATER RETURN PIPING
- F — FIRE SPRINKLER PIPE (FS)
- G — GAS PIPING
- ST — STORM LINE
- HHWS — HEATING HOT WATER SUPPLY
- HHWR — HEATING HOT WATER RETURN

Mechanical	
Sheet Number	Sheet Title
M0–01	MECHANICAL LEGEND AND ABBREVIATIONS
FP1–01	FLOOR PLANS – FIRE PROTECTION
M1–00	MECHANICAL SITE PLAN
M1–01	FLOOR PLANS – SANITARY & VENT
M1–02	FLOOR PLANS – DOMESTIC WATER
M1–03	FLOOR PLANS – GAS
M2–01	FLOOR PLANS – HVAC
M3–01	FLOOR PLANS – PIPING
M4–01	MECHANICAL SCHEDULES
M4–02	MECHANICAL SCHEDULES
M5–01	MECHANICAL DETAILS
M5–02	MECHANICAL DETAILS
M6–01	TEMERATURE CONTROLS
M6–02	TEMERATURE CONTROLS

GENERAL HVAC NOTES:

THE FOLLOWING NOTES APPLY TO ALL HVAC DRAWINGS, EXCEPT WHERE OTHERWISE INDICATED.

1. WHEREVER VOLUME DAMPERS OCCUR ABOVE CEILINGS WITHOUT REMOVABLE TILE AND AN ACCESS PANEL IS NOT FURNISHED, PROVIDE AN EXPOSED DAMPER REGULATOR TO ALLOW DAMPER ADJUSTMENT FROM BELOW CEILING. UNIT TO BE EQUAL TO VENTLOCK No. 666 IN 1/2"x3/8" SIZE.
2. ALL DIMMENSION SHOWN FOR DUCTWORK ARE NET INSIDE DIMENSIONS.
3. DIFFUSER AND REGISTER LOCATIONS SHALL BE COORDINATED WITH ARCHITECTURAL REFLECTED CEILING PLAN.
4. THOUGH SOME OFFSETS & TRANSITIONS ARE SHOWN IN PIPING AND SHEET METAL TO HELP INDICATE THE PHYSICAL RELATIONSHIP BETWEEN THEM. IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL PIPING AND SHEET METAL OFFSET & TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY COORDINATE THE MECHANICAL WORK WITHIN ITSELF AND WITH THE WORK OF ALL TRADES TO PROVIDE COMPLETE AND OPERABLE SYSTEMS WITHOUT INTERFERENCES.
5. DUCT PRESSURE CONSTRUCTION CLASSIFICATION SHALL BE AS SPECIFIED.
6. ALL ROUND RUNOUTS AND DROPS TO DIFFUSERS SHALL BE SAME NOMINAL SIZE AS INDICATED ON THE DRAWINGS.
7. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN FURRED CHASE OR SUSPENDED CEILING.
8. ACCESS PANELS AND DOORS ARE REQUIRED THROUGH BUILDING CONSTRUCTION ASSEMBLIES SUCH AS WALLS, CEILING, PARTITONS AND FLOORS TO SERVICE AND MAINTAIN DAMPERS, CONTROL MOTORS, REGULATORS, VALVES, FLEXIBLE DUCT CONNECTIONS AND OTHER ITEMS OR DEVICES INCORPORATED IN MECHANICAL WORK. SUCH PANELS AND DOORS SHALL BE PROVIDED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS. MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION OF ACESS DOORS AND PANELS AND VERIFY THE EXACT QUANTITY, SIZE, FIRE-RATING AND LOCATION AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILING AND BUILDING ASSEMBLIES. MINIMUM ACCESS PANEL AND DOOR SIZE SHALL BE 24 INCHES BY 18 INCHES UNLESS OTHERWISE NOTED.
9. ALL DUCTWORK PENETRATIONS FIRE-RATED WALLS AND FLOORS SHALL BE PROVIDED WITH FIRE DAMPERS AND ACCESS DOOR.

PLUMBING GENERAL NOTES:

1. FOR PIPE SIZES TO INDIVIDUAL PLUMBING FIXTURES AND VARIOUS PIECES OF EQUIPMENT REFER TO SPECIFICATIONS.
2. IN ALL WASTE DRAINAGE PIPING THE CONTRACTOR SHALL FURNISH AND INSTALL CLEANOUTS (IN ADDITION TO THE CLEANOUTS INDICATED ON DRAWINGS AS REQUIRED BY THE GOVERNING PLUMBING CODE).
3. REFER TO HVAC GENERAL NOTE-4
4. FOR ADDITION NOTES COMMON TO PLUMBING REFER TO HVAC NOTES.

FIRE PROTECTION GENERAL NOTES:

1. AREA UNDER RENOVATION IS TO BE FULLY SPRINKLERED. SPRINKLER SYSTEM DESIGN AND LAYOUT TO BE IN COMPLIANCE WITH NFPA 13. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION. ALL UNFINISHED/UNOCCUPIED AREAS SHALL BE TREATED AS STORAGE AREAS.
2. REMOVE ALL AUTOMATIC SPRINKLER HEADS PRESENTLY INSTALLED IN THE AREA OF RENOVATION AND TURN OVER TO THE OWNER. FIELD VERIFY LOCATION OF EXISTING HEADS AND SPRINKLER PIPING LOCATION PRIOR TO DESIGN & INSTALLATION. CONNECT NEW SPRINKLER HEADS TO EXISITNG MAINS IF FEASABLE, PROVIDE NEW MAIN VALVES, FLOW SWITCHES AS REQUIRED. WORK SHALL BE PHASED SO THAT FIRE PROTECTION SERVICE WILL NOT BE INTERRUPTED FOR THE ADJACENT SPACES DURING ALTERATIONS.
3. DO NOT SCALE THE PLUMBING AND FIRE PROTECTION DRAWINGS FOR LOCATION OF CEILING MOUNTED SPRINKLER HEADS. ALL CEILING MOUNTED HEADS SHALL BE COORDINATED WITH AND LOCATED AS SHOWN ON REFLECTED ARCHITECTURAL CEILING PLANS, UNLESS OTHERWISE NOTED.
4. ALL SPRINKLERS LOCATED IN LAY-IN CEILINGS SHALL BE CENTERED IN THE MIDDLE OF THE CEILING TILES UNLESS OTHERWISE INDICATED ON THE ARCHITECTURAL SERIES DRAWINGS.
5. REFER TO HVAC GENERAL NOTE-6.
6. THOUGH SOME FIRE PROTECTION MAINS ARE SHOWN ON THE DRAWINGS, ADDITIONAL PIPING ARE EXISTING AND REQUIRED TO BE REMOVED & TRASHED. FIELD VERIFY LOCATION PRIOR TO START OF DEMOLITION.

HVAC LEGEND & SYMBOLS

- 18x6 — INDICATES RECTANGULAR DUCT WITH DUCT SIZE 18 INCHES WIDE (IN PLANE OF DRAWING) AND 6 INCHES DEEP. SIZE PERTAINS TO THE ENTIRE RUN OF DUCT UNLESS OTHERWISE NOTED.
- 22x14ø — INDICATES FLAT OVAL DUCT WITH DUCT SIZE 22 INCHES WIDE (IN PLANE OF DRAWING) AND 14 INCHES DEEP. SIZE PERTAINS TO THE ENTIRE RUN OF DUCT UNLESS OTHERWISE NOTED.
- 6"ø — INDICATES ROUND DUCT WITH DUCT SIZE OF 6 INCHES IN DIAMETER. SIZE PERTAINS TO THE ENTIRE RUN OF DUCT (FROM DUCT ORIGIN AT TAP TO END OF DUCT) UNLESS OTHERWISE NOTED.
- VANE TURN ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
- RISE — INCLINED RISE IN RESPECT TO AIR FLOW
- DN. — INCLINED DROP IN RESPECT TO AIR FLOW
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES)
- VANED ELBOW (SHORT RADIUS)
- INDICATES FLEXIBLE DUCT (RUNOUT) OF SIZE AS SCHEDULED OR SHOWN. LENGTH SHALL NOT EXCEED 5 FT.
- DUCT TURNING UP
- DUCT TURNING DOWN
- VERTICAL FIRE DAMPER
- HORIZONTAL FIRE DAMPER
- POINT OF NEW CONNECTION
- SD — DUCT SMOKE DETECTOR
- DEMOLITION WORK

- MD — VOLUME CONTROL DAMPER (MANUAL)
- FLEXIBLE CONNECTION OR FLEXIBLE DUCT CONNECTOR
- M — MOTORIZED DAMPER
- S — SMOKE DAMPER

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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

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SHEET NAME

MECHANICAL LEGEND AND ABBREVIATIONS

SHEET NO.
M0-01

FIRE PROTECTION GENERAL NOTES:

A. COORDINATE ALL WORK WITH OTHER TRADES.

B. BUILDING IS TO BE FULLY SPRINKLED. SPRINKLER SYSTEM DESIGN AND LAYOUT TO BE A HYDRAULICALLY DESIGNED SYSTEM IN COMPLIANCE WITH THE MICHIGAN BUILDING CODE, NFPA 13, OWNER'S UNDERWRITER AND AUTHORITY HAVING JURISDICTION. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION.

C. DO NOT SCALE THE PLUMBING AND FIRE PROTECTION DRAWINGS FOR LOCATION OF CEILING MOUNTED SPRINKLER HEADS. ALL CEILING MOUNTED HEADS SHALL BE COORDINATED WITH ARCHITECTURAL CEILING PLANS, UNLESS OTHERWISE NOTED.

D. ALL SPRINKLERS LOCATED IN LAY-IN CEILINGS SHALL BE CENTERED IN THE MIDDLE OF THE CEILING TILES UNLESS OTHERWISE INDICATED ON THE ARCHITECTURAL SERIES DRAWINGS.

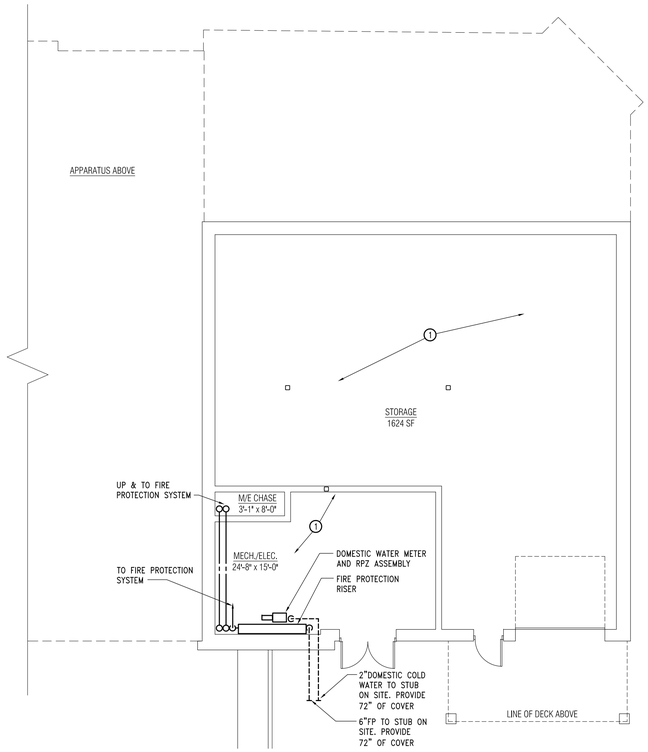
E. SPRINKLER HEADS IN AREAS WITH CEILINGS TO BE SIMILAR TO TYCO ROYAL FLUSH II UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

F. PRIOR TO START OF ANY CONSTRUCTION, SUBMIT DRAWINGS TO OWNER'S INSURANCE COMPANY AND LOCAL AUTHORITY HAVING JURISDICTION FOR APPROVAL.

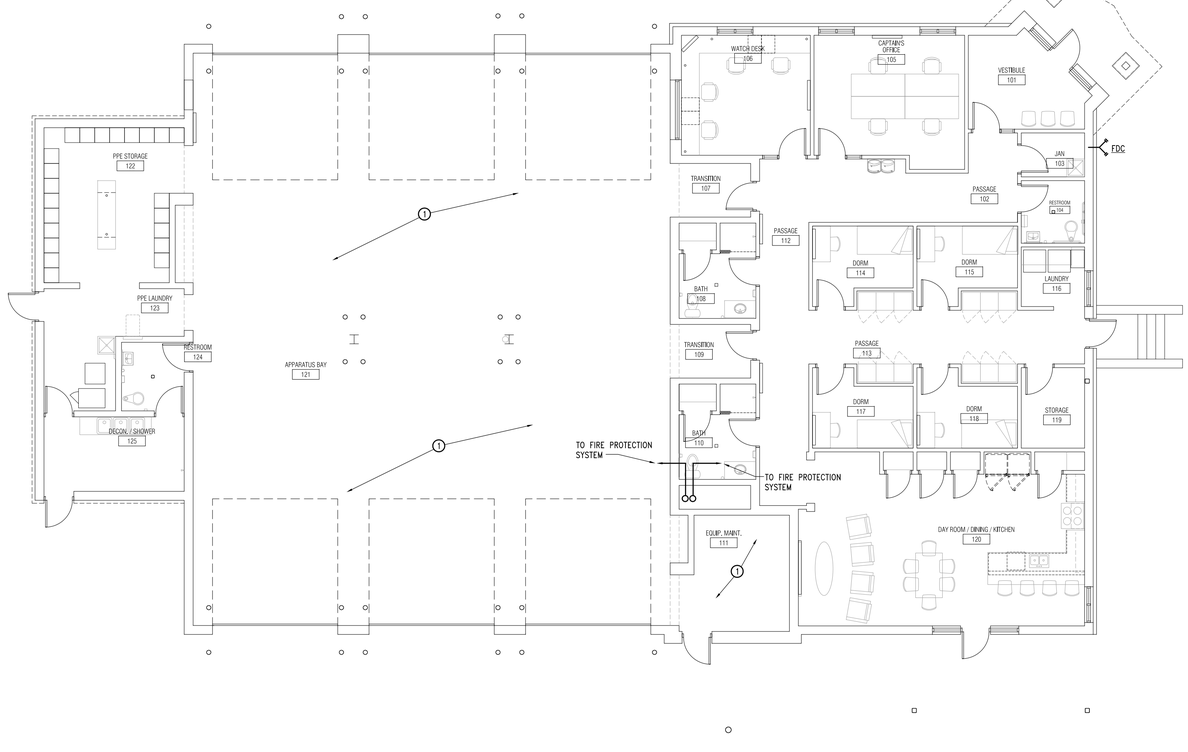
G. ALTHOUGH SOME PREFERRED LOCATIONS OF MAINS ARE SHOWN ADDITIONAL MAINS MAY BE REQUIRED.

FIRE PROTECTION KEY NOTES:

(1) ALL FIRE PROTECTION PIPING IN EXPOSED AREAS TO BE ON LINEAR, EQUALLY SPACED, GRID PATTERN AND TO BE PAINTED RED. REFER TO ARCHITECTURAL CONSTRUCTION DOCUMENTS FOR FURTHER INFORMATION.



2 Lower Level Floor Plan - Fire Protection
1/8" = 1'-0"



1 Main Level Floor Plan - Fire Protection
1/8" = 1'-0"

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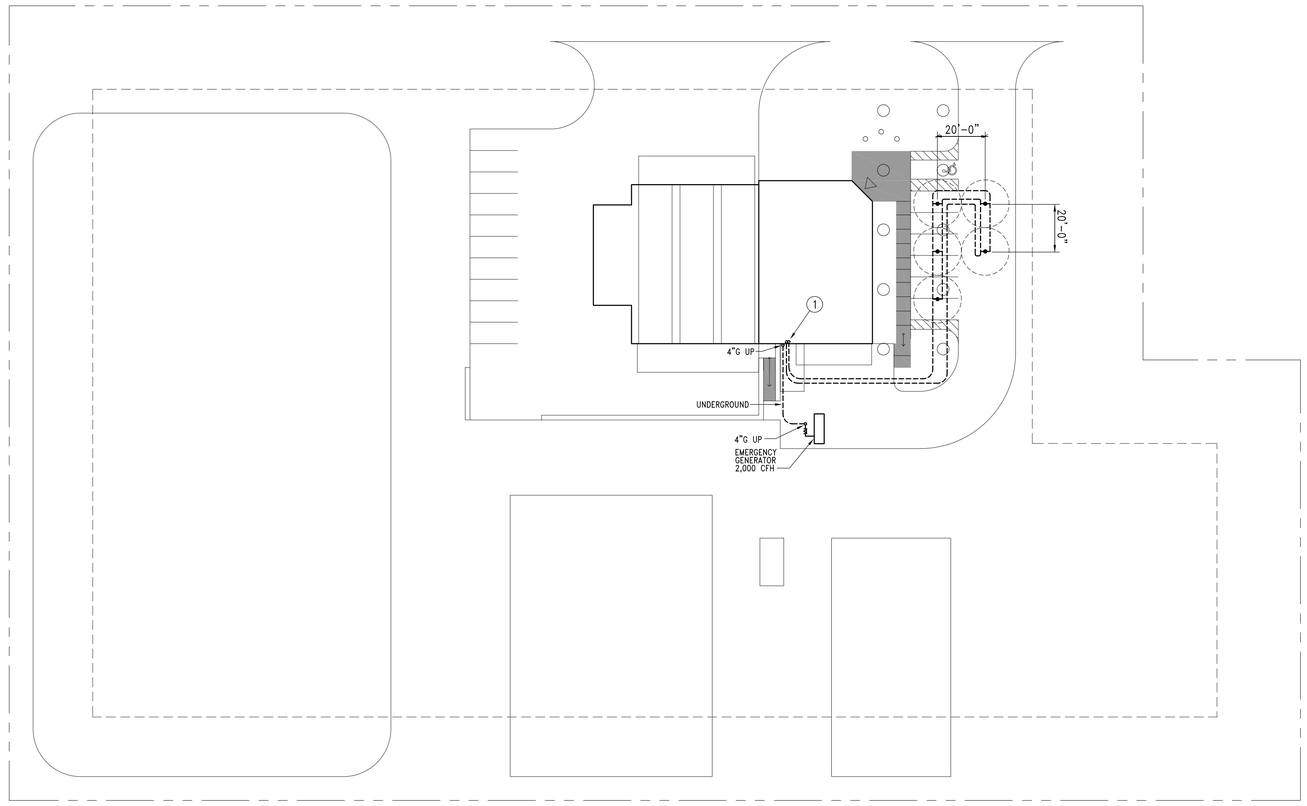
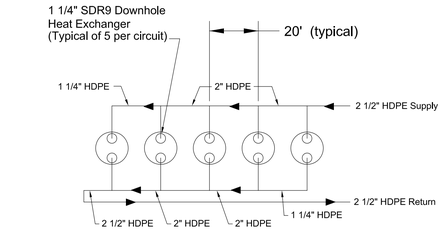
FLOOR PLANS - FIRE PROTECTION

SHEET NO.
FP0-01



N

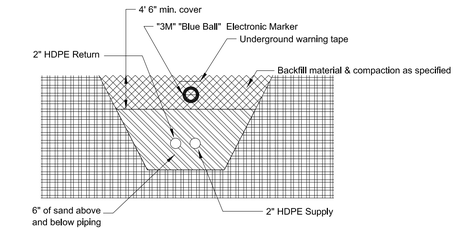
1 Mechanical Site Plan
1/40" = 1'-0"



30 GPM per 2" Main
6.00 GPM per Bore Hole

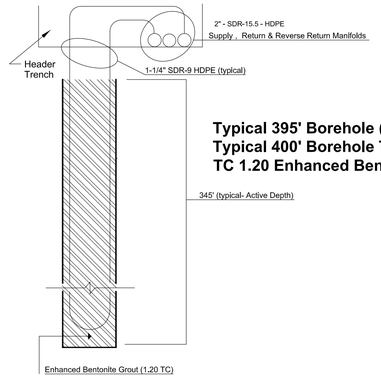
Borehole Manifold (Schematic) Borehole Manifold (Schematic), One Circuits - 5 Bores

No scale



Trench Detail

No scale



Typical 395' Borehole (Active Depth)
Typical 400' Borehole TD
TC 1.20 Enhanced Bentonite Grout

Bore Detail

No scale

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MECHANICAL SITE PLAN

SHEET NO.

M1-00

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

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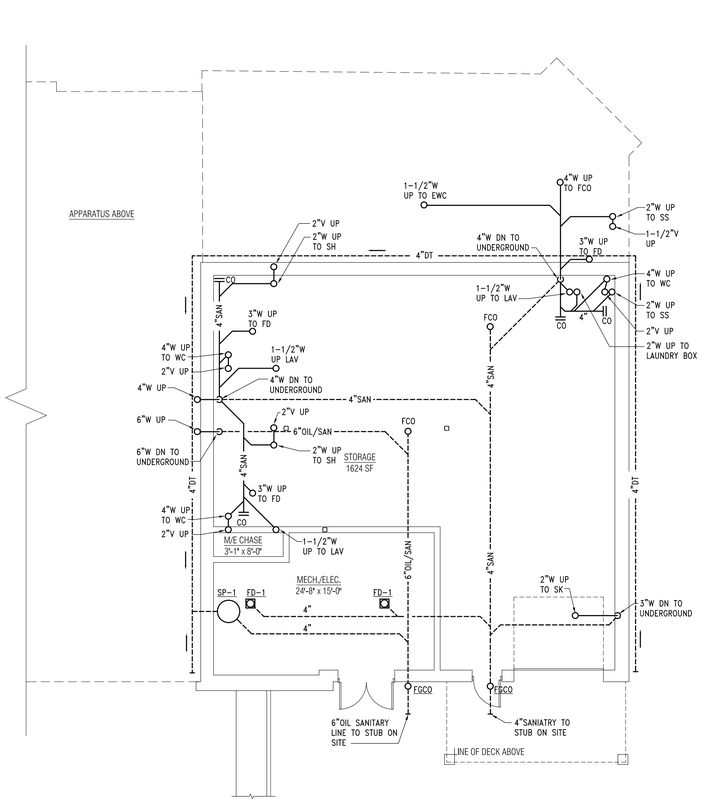
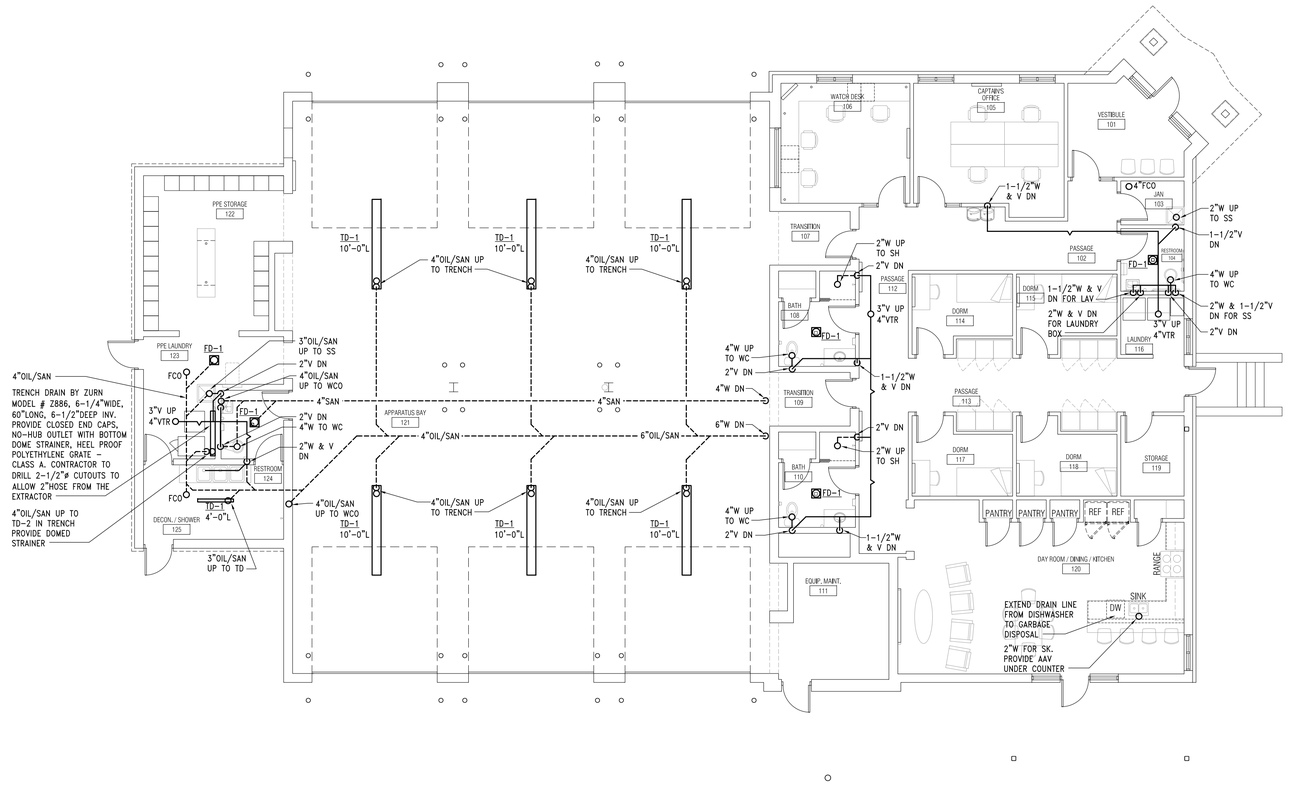


2 Lower Level Floor Plan - Sanitary & Vent
1/8" = 1'-0"



1 Main Level Floor Plan - Sanitary & Vent
1/8" = 1'-0"

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SHEET NAME

FLOOR PLANS - SANITARY & VENT

SHEET NO.

M1-01

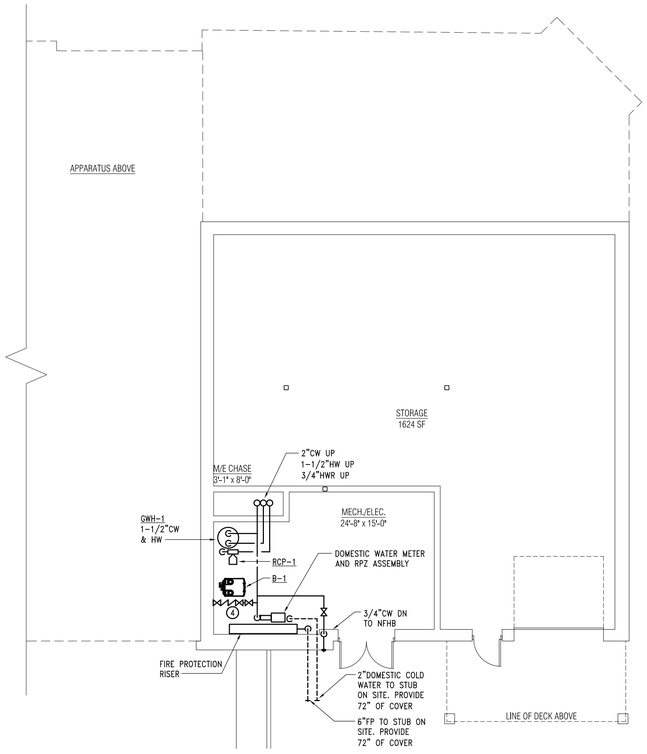
STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

NEW WORK KEY NOTES:

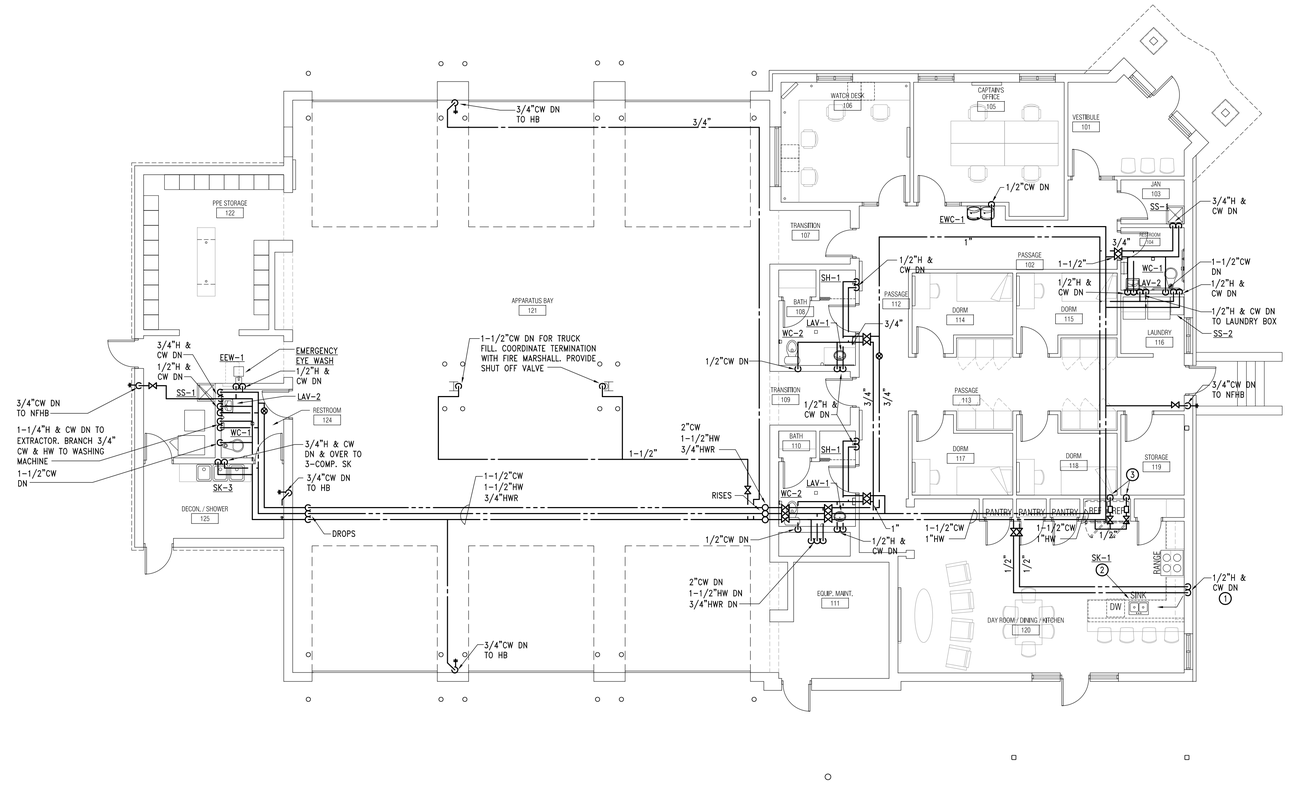
1. EXTEND DOMESTIC WATER IN WALL TO SINK. KEEP TIGHT TO INTERIOR OF WALL. PROVIDE MINIMUM 2" RIGID INSULATION BEHIND PIPE AN SEAL TO STUD AND ALL SEAMS.
2. EXTEND 1/2"HOT WATER TO DISHWASHER. PROVIDE FINAL CONNECTION PER MANUFACTURERS RECOMMENDATION.
3. ½" COLD WATER DOWN TO REFRIGERATOR, PROVIDE ONE BACKFLOW PREVENTER APOLLO MODEL #4C-100 SERIES PER COLD WATER DROP ABOVE CEILING.
4. 1" COLD WATER TO MECHANICAL EQUIPMENT. PROVIDE RPZ AND PIPE "SPIT" TO FLOOR DRAIN.

GENERAL NOTES:

A. COORDINATE ALL WORK WITH OTHER TRADES.



2 Lower Level Floor Plan - Domestic Water
1/8" = 1'-0"



1 Main Level Floor Plan - Domestic Water
1/8" = 1'-0"

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SHEET NAME

FLOOR PLANS -
DOMESTIC WATER

SHEET NO.

M1-02

GAS GENERAL NOTES:

A. PIPE MATERIALS AND FITTINGS

1. ABOVEGROUND 2" AND SMALLER FOR PRESSURES RANGING FROM 0 PSIG TO 125 PSIG.
   a. PIPE: ASTM A53 SEAMLESS GRADE B, SCHEDULE 40 BLACK STEEL.
   b. FITTINGS: ANSI B16.3, 150 LB., MALLEABLE IRON SCREWED; ANSI B16.9, STEEL BUTTWELD.
   c. JOINTS: 2" AND SMALLER, ANSI B2.1 THREADS, 2-1/2" AND LARGER, ANSI B16.25 BUTTWELD.

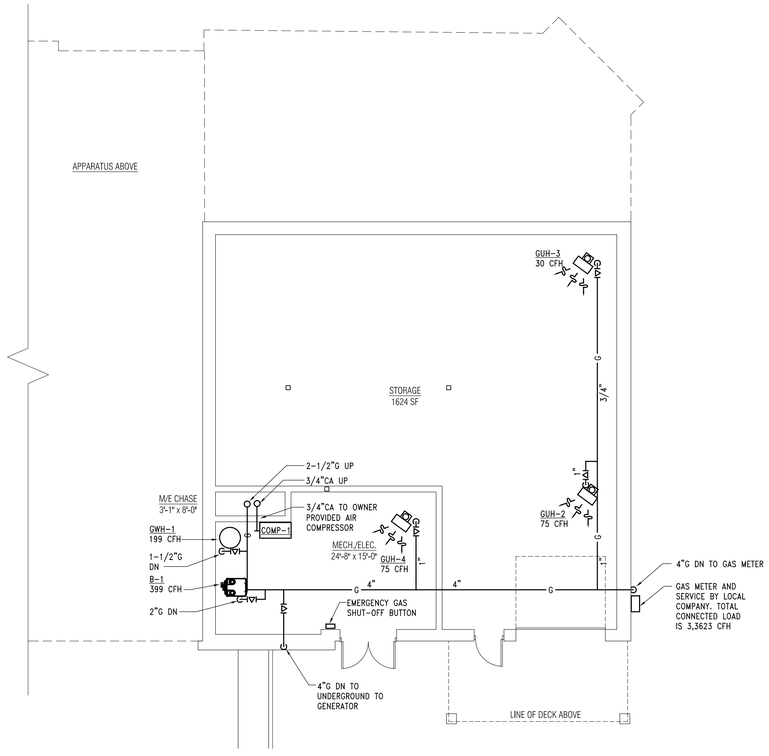
B. VALVES

1. PROVIDE SHUT-OFF VALVES ON MAINS, BRANCH MAINS, RISERS, AT CONNECTIONS TO EQUIPMENT AND COMPRESSED AIR SPECIALTIES, AND WHERE SHOWN ON THE CONTRACT DOCUMENTS.
2. LOCATE VALVES WHERE EASILY ACCESSIBLE AND WHERE THEY WILL BE PROTECTED FROM POSSIBLE INJURY.
3. BALL VALVES:
   a. BALL VALVES: MILWAUKEE BA-4005 FULL PORT, TWO PIECE WITH SCREWED ENDS, MILWAUKEE BA-4505 FOR SOLDERED ENDS BRONZE BODY, STEM, TEFLON PACKING WITH BRASS PACKING GLAND, ZINC PLATED STEEL HANDLE WITH PLASTIC GRIP SECURED BY ZINC PLATED STEEL HANDLE NUT, 150 PSI STEAM, 600 PSI WOG WORKING PRESSURE.

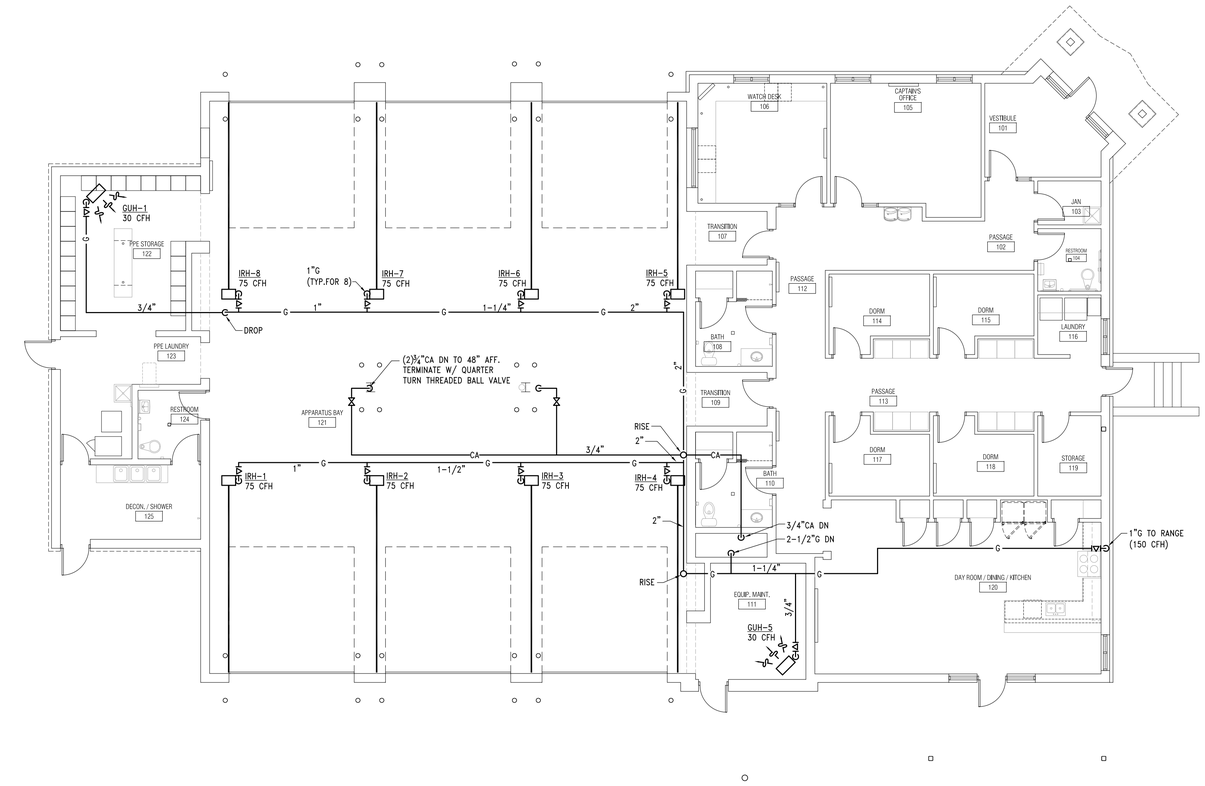
NATURAL GAS LOAD SUMMARY

EQUIPMENT	INPUT (CFH)
GWH-1	199
IRH-1 THRU 8	(8x75) 600
B-1	399
GAS RANGE (ALLOCATED)	150
GAS DRYER (ALLOCATED)	35
GENERATOR (ALLOCATED)	2000
GUH-1	30
GUH-2	75
GUH-3	30
GUH-4	75
GUH-5	30
TOTAL =	3,623 CFH

PIPE DESIGN BASED ON 7"W.C. @ 225 LINEAR FT. WITH 0.3"W.C. ALLOWABLE PRESSURE DROP.



2 Lower Level Floor Plan - Gas
1/8" = 1'-0"



1 Main Level Floor Plan - Gas
1/8" = 1'-0"

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KEY PLAN

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Highland Township
Fire Department

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Fire Station No. 2

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PROJECT NO.

18-122B

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SHEET NAME

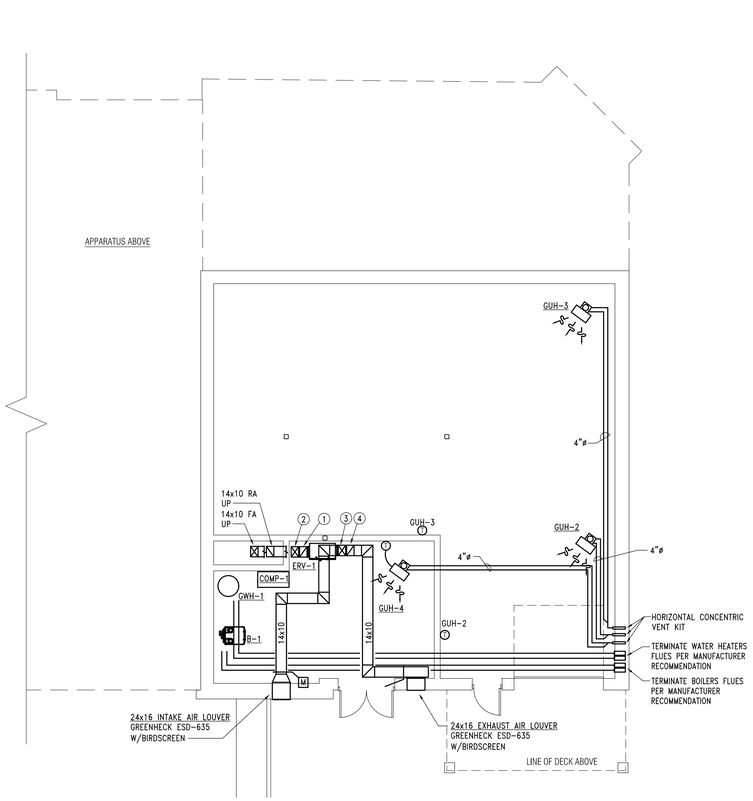
FLOOR PLANS - GAS

SHEET NO.

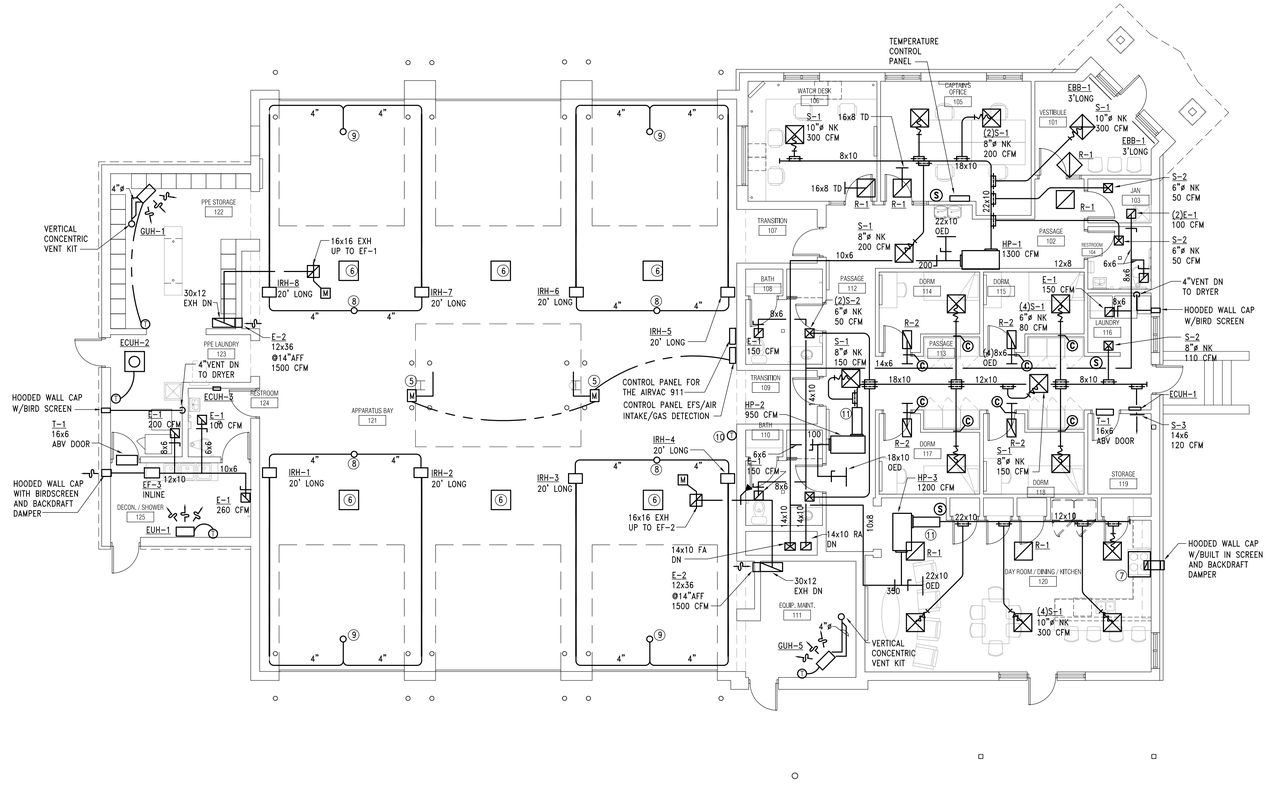
M1-03

KEY NOTES:

1. 14x10 RA DN AND TRANSITION WITH A 12"ø DUCT TO ERV RA INLET.
2. 14x10 FA DN AND TRANSITION WITH A 12"ø DUCT TO ERV FA INLET.
3. 14x10 OA DN AND TRANSITION WITH A 12"ø DUCT TO ERV OA INLET.
4. 14x10 EA DN AND TRANSITION WITH A 12"ø DUCT TO ERV EA INLET.
5. PROVIDE MOTORIZE DAMPER TO CONTROL (OPEN/CLOSE) THE COPULA LOUVERS. LOUVERS BY ARCHITECT.
6. ENGINE EXHAUST REMOVAL SYSTEM BY AIR VAC 911, 120/1, 3/4" HP, 13 AMPS. PROVIDE COMPLETE SYSTEM; WALL GAS DETECTORS, OVERRIDE SWITCH, CONTROL PANEL. INSTALL BOTTOM OF THE UNIT AT 25" AFF.
7. KITCHEN HOOD BY ACCUREX MODEL XRRS-W-30-R, INTEGRAL FAN, REAR DISCHARGE, 500 CFM.
8. 6"ø INTAKE UP THROUGH ROOF. TERMINATE WITH GOOSENECK AND PER MANUFACTURER RECOMMENDATION. PROVIDE BIRDSCREEN.
9. 6"ø VENT UP THROUGH ROOF. TERMINATE WITH ROOF CAP (PITCH ROOF), CONCENTRIC KIT AND PER MANUFACTURER RECOMMENDATION.
10. CONNECT ALL IRH TO THIS THERMOSTAT.
11. PROVIDE CIRCULAR MEDIUM VELOCITY SILENCER BY PRICE MANUFACTURER MODEL CM24 SERIES.



2 Lower Level Floor Plan - HVAC
1/8" = 1'-0"



1 Main Level Floor Plan - HVAC
1/8" = 1'-0"

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

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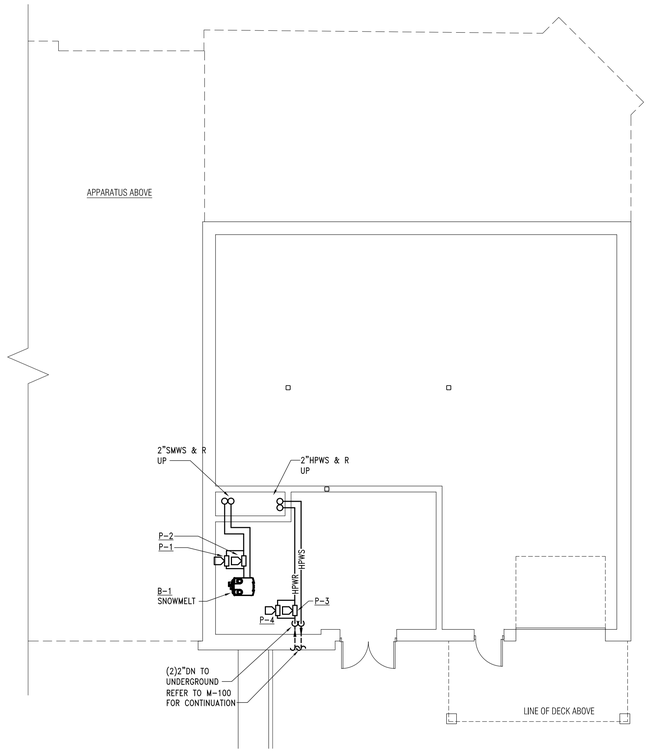
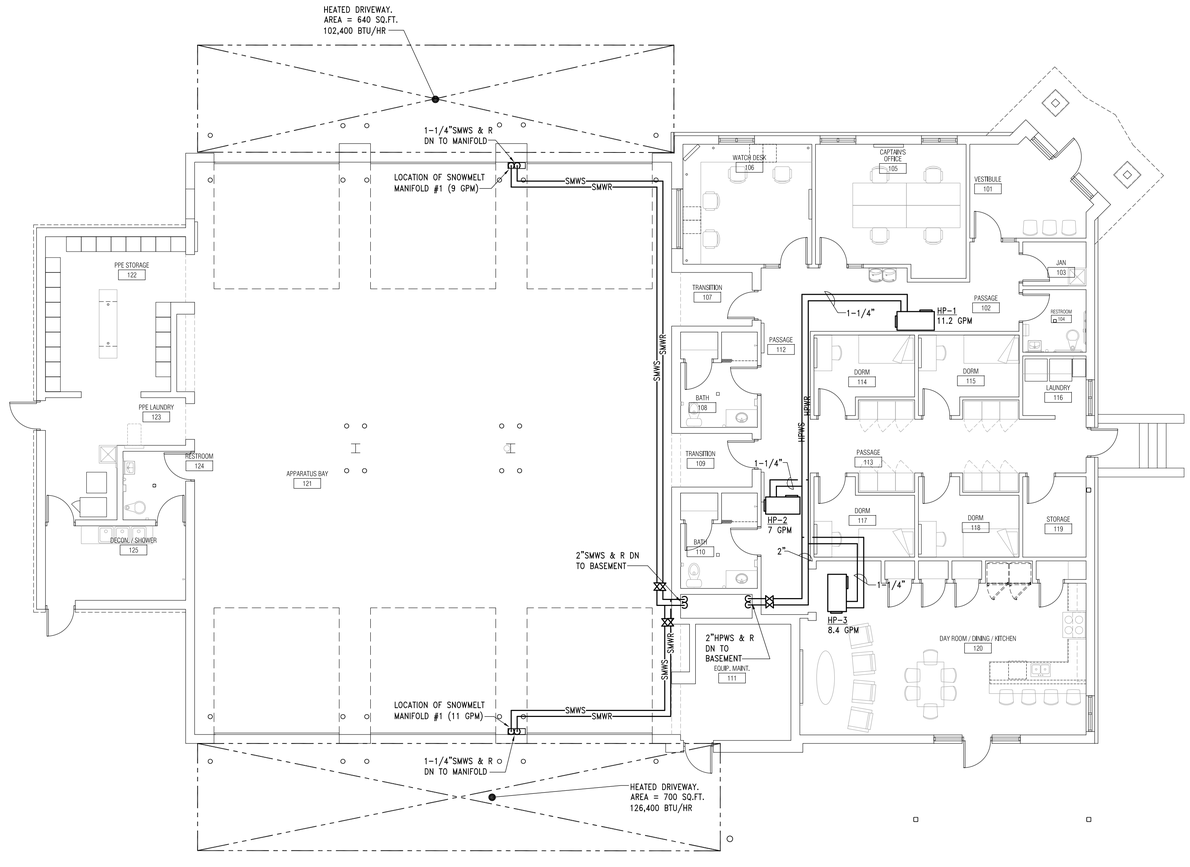
FLOOR PLANS - HVAC

SHEET NO.

M2-01



2 Lower Level Floor Plan - Piping
1/8" = 1'-0"



1 Main Level Floor Plan - Piping
1/8" = 1'-0"

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SHEET NAME

FLOOR PLANS - PIPING

SHEET NO.

M3-01

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

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DOMESTIC WATER HEATER SCHEDULE

TAG	MANUFACTURER & MODEL No.	LOCATION	CAPACITIES			(2)PVC PIPE INTAKE/EXHAUST ø	BTU	NOTES/ACCESSORIES
			STORAGE	RECOVERY	TD °F			
GWH-1	A.O. SMITH BTH-199	BOILER ROOM	100	288	100	4"	199,000	A B C D E F G H

NOTES AND ACCESSORIES DESIGNATION

A	P & T RELIEF TO FD	E	EXPANSION TANK
B	FLOOR MOUNTED	F	NATURAL GAS
C	POWER VENTED	G	120V/1ø, DISCONNECT SWITCH
D	BMS CONTACT FOR REMOTE MONITORING	H	CP-1 BY BELL&GOSSETT MODEL # EROCIRC XL55-45 ALL BRONZE. 20 GPM, 30' OF HEAD, 208/1ø, .5 HP. INTERLOCK W/AQUASTAT (SET AT 110°F)

GAS INFRARED HEATER SCHEDULE

TAG	MANUFACTURER & MODEL No.	AREA SERVED	REFLECTIVE PATTERN ANGLE	INTAKE/ FLUE SIZE	LENGTHS (FT)	GAS DATA			ELECTRICAL		NOTES/ACCESSORIES
						TYPE	MBH HIGH	MBH LOW	VOLTS	AMPS	
IRH-1	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	30	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-2	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	0	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-3	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	0	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-4	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	30	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-5	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	30	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-6	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	0	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-7	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	0	4"	20	NAT	75	50	120	4.8	A B C D E F G
IRH-8	RE-VERBER-RAY HL3-20-75	APPARATUS BAY	30	4"	20	NAT	75	50	120	4.8	A B C D E F G

NOTES AND ACCESSORIES DESIGNATION

A	TWO STAGE OPERATION	F	4"SIDE WALL VENT KIT
B	LOW INTENSITY	G	MOUNTING CHAIN KIT
C	ONE THERMOSTAT FOR ALL		
D	MOUNTING @ 16' AFF		
E	UNIT MOUNTED DISCONNECT		

GAS FIRED UNIT HEATER SCHEDULE

TAG	MANUFACTURER & MODEL No.	AREA SERVED	TYPE	CFM	INTAKE/ FLUE SIZE	GAS DATA			ELECTRICAL		NOTES/ACCESSORIES
						TYPE	MBH IN	MBH OUT	VOLTS	HP	
GUH-1	MODINE HDS-30	PPE STORAGE 122	PROP.	500	3"	NAT	30	24.6	120	1/15	A B C D E
GUH-2	MODINE HDS-75	BASEMENT	PROP.	1160	4"	NAT	75	61.5	120	1/12	A B C D E
GUH-3	MODINE HDS-30	BASEMENT	PROP.	500	3"	NAT	30	24.6	120	1/15	A B C D E
GUH-4	MODINE HDS-75	BASEMENT MECH/ELEC	PROP.	1160	4"	NAT	75	61.5	120	1/12	A B C D E
GUH-5	MODINE HDS-30	EQUIP MAINT 111	PROP.	500	3"	NAT	30	24.6	120	1/15	A B C D E

NOTES AND ACCESSORIES DESIGNATION

A	VIBRATION ISOLATORS		
B	4 POINT SUSPENSION KIT		
C	REMOTE THERMOSTAT		
D	SIDE WALL CONCENTRIC VENT KIT		
E	DISCONNECT SWITCH		

ELECTRIC CABINET UNIT HEATER SCHEDULE

TAG	MANUFACTURER & MODEL No.	AREA SERVED	MOUNTING	CFM	BTU/HR	ELECTRICAL DATA			NOTES/ACCESSORIES
						WATTS	VOLT	AMPS	
ECUH-1	MARKEL 3320 SERIES	PASSAGE 113	WR	175	10230	3000	208/1	10.8	A C E
ECUH-2	MARKEL 3480 SERIES	PPE LAUNDRY 123	RC	425	17000	5000	208/3	13.9	A C E
ECUH-3	MARKEL 3320 SERIES	RESTROOM 124	WR	175	2560	750	120/1	6.25	A C E

MOUNTING KEY

PD – PEDISTAL
FL – FLOOR
WL – WALL
WR – WALL RECESS
RC – FULLY RECESSED CEILING

NOTES AND ACCESSORIES DESIGNATION

A	INTERGRAL THERMOSTAT	E	HEAVY DUTY GRILLE
B	REMOTE THERMOSTAT		
C	UNIT MOUNTED DISCONNECT SWITCH		
D	CONVERTIBLE		

ELECTRIC UNIT HEATER SCHEDULE

TAG	MANUFACTURER & MODEL No.	AREA SERVED	MOUNTING	CFM	MBH	ELECTRICAL DATA		NO OF FANS	NOTES/ACCESSORIES
						KW	VOLT		
EUH-1	MARKEL 5100 SERIES	DECON/SHOWER 125	SUSPENDED	350	17.0	5.0	208/3	1	A B C

NOTES AND ACCESSORIES DESIGNATION

A	REMOTE THERMOSTAT	C	MOUNT AS HIGH AS POSSIBLE, HANGING KIT
B	UNIT MOUNTED DISCONNECT SWITCH		

ELECTRIC BASEBOARD SCHEDULE

TAG	MANUFACTURER & MODEL NO.	LOCATION	ELECTRICAL		VOLT	NOTES/ACCESSORIES
			LENGTH	WATTS		
EBB-1	MARKEL DBF SERIES	SEE DWG	SEE DWG	250W/1FT	208/1	A B C

NOTES AND ACCESSORIES DESIGNATION

A	INTEGRAL THERMOSTAT
B	INTEGRAL DISCONNECT SWITCH
C	PEDESTALS MOUNTING

GRILLE, REGISTER & DIFFUSER SCHEDULE

TAG	MANUFACTURER & MODEL No.	SERVICE	MOUNTING	OVERALL SIZE	NECK SIZE	NOTES/ ACCESSORIES
S-1	TITUS OMNI	SAD	LAY-IN	24x24	SEE PLAN	A
S-2	TITUS OMNI	SAD	SURFACE	12x12	SEE PLAN	A
S-3	TITUS 272RL	SAD	SURFACE	SEE PLAN	SEE PLAN	A B
S-4	TITUS TBD-80	SAD	LAY-IN	48"L, 2 SLOT 1"W SLOT	SEE PLAN	A B
R-1	TITUS 50F	RAR	LAY-IN	24x24	---	A
R-2	TITUS 50F	RAR	LAY-IN	12x24	---	A
R-3	TITUS 25RL	RAR	SURFACE	SEE PLAN	---	A
E-1	TITUS 25RL	RAR	SURFACE	SEE PLAN	---	A
T-1	TITUS 350 RL	TAG	SURFACE	SEE PLAN	---	A

KEY:
SAD – CEILING SUPPLY DIFFUSER
TAG – CEILING OR WALL TRANSFER GRILLE
RAG – CEILING OR WALL RETURN GRILLE
EAG – CEILING OR WALL EXHAUST GRILLE

NOTES AND ACCESSORIES DESIGNATION

A	COLOR BY ARCHITECH		
B	OPPOSED BLADE DAMPER		

WATER SOURCE HEAT PUMP SCHEDULE

TAG	MANUFACTURER & MODEL No.	MOUNTING	CFM	EXT. SP IN	ECM FAN HP	COOLING				HEATING			GPM	ELECTRICAL DATA				EER	NOTES/ACCESSORIES
						MBH TOTAL	MBH SENS	EWT DEG F	LWT DEG F	MBH	EWT DEG F	LWT DEG F		VOLT	ELECTRIC HEAT (KW)	MCA	MOCP		
HP-1	TRANE EXH-048	HORIZONTAL	1300	0.4	3/4	55.6	41.6	45	55.9	45.0	45	38.6	11.2	208/3	6.5	28.9	30	22.40	A B C D E F G
HP-2	TRANE EXH-030	HORIZONTAL	950	0.4	3/4	41.9	31.6	45	55.8	34.1	45	38.6	7.0	208/1	4.9	33.45	35	24.30	A B C D E F G
HP-3	TRANE EXH-036	HORIZONTAL	1200	0.4	3/4	41.9	31.6	45	55.8	34.1	45	38.6	8.4	208/3	5	22	25	25.80	A B C D E F G

NOTES AND ACCESSORIES DESIGNATION

A	FACTORY MOUNTED CONTROL	D	2" FILTER
B	PROVIDE VIBRATION ISOLATION HANGER	E	BUILT-IN DISCONNECT SWITCH
C	DRAIN CONDENSATE THRU OUTSIDE WALL	F	30% PROPYLENE CLYCOL
		G	BACNET CARD

GAS FIRED BOILER SCHEDULE

94.1 THERMAL EFFICIENCY (%)

TAG	MANUFACTURER & MODEL NO.	SERVICE	LOCATION	TYPE	INPUT CFH MIN/MAX	OUTPUT MBH	SUPPLY °F	TD °F	ELECTRICAL		NOTES/ACCESSORIES
									VOLTS	FLA	
B-1	THERMAL SOLUTIONS APX425C	SNOW MELT	MECH ROOM	HOT WATER	80/399	375	160	30	120/1	10	A B C D E F G H I G K L

NOTES AND ACCESSORIES DESIGNATION

A	CONDENSING TYPE	F	4"CONCRETE PAD	K	DISCONNECT SWITCH
B	RELIEF VALVE DRAIN TO FD	G	4 VENT, 4 INTAKE; AL29-4C MATERIALS	L	ALTERNATE # 5
C	BOILER PUMP SEE SCHEDULE (BP-1) FOR EACH BOILER	H	CONDENSATE NEUTRALIZER DRAIN		
D	PROVIDE SINGLE POWER CONNECTION	I	BACNET CARD		
E	5:1 TURNDOWN	G	30% PROPYLENE GLYCOL		

PUMP SCHEDULE

TAG	MANUFACTURER & MODEL No.	LOCATION	SYSTEM SERVED	TYPE	IMPELLER IN	CAPACITIES		MOTOR DATA			NOTES/ACCESSORIES
						GPM	HEAD	HP	VOLTS	RPM	
P-1 P-2	BELL & GOSSETT E-90-1.5AB	BASEMENT MECH RM	SNOW MELT	IN LINE	5.5	24	30	3/4	208/3	3250	A B C D
P-3 P-4	BELL & GOSSETT E-90 1AAB	BASEMENT MECH RM	GEO-THERMAL HEAT PUMP	IN LINE	5	26.6	100	3	208/3	3600	A C D E F
BP-1	BELL & GOSSETT PL-55	MECH ROOM	B-2	IN LINE		25	20	2/5	120/1	3250	A B C D

NOTES AND ACCESSORIES DESIGNATION

A	30% PROPYLENE GLYCOL	D	BACNET CARD
B	INTERLOCK WITH BOILER	E	VFD
C	DISCONNECT SWITCH	F	SUSPEND FROM STRUCTURE

FAN SCHEDULE

TAG	MANUFACTURER & MODEL NO.	SERVICE	LOCATION	CFM	ESP "WC	FAN KEY	WHEEL TYPE	ELECTRICAL		WEIGHT POUND	NOTES/ ACCESSORIES
								VOLTS /ø	HP		
EF-1	GREENHECK CUBE-131	APPERATUS BAY	PITCHED ROOF	1500	0.6	RMC	BI	120/1	1/2	80	A B C D E
EF-2	GREENHECK CUBE-131	APPERATUS BAY	PITCHED ROOF	1500	0.6	RMC	BI	120/1	1/2	80	A B C D E
EF-3	GREENHECK SQ-95-VG	SEE PLAN	INLINE DUCT	560	.4	ILC	BI	120/1	1/6	60	G H

FAN KEY:
RMC – ROOF MOUNTED CENTRIFUGAL
CLG – CEILING MOUNT
ILC – INLINE CENTRIFUGAL
SW – SIDE WALL

WHEEL KEY:
FC – FORWARD CURVED
BI – BACKWARD INCLINED

NOTES AND ACCESSORIES DESIGNATION

A	14"H PITCH ROOF CURB	G	INTERLOCK WITH THERMOSTAT THERMOSTAT SHALL BE ADJUSTABLE
B	MOTORIZED BACKDRAFT DAMPER	H	VIRATION ISOLATOR HANGING KIT
C	FACTORY MOUNTED & WIRED DISCONNECT SWITCH	E	INTERLOCK WITH CONTROL PANEL
D	BIRDSCREEN	F	ON ALL THE TIME

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

DRAWN BY
MS

CHECKED BY
MS

APPROVED BY
MS

SHEET NAME

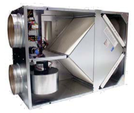
MECHANICAL SCHEDULES

SHEET NO.

M4-01

Project Number: O-043007
Project Name: HIGHLAND FIRE STATION # 2
Unit Tag: ERV-1
Model: HE-1X|INH-S15EE--DGNT---L
Qty: 1

Intertek



HE1XINH shown

Specifications

Ventilation Type:	Static plate, heat and humidity transfer
Typical Airflow Range:	250-925 CFM
AHRI 1060 Certified Core:	One L125-G5
OA Filters:	Total Qty. 1, MERV 8: 20" x 20" x 2"
RA Filters:	Total Qty. 1, MERV 8: 20" x 20" x 2"
Unit Weight:	204-275 lbs. (varies by option)

Configuration

Unit Tag	ERV-1
Model	[HE-1X] HE-1X
Core Type	[J] G5
Installation Location	[IN] Indoor Unit
Airflow Orientation	[H] Orientation H
Wall	[S] Single (Standard)
Electrical Service	[15] 208-230V / 1 Phase / 60 HZ
Fresh Air Motor	[E] Variable Speed / ECM - Direct Drive Motors
Exhaust Air Motor	[E] Variable Speed / ECM - Direct Drive Motors
Flow Control	[D] Motorized Dampers Both Airstreams
Unit Control	[G] Terminal Strip For EC Motors
Disconnect	[N] Non Fused (Standard)
Control Option	[T] Transformer with Isolation Relay (Standard)
Filter Monitor	[-] None
Paint	[-] None
Safety Listing	[L] Listed

Airflow Orientation

Unit Accessories and Service Parts

Type	Part Number	Description	Quantity
Electric Heater	EK-1212005SCCHR--33-1SV-N	EK-1212005SCCHR--33-1SV-N	1
Accessory	131300	TC7D-W DIGITAL TIME CLOCK WALL MNT	1

	SUMMER			WINTER		
	Outdoor Air	Room Air	Fresh Air	Outdoor Air	Room Air	Fresh Air
Standard Flow Rate **SCFM**	669*	660	660	669*	660	660
Actual Flow Rate **ACFM**	720*	686	694	595*	678	652
Dry Bulb **°F**	92.0	75.0	79.8	0.0	70.0	50.3
Wet Bulb **°F**	74.0	62.5	67.8	0.0	54.2	41.0
Enthalpy (H) **BTU/lb**	37.9	28.3	32.4	0.9	22.9	15.8
Moisture Ratio (MR) **grains/lb**	100.3	66.2	84.9	5.6	38.9	24.0
Fresh Air - External Static Pressure **in w.g.**		0.50			0.50	
Exhaust Air - External Static Pressure **in w.g.**		0.50			0.50	
Sensible effectiveness **%**		71.9			71.9	
Total effectiveness **%**		56.9			67.9	
Load savings ratio **%** - 90.1 Compliance		56.9			67.9	
Moisture removed **grains/lb**		15.4			-18.4	
	Sen	**Lat**	**Tot**	**Sen**	**Lat**	**Tot**
Original load **BTUH [Tons]**	12124 [1.0]	16178 [1.3]	28302 [2.4]	49924	15495	65419
Load with RenewAire **BTUH [Tons]**	3407 [0.3]	8799 [0.7]	12205 [1.0]	14028	6975	21003
Total energy saved **BTUH [Tons]**	8718 [0.7]	7379 [0.6]	16097 [1.3]	35896	8519	44415

*Note: OA Flow Rate values are gross airflow, all others are net airflow.

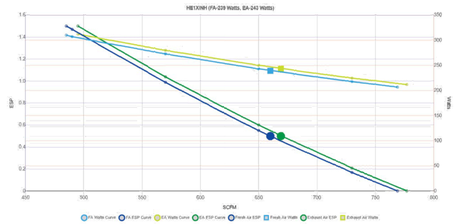
Fans

	Gross CFM	ESP	Filters	Fan RPM	Watts	Elevation	Motors Protected by Motor Starters		Motors Protected by VFDs	
							Qty @ HP	FLA	Qty @ HP	FLA
PA	660	0.50	2" MERV-8	4.9	239	627	2@0.5	4.8	None	-
EA	669	0.50	2" MERV-8	5	243					

Unit Electrical Data

Volts	Hertz	Phase	MCA	MOP
208-230	60	1	10.8	15

Fan Curve



Project Number: O-043007
Project Name: HIGHLAND FIRE STATION # 2
Heater Tag: EDH-1
Model: EK-1212005SCCHR--33-1SV-N
Quantity: 1

cULus LISTED

Specifications

Heater Type:	Electric Duct Heater
Standard Features:	A disconnecting magnetic control contactor per stage or each 48 Amp circuit within a stage
	Open-coil element
	Control terminal board
	Grounding lugs
	Automatic limit switch for primary overtemperature protection
	Manual reset limit switch for secondary overtemperature protection
	Non-adjustable airflow switch
	Disconnect switch

Configuration

Heater Tag	EDH-1
Heater Series	[EK] EK Electric Duct Heater
Width	[12] Width
Height:	[12] Height
Heater Capacity	[005] Capacity
Mount	[S] Slip-in (Standard)
Element Style	[C] Open Coil (Standard)
Element Material	[C] 60-20-20 Ni-Cr-Fe with Nickel-Plate Terminal Pins (Standard)
Airflow Orientation	[H] Horizontal
Control Box Offset	[R] Right Hand
Control Box Recessed	[-] None
Control Box Dust Tight	[-] None
Electrical Service	[33] 240V / 3 Phase / 60 HZ
Power Fusing	[-] None
Stage	[1] Single Stage
Control Voltage	[5] 24VAC
Control Type	[V] SCR with Thermostat and Sensor
Pilot Light	[N] None

Unit Accessories and Service Parts

No accessories for this unit

Performance

CFM	Temp In	Temp Out	kW	Volts	Hertz	Phase	FLA	MCA	MOPD
660	50°F	73.86°F	5	240V	60	3	12.03	15.04	20

RENEWAIRE
ERV-1 SCHEDULE WITH ELECTRIC HEATER

PROVIDE DEDICATE CIRCUIT FOR ELECTRIC HEATER
PROVIDE DISCONNECT FOR ERV AND ELECTRIC HEATER

PARTNERS

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KEY PLAN

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MS

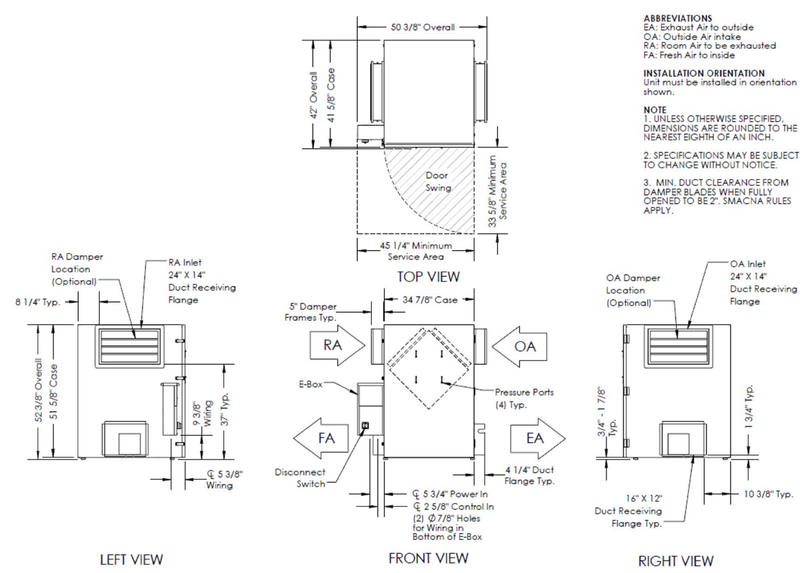
SHEET NAME

MECHANICAL
SCHEDULES

SHEET NO.

M4-02

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER



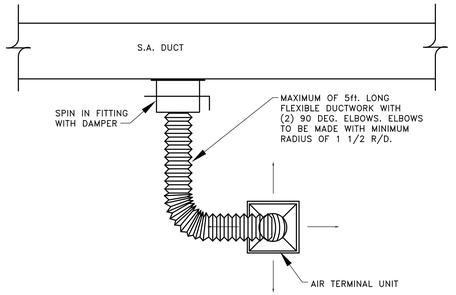
ABBREVIATIONS
EA: Exhaust Air to outside
OA: Outside Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

INSTALLATION ORIENTATION
Unit must be installed in orientation shown.

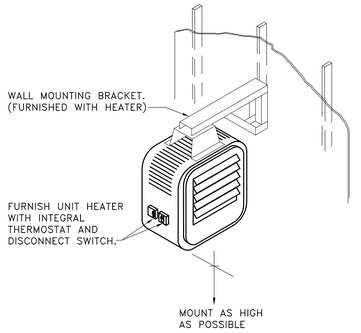
NOTE
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE ROUNDED TO THE NEAREST EIGHTH OF AN INCH.

2. SPECIFICATIONS MAY BE SUBJECT TO CHANGE WITHOUT NOTICE.

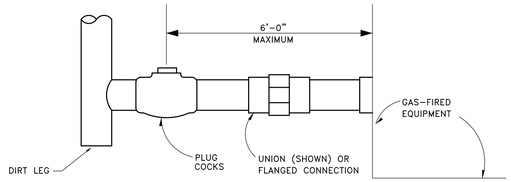
3. MIN. DUCT CLEARANCE FROM DAMPER BLADES WHEN FULLY OPENED TO BE 2". SMACNA RULES APPLY.



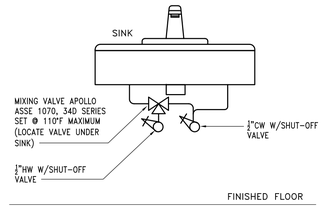
FLEXIBLE DUCT CONNECTION DETAIL
NO SCALE



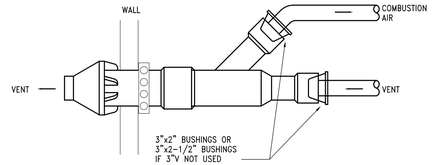
UNIT HEATER DETAIL
NO SCALE



TYPICAL GAS PIPING CONNECTION
NO SCALE

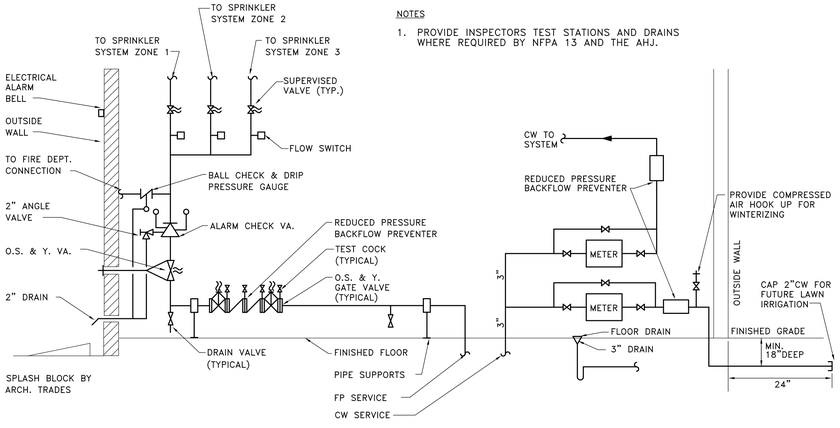


MIXING VALVE PIPING DETAIL
NO SCALE

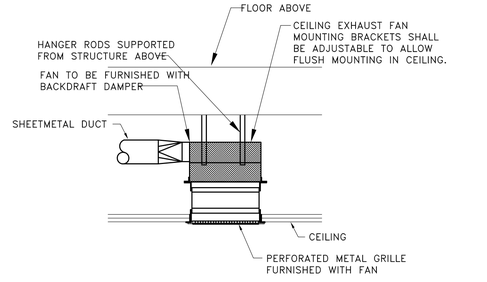


CONCENTRIC VENT KIT (WALL INSTALLATION)
NO SCALE

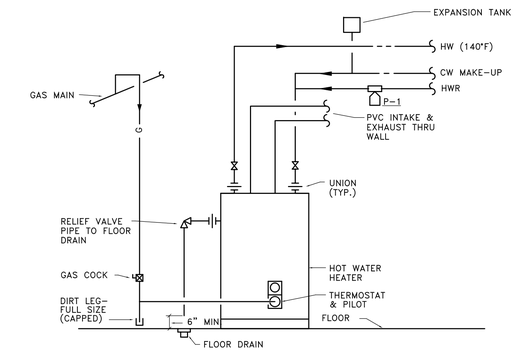
NOTES
1. PROVIDE INSPECTORS TEST STATIONS AND DRAINS WHERE REQUIRED BY NFPA 13 AND THE AHJ.



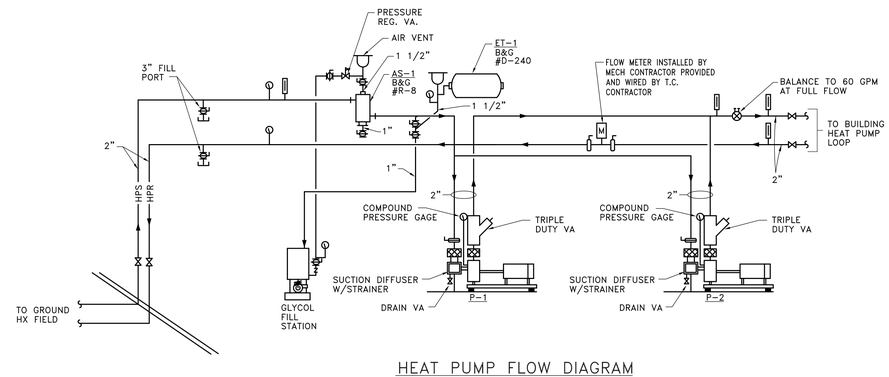
TYPICAL AUTOMATIC SPRINKLER RISER & WATER METER DIAGRAM
NO SCALE



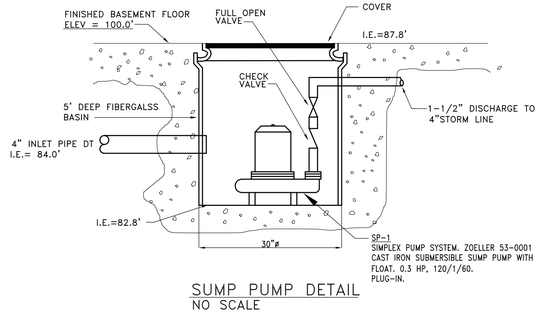
CEILING EXHAUST FAN DETAIL
NO SCALE



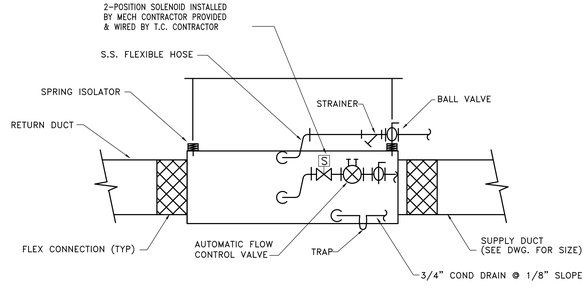
DOMESTIC WATER HEATER PIPING SCHEMATIC
NO SCALE



HEAT PUMP FLOW DIAGRAM
NO SCALE



SUMP PUMP DETAIL
NO SCALE



DETAIL OF HORIZONTAL HEAT PUMP INSTALLATION
NO SCALE

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Highland Township Fire Station No. 2

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PROJECT NO.
18-122B

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90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

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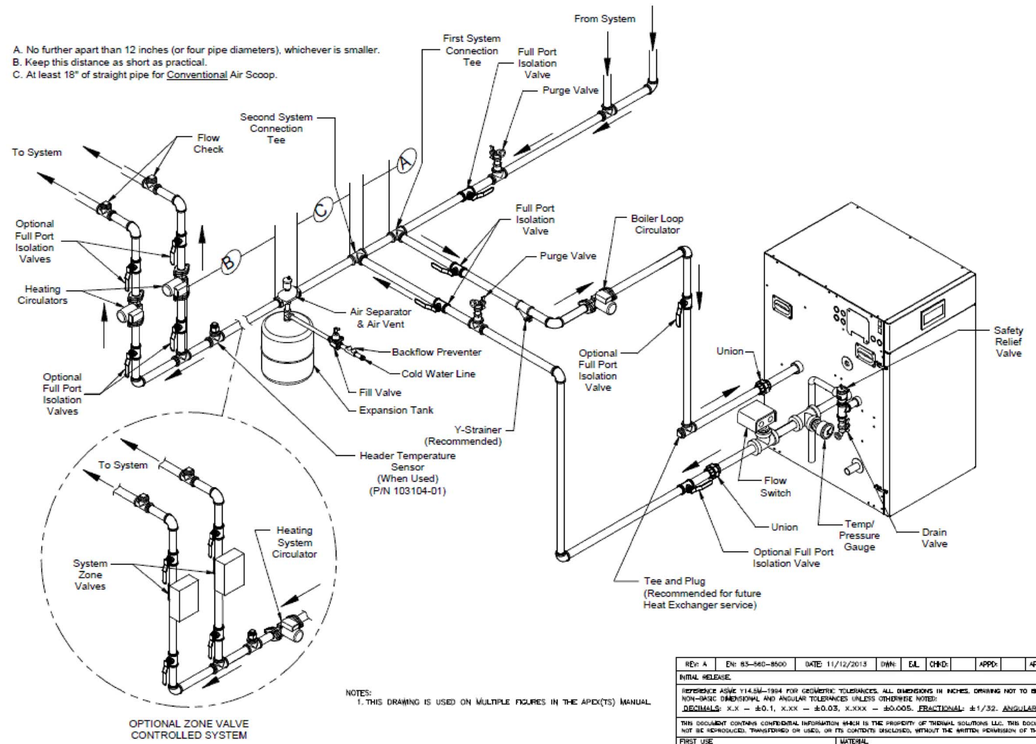
SHEET NAME
MECHANICAL DETAILS

SHEET NO.
M5-01



OPTIONAL ZONE VALVE CONTROLLED SYSTEM

NOTES:
1. THIS DRAWING IS USED ON MULTIPLE FIGURES IN THE APEX(TS) MANUAL.

REV: A	ECN: 83-560-8500	DATE: 11/12/2013	DWN:	EJL	CHKD:	APPD:	APPD:

INITIAL RELEASE.

REFERENCE ASME Y14.5M-1994 FOR GEOMETRIC TOLERANCES. ALL DIMENSIONS IN INCHES. DRAWING NOT TO BE SCALED. NON-BASIC DIMENSIONAL AND ANGULAR TOLERANCES UNLESS OTHERWISE NOTED:
DECIMALS: X.X – ±0.1, X.XX – ±0.03, X.XXX – ±0.005. FRACTIONAL: ±1/32. ANGULAR: ±1°

FIRST USE: APEX(TS)	MATERIAL
PROPERTY OF: Thermal Solutions Products LLC, LANCASTER, PA 17604-3244	TITLE: NEAR BOILER PIPING HEATING ONLY (WITH CENTRAL HEATING CIRCULATORS)
	DRAWING NUMBER: TS-83-150 | SCALE: NONE | DWG SIZE: C | SHEET: 1 OF 1

SNOW MELT SYSTEM SCHEMATIC

H:\ACAD\FILES\75\75811 - Highland Twp FS-2\CAD\MECH\75811-M5-01-Details.dwg Wed, 26 Aug 2020 - 4:30pm

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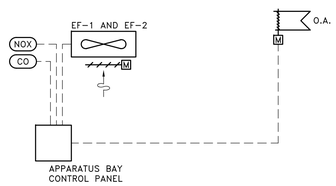
MECHANICAL DETAILS

SHEET NO.

M5-02



EF-1 & EF-2 CONTROL DIAGRAM

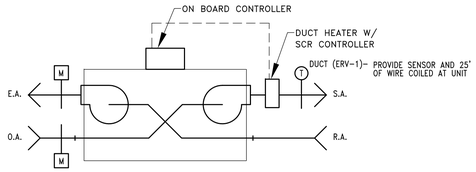
NO SCALE

NOTES:

THE CONTROLS CONTRACTOR SHALL PROVIDE ALL WIRING, TRANSFORMERS, SENSORS, HARDWARE, SOFTWARE AND PROGRAMMING FOR A COMPLETE AND OPERATIONAL CONTROLS SYSTEM. COORDINATE ALL DEVICES WITH HVAC EQUIPMENT. ALL WIRING SHALL BE IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS.

SEQUENCE OF OPERATION: EF-1 AND EF-2

1. NOX SYSTEM IS ACTIVATED BY SENSORS. INTAKE DAMPERS LOCATED AT CAPULA SHALL OPEN AND EXHAUST FANS EF-1 AND EF-2 SHALL ACTIVATE TO PURGE THE SPACE FOR A MINIMUM OF 15 MINUTES. EF-1 AND EF-2 ARE ENERGIZED AND DAMPER OPENS.

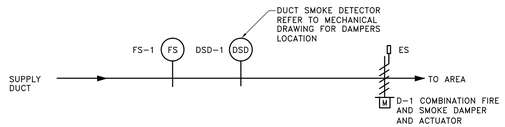


SEQUENCE OF CONTROLS

1. ERV IS STARTED THROUGH AN ON BOARD MICROPROCESSOR CONTROL.
2. DUCT HEATER SCR CONTROLLER MODULATES TO MAINTAIN SET DISCHARGE.

ERV-1 CONTROL DIAGRAM

NO SCALE



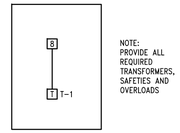
FLOW SCHEMATIC COMBINATION FIRE AND SMOKE DAMPER CONTROL

SEQUENCE OF OPERATION:

1. GENERAL

WHENEVER AIR HANDLING UNIT IS SHUT DOWN BY EITHER SMOKE DETECTORS OR ANY OTHER CONDITION ALL THE ASSOCIATED FLOOR SUPPLY, RETURN, AND EXHAUST AIR SMOKE AND FIRE DAMPERS CLOSE THROUGH THE DDC CONTACT.

THE AREA COMBINATION FIRE AND SMOKE DAMPER IS CONTROLLED LOCALLY FROM LOCAL DUCT DETECTOR DSD-1 OR LOCAL FIRESTAT FS-1. ACTIVATION OF THE SMOKE DETECTOR OR THE FIRESTAT DEENERGISES THE DAMPER ACTUATOR AND THE SMOKE DAMPER D-1 CLOSES. THE DUCT SMOKE DETECTOR RELAY MAY BE RESET FROM THE FIRE ALARM SYSTEM PANEL. THE FIRESTAT MUST BE MANUALLY RESET AT THE DEVICE.



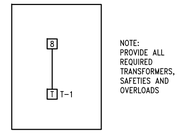
NOTE:
PROVIDE ALL
REQUIRED
TRANSFORMERS,
SAFETIES AND
OVERLOADS

ELECTRIC AND GAS FIRED UNIT HEATRS CONTROL DIAGRAM

NO SCALE

SEQUENCE OF OPERATION:

1. LOW VOLTAGE THERMOSTAT STARTS FAN AND HEATER WHEN CALLED FOR.



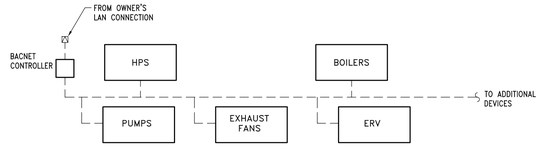
NOTE:
PROVIDE ALL
REQUIRED
TRANSFORMERS,
SAFETIES AND
OVERLOADS

ELECTRIC CABINET UNIT HEATER CONTROL DIAGRAM

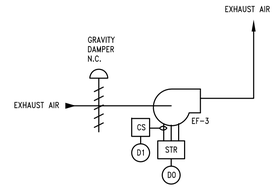
NO SCALE

SEQUENCE OF OPERATION:

1. LOW VOLTAGE THERMOSTAT STARTS FAN AND HEATER WHEN CALLED FOR.



DDC ARCHITECTURE



TYPICAL EXHAUST FAN DETAIL – W/ TEMP CONTROL

SEQUENCE OF OPERATION:

1. THE SPACE THERMOSTAT SHALL ACTIVATE THE EXHAUST FAN WHEN SPACE TEMPERATURE IS ABOVE 80° F. (ADJUSTABLE).
2. DDC SHALL MONITOR EXHAUST FAN RUN STATUS THRU THE CURRENT SWITCH. ABNORMAL STATUS CONDITION SHALL ACTIVATE AN ALARM IN THE DDC SYSTEM.

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HOT WATER HEATING SEQUENCE OF OPERATION:

NOTE: ALL SETPOINTS AND TIME INTERVALS SETPOINTS DESCRIBED IN THE SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).

HOT WATER HEATING SYSTEM CIRC PUMPS (P-1 & P-2) / (P-3 & P-4) SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. THE HAND-OFF-AUTO SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. WHEN OA TEMP IS 55°F OR BELOW, ONE OF TWO SECONDARY PUMPS SHALL BE ACTIVATED BY THE DDC TO OPERATE CONTINUOUSLY. THE OTHER WILL SERVE AS STANDBY.

THE DIFFERENTIAL PRESSURE SENSOR (DPT-1) THRU THE DDC MODULATES THE ACTIVE PUMP VARIABLE SPEED DRIVE TO MAINTAIN THE DESIRED SYSTEM DIFFERENTIAL PRESSURE AS DETERMINED DURING SYSTEM BALANCING.

DDC SHALL ALTERNATE PUMP OPERATION BASED ON RUNTIME HOURS OR AT THE BEGINNING OF EACH MONTH – OPERATOR SELECTABLE.

DDC SHALL MONITOR OPERATING STATUS OF EACH PUMP THRU ITS RESPECTIVE CURRENT SWITCH. UPON PUMP FAILURE, DDC SHALL ACTIVATE A FAILURE ALARM AND AUTOMATICALLY START THE STANDBY PUMP.

THE DDC SYSTEM ENABLES THE MASTER SEQUENCING PANEL WHEN THE OA TEMP IS 55°F OR BELOW. ABOVE 55°F THE DDC DISABLES THE SYSTEM.

THE MASTER SEQUENCING PANEL SHALL ACTIVATE OR DEACTIVATE BOILERS AND BOILER STAGES AS REQUIRED TO MAINTAIN HWH SUPPLY TEMP (T-1) SETPOINT.

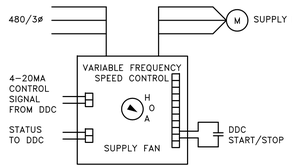
THE MASTER SEQUENCING PANEL SHALL INCLUDE OPERATOR SELECTABLE BOILER LEAD/LAG OPERATION OR FIRST ON/FIRST OFF OPERATION.

WHENEVER A BOILER CIRCUIT IS ACTIVATED, ITS RESPECTIVE PRIMARY CIRCULATION PUMP SHALL BE ACTIVATED BY FACTORY WIRED PUMP RELAY. WHENEVER A BOILER IS DEACTIVATED, A TIME DELAY RELAY SHALL KEEP THE PUMP RUNNING FOR 10 MINUTES (ADJUSTABLE) TO DISSIPATE HEAT FROM THE DEACTIVATED BOILER.

WHEN A BOILER IS ACTIVATED, BOTH SETS OF COMBUSTION AIR DAMPERS SHALL BE OPENED THRU HARDWIRED INTERLOCK. WHEN THE DAMPERS OPEN, END SWITCHES MAKE, AND THE BOILERS ARE ALLOWED TO START.

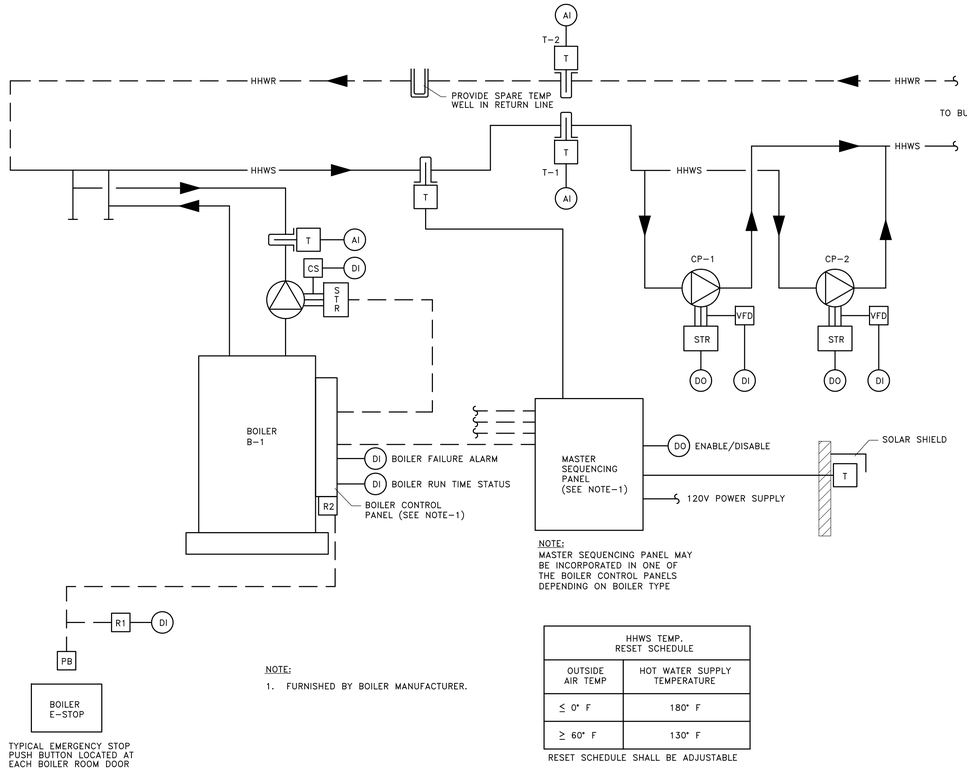
DDC SHALL MONITOR BOILER RUN STATUS AND BOILER FAILURE ALARM AT EACH BOILER THROUGH DRY CONTACTS AVAILABLE IN THE BOILER CONTROL PANEL. BOILER FAILURE MONITORING SHALL INCLUDE "LOW WATER" AND "FLAME FAILURE".

THE EMERGENCY STOP PUSH BUTTON(S), LOCATED AT EACH BOILER ROOM DOOR(S), DEACTIVATES EACH BOILER WHENEVER THE PUSH BUTTON IS ACTIVATED. THE BOILERS REMAIN DE-ACTIVATED UNTIL THE PUSH BUTTON(S) IS MANUALLY RESET.



TYPICAL PUMP VFD ELECTRIC SCHEMATIC

NO SCALE



TYPICAL EMERGENCY STOP PUSH BUTTON LOCATED AT EACH BOILER ROOM DOOR

NOTE:
MASTER SEQUENCING PANEL MAY BE INCORPORATED IN ONE OF THE BOILER CONTROL PANELS DEPENDING ON BOILER TYPE

NOTE:
1. FURNISHED BY BOILER MANUFACTURER.

HHWS TEMP. RESET SCHEDULE	
OUTSIDE AIR TEMP	HOT WATER SUPPLY TEMPERATURE
≤ 0° F	180° F
≥ 60° F	130° F

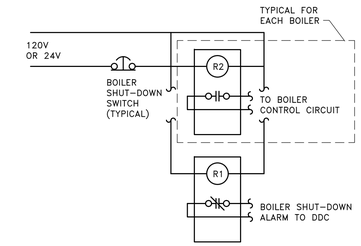
RESET SCHEDULE SHALL BE ADJUSTABLE

	HARDWARE																	SOFTWARE									
	OUTPUT				INPUT																						
	DIGITAL			ANALOG	DIGITAL	ANALOG																					
	CONTROL RELAY	POSITION ADJUSTMENT	4-20ma	CONTACT CLOSURE	TEMPERATURE	% RELATIVE HUMIDITY	PSIG, PSIA, PSID, IN. H2O	FLOW	CO2									SCHEDULED S/S	ECONOMIZER	ENTHALPY	RUN TIME	DAY/NIGHT SET BACK	WARM UP CYCLE	SMOKE CONTROL	TREND LOG CAPABILITY	SYSTEM GRAPHICS	
HEATING SYSTEM																									◆	
PRIMARY PUMP				4																◆						
BOILER FAILURE ALARM				4																						
BOILER RUN STATUS				4																◆						
BOILER DISCH TEMP					4																			◆		
SECONDARY PUMP	4			4													◆			◆						
TERTIARY PUMP	2			2													◆			◆						
TERTIARY VFD FAULT				2																						
GLYCOL WATER S TEMP					1																			◆		
GLYCOL WATER R TEMP					1																			◆		
HHWS TEMP					1																			◆		
HHWR TEMP					1																			◆		
BOILER E-STOP				1																						

ROOFTOP UNIT POINTS ARE OBTAINED VIA BACNET WORKS INTERFACE.
COORDINATE WITH RTU MANUFACTURER.

GENERAL NOTES

1. 120 VOLT POWER FROM STARTER TRANSFORMER
2. ■ DENOTES TERMINAL AT STARTER
3. □ DENOTES TERMINAL AT CONTROL PANEL
4. ——— DENOTES FIELD WIRING
5. ——— DENOTES WIRING IN STARTER OR IN CONTROL PANEL
6. ○ DENOTES TERMINAL AT DEVICE



REMOTE BOILER EMERGENCY SHUTDOWN WIRUNG

NO SCALE

NOTES:

1. LOCATE A SWITCH AT EACH ENTRANCE JUST INSIDE BOILER ROOM. REFER TO FLOOR PLANS FOR QUANTITY AND LOCATION OF ROOM ENTRANCES. COORDINATE SWITCH LOCATION WITH ALL OTHER TRADES.
2. TEMPERATURE CONTROLS (TCC) SHALL PROVIDE SIGN (NAME PLATE) TO BE PLACED DIRECTLY ABOVE OR BELOW EACH PUSH BUTTON SWITCH THAT READS: "EMERGENCY BOILER SHUTDOWN".
3. TCC SHALL SUPPLY POWER TO CONTROL RELAY FROM EMERGENCY POWER CIRCUIT. REFER TO ELECTRICAL PANEL SCHEDULES AND COORDINATE WITH ELECTRICAL CONTRACTOR AS NECESSARY.
4. TCC SHALL WIRE BOILERS' CONTROL CIRCUITS (POWER FROM SECONDARY SIDE OF CONTROL TRANSFORMERS) THRU NORMALLY OPEN RELAY CONTACTS. TCC SHALL COORDINATE EXACT WIRING AND TERMINATION REQUIREMENTS WITH BOILER MANUFACTURER.
5. TCC SHALL MOUNT SHUTDOWN CONTROL RELAYS AT RESPECTIVE BOILER CONTROL PANELS.
6. TCC SHALL PROVIDE PUSH BUTTON SWITCH (PUSH TO LATCH – TURN KEY OR PULL TO RELEASE) WITH MUSHROOM HEAD OPERATOR AND NORMALLY CLOSE (NC) CONTACTS. PROVIDE WITH PROPER ENCLOSURE.

SEQUENCE OF OPERATION:

UNDER NORMAL OPERATING CONDITIONS THE CIRCUIT SHALL BE ENERGIZED AND THE RELAYS NORMALLY OPEN (NO) CONTACTS SHALL BE CLOSED. WHEN A SWITCH IS PUSHED (LATCHED) THE RELAY CONTACTS SHALL OPEN AND INTERRUPT EVERY BOILER'S CONTROL CIRCUIT. WHEN SWITCH IS RELEASED, THE RELAY SHALL BE ENERGIZED AND ITS NORMALLY OPEN CONTACTS SHALL CLOSE, ENERGIZING EVERY BOILER'S CONTROL CIRCUIT.

DDC SHALL ACTIVATE AN ALARM WHEN REMOTE SWITCH HAS BEEN PUSHED.

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TEMPERATURE CONTROLS

SHEET NO.
M6-02

480V., THREE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY (AMPS)	MAX. CIRCUIT LOAD (AMPS)	MAXIMUM LENGTH IN FEET																							
		NO.12	NO.10	NO.8	NO.6	NO.4	NO.2	NO.1	1/0	2/0	3/0	4/0	250	350	500	2-3/0	2-4/0	2-250	2-350	2-500	3-300	3-400	4-350	4-500	5-500	6-500
20	16	253	403	642	1019	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
30	24	–	269	428	679	1079	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
40	32	–	–	321	509	809	1293	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
50	40	–	–	–	408	648	1034	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
60	48	–	–	–	–	540	862	1083	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
70	56	–	–	–	–	–	739	928	1169	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
80	64	–	–	–	–	–	646	812	1023	1286	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
90	72	–	–	–	–	–	574	722	909	1143	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100	80	–	–	–	–	–	–	650	818	1029	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
125	100	–	–	–	–	–	–	–	655	823	1043	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
150	120	–	–	–	–	–	–	–	546	689	869	1107	–	–	–	–	–	–	–	–	–	–	–	–	–	–
175	140	–	–	–	–	–	–	–	–	588	745	949	1110	–	–	–	–	–	–	–	–	–	–	–	–	–
200	160	–	–	–	–	–	–	–	–	–	652	830	971	1360	–	–	–	–	–	–	–	–	–	–	–	–
225	180	–	–	–	–	–	–	–	–	–	–	738	863	1209	1743	–	–	–	–	–	–	–	–	–	–	–
250	200	–	–	–	–	–	–	–	–	–	–	–	777	1088	1569	1043	–	–	–	–	–	–	–	–	–	–
300	240	–	–	–	–	–	–	–	–	–	–	–	–	907	1307	869	1107	–	–	–	–	–	–	–	–	–
350	280	–	–	–	–	–	–	–	–	–	–	–	–	–	1120	745	949	1110	–	–	–	–	–	–	–	–
400	320	–	–	–	–	–	–	–	–	–	–	–	–	–	980	652	830	971	1360	–	–	–	–	–	–	–
450	360	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	738	863	1209	–	–	–	–	–	–	–
500	400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	777	1088	1569	–	–	–	–	–	–
600	480	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	907	1307	1165	–	–	–	–	–
700	560	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1120	999	1346	–	–	–	–
800	640	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	874	1177	1360	–	–	–
1000	800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	942	1088	1569	–	–
1200	960	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	785	907	1307	–	–
1600	1200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	980	1226	1307
1800	1440	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1089	1177
2000	1600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	980	1137

208V. SINGLE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY (AMPS)	MAX. CIRCUIT LOAD (AMPS)	MAXIMUM LENGTH IN FEET				
		NO.12	NO.10	NO.8	NO.6	NO.4
20	4	380	605	964	–	–
	8	190	302	482	765	–
	12	127	202	321	510	810
	16	95	151	241	382	607
30	24	–	101	161	255	405
40	32	–	–	121	191	304
50	40	–	–	–	153	243
60	48	–	–	–	–	202

120V. SINGLE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY (AMPS)	MAX. CIRCUIT LOAD (AMPS)	MAXIMUM LENGTH IN FEET				
		NO.12	NO.10	NO.8	NO.6	NO.4
20	4	220	349	556	882	–
	8	110	174	278	441	701
	12	73	116	185	294	467
	16	55	87	139	221	350
30	24	–	58	93	147	234
40	32	–	–	70	110	175
50	40	–	–	–	88	140
60	48	–	–	–	–	117

208V. THREE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY (AMPS)	MAX. CIRCUIT LOAD (AMPS)	MAXIMUM LENGTH IN FEET				
		NO.12	NO.10	NO.8	NO.6	NO.4
20	4	439	698	1113	–	–
	8	220	349	557	883	–
	12	127	233	371	589	935
	16	95	175	278	442	701
30	24	–	116	186	294	468
40	32	–	–	139	221	351
50	40	–	–	–	177	281
60	48	–	–	–	–	234

FEEDER & BRANCH CIRCUIT SIZING SCHEDULE – NONLINEAR LOADS

OVERCURRENT DEVICE RATING (AMPERES)	WIRE SIZE – AWG OR KCMIL		CONDUIT SIZE			NOTE
	PHASE & NEUTRAL	E.G.	4. WIRE+G (3PH & 2N)	5. WIRE+G (NOTE-7)	6. WIRE+G (3PH & 3N)	
15–20	12	12	3/4"	3/4"	3/4"	
25–30	10	10	3/4"	3/4"	3/4"	
35–40	8	10	3/4"	1"	1"	
45–50	8(6)	10	3/4"(1")	1"	1"(1 1/4")	
60	6(4)	10	1"(1 1/4")	1"(1 1/4")	1 1/4"	
70	6(4)	8	1"(1 1/4")	1"(1 1/4")	1 1/4"	
80–90	4(2)	8	1 1/4"	1 1/4"(1 1/2")	1 1/4"(1 1/2")	
100	3(2)	8	1 1/4"	1 1/2"	1 1/2"	
110	2(1)	6	1 1/2"	2"	2"	
125	1(1/0)	6	1 1/2"(2")	2"	2"	
150	1/0	6	2"	2"	2"	
175	2/0	6	2"	2"	2 1/2"	
200	3/0	6	2"	2 1/2"	2 1/2"	
225	4/0	4	2 1/2"	2 1/2"	3"	
250	250	4	3"	3"	3"	
300	350	4	3"	3 1/2"	3 1/2"	
350	500	3	3 1/2"	4"	4"	
400	500	3	3 1/2 "	4"	4"	
450	2–4/0	2–2	2–2 1/2"	2–2 1/2"	2–3"	
500	2–250	2–2	2–3"	2–3"	2–3"	
600	2–350	2–1	2–3"	2–3 1/2"	2–3 1/2"	
700	2–500	2–1/0	2–3 1/2"	2–4"	2–4"	
800	2–500	2–1/0	2–3 1/2"	2–4"	2–4"	
1000	3–400	3–2/0	3–3"	3–3 1/2"	3–4"	
1200	4–350	4–3/0	4–3"	4–3 1/2"	4–3 1/2"	
1600	5–400	5–4/0	5–3"	5–3 1/2"	5–4"	
2000	6–400	6–250	6–3"	6–3 1/2"	6–4"	

FEEDER & BRANCH CIRCUIT SIZING SCHEDULE – GENERAL PURPOSE

OVERCURRENT DEVICE RATING (AMPERES)	WIRE SIZE – AWG OR KCMIL		CONDUIT SIZE			NOTE
	PHASE & NEUTRAL	E.G.	2. WIRE+G	3. WIRE+G	4. WIRE+G (3PH & 1N)	
15–20	12	12	3/4"	3/4"	3/4"	
25–30	10	10	3/4"	3/4"	3/4"	
35–40	8	10	3/4"	3/4"	3/4"	
45–50	8(6)	10	3/4"	3/4"	3/4"(1")	
60	6(4)	10	3/4"(1")	3/4"(1")	1"(1 1/4")	
70	6(4)	8	3/4"(1")	3/4"(1")	1"(1 1/4")	
80–90	4(2)	8	1"	1"(1 1/4")	1 1/4"	
100	3(2)	8	1"(1 1/4")	1 1/4"	1 1/4"	
110	2(1)	6	1 1/4"	1 1/4"(1 1/2")	1 1/4"(1 1/2")	
125	1(1/0)	6	1 1/4"	1 1/2"	1 1/2"(2")	
150	1/0	6	1 1/4"	1 1/2"	2"	
175	2/0	6	1 1/2"	2"	2"	
200	3/0	6	1 1/2"	2"	2"	
225	4/0	4	2"	2"	2 1/2"	
250	250	4	2"	2 1/2"	2 1/2"	
300	350	4	2 1/2"	3"	3"	
350	500	3	3"	3"	3 1/2"	
400	500	3	3"	3"	3 1/2 "	
450	2–4/0	2–2	2–2"	2–2"	2–2 1/2"	
500	2–250	2–2	2–2"	2–2 1/2"	2–2 1/2"	
600	2–350	2–1	2–2 1/2"	2–3"	2–3"	
700	2–500	2–1/0	2–3"	2–3"	2–3 1/2"	
800	2–500	2–1/0	2–3"	2–3"	3–3 1/2"	
1000	3–400	3–2/0	3–2 1/2"	3–3"	3–3"	
1200	4–350	4–3/0	4–2 1/2"	4–3"	4–3"	
1600	5–400	5–4/0	5–2 1/2"	5–3"	5–3"	
2000	6–400	6–250	6–2 1/2"	6–3"	6–3"	

TRANSFORMER CIRCUIT SIZING SCHEDULE - GENERAL PURPOSE TYPE (NOTE 6)

TRANSF. KVA	PRIMARY CIRCUIT		SECONDARY CIRCUIT	
	SWITCH/FUSE OR CIRCUIT BREAKER	PRIMARY FEEDER	SWITCH/FUSE OR CIRCUIT BREAKER	SECONDARY FEEDER
9	30/20A.	20A., 3W.	30/30A.	30A., 4W.
15	30/25A.	25A., 3W.	60/60A.	60A., 4W.
30	60/45A.	45A., 3W.	100/100A.	100A., 4W.
45	100/70A.	70A., 3W.	200/150A.	175A., 4W.
75	200/125A.	125A., 3W.	400/250A.	250A., 4W.
112 1/2	200/175A.	175A., 3W.	400/400A.	400A., 4W.
150	400/225A.	225A., 3W.	600/500A.	500A., 4W.
225	400/350A.	350A., 3W.	800/800A.	800A., 4W.
300	600/500A.	500A., 3W.	1200/1000A.	1000A., 4W.

TRANSFORMER CIRCUIT SIZING SCHEDULE - NONLINEAR LOAD TYPE (NOTE 6)

TRANSF. KVA	PRIMARY CIRCUIT		SECONDARY CIRCUIT	
	SWITCH/FUSE OR CIRCUIT BREAKER	PRIMARY FEEDER	SWITCH/FUSE OR CIRCUIT BREAKER	SECONDARY FEEDER
9	30/20A.	20A., 3W.	30/30A.	30A., 5W.–NL
15	30/25A.	25A., 3W.	60/60A.	60A., 5W.–NL
30	60/45A.	45A., 3W.	100/100A.	100A., 5W.–NL
45	100/70A.	70A., 3W.	200/175A.	175A., 5W.–NL
75	200/125A.	125A., 3W.	400/300A.	300A., 5W.–NL
112 1/2	200/175A.	175A., 3W.	400/400A.	400A., 5W.–NL
150	400/225A.	225A., 3W.	600/600A.	600A., 5W.–NL
225	400/350A.	350A., 3W.	800/800A.	800A., 5W.–NL

MOUNTING HEIGHTS

EQUIPMENT OR OUTLETS	ELEVATIONS
WALL SWITCHES	4'–0" AFF
RECEPTACLES	1'–6" AFF
TELECOMMUNICATIONS OUTLETS	1'–6" AFF
TELECOMMUNICATIONS OUTLETS – WALL PHONE	4'–6" AFF
CLOCK OUTLETS	7'–6" AFF
TV OUTLETS	1'–6" AFF
FIRE ALARM – PULL STATIONS	4'–0" AFF
FIRE ALARM – SPEAKERS, VISUAL UNITS, HORNS	7'–0" AFF
PUSHBUTTONS	4'–0" AFF
DISCONNECT SWITCHES	5'–6" AFF
MOTOR STARTERS	5'–6" AFF
PANELS & CABINETS	6'–0" TO TOP
VOLUME CONTROLS	4'–0" AFF
NURSE CALL STATIONS	4'–0" AFF
DIMMERS	4'–0" AFF
INDIVIDUAL CIRCUIT BREAKERS	5'–6" TO TOP
ACCESS CONTROL DEVICES	4'–0" AFF

MOUNTING HEIGHT NOTES:

1. ALL ELEVATIONS ARE TO CENTER LINE OF DEVICE, UNLESS OTHERWISE NOTED.
2. REFER TO ARCHITECTURAL ELEVATION DRAWINGS FOR COORDINATION WITH CASEWORK.

CIRCUIT MAXIMUM DISTANCE TABLES

NOTES:

1. CIRCUIT MAXIMUM DISTANCE IS BASED ON NEC CHAPTER 9, TABLE 8 CONDUCTOR PROPERTIES FOR COATED COPPER CONDUCTORS AT 75 DEGREES CELSIUS.
2. MAXIMUM CIRCUIT LOAD FOR DISTANCE IS BASED ON NEC 220–10(b)
3. FOR 208V, THREE PHASE MAXIMUM DISTANCE MULTIPLY 480V DISTANCE IN TABLE ABOVE BY 0.43; AND FOR 240V, THREE PHASE MULTIPLY 480V DISTANCE IN TABLE ABOVE BY 0.5.

CIRCUIT SIZING SCHEDULES NOTES:

1. BASED ON THHN/THWN, 90°., 600V., INSULATED, COPPER WIRE APPLIED AT 75° FOR TERMINATIONS RATED AT 60°C/75°C AND 75°C. FOR TERMINATIONS RATED AT 60°C PROVIDE WIRE AND CONDUIT SIZES INDICATED IN PARENTHESIS.
2. BASED ON WIRE OUTSIDE DIAMETERS AND RIGID METALLIC CONDUIT INSIDE DIAMETERS AS PROVIDED IN THE NEC. DO NOT REDUCE CONDUIT SIZE FOR NON–RIGID METALLIC APPLICATION. REFER TO NEC FOR CONDUIT TYPES MORE RESTRICTIVE THAN RIGID METALLIC.
3. BASED ON MOTOR FULL LOAD AMPERES AS PROVIDED BY THE NEC.
4. BASED ON MOTOR RUNNING OVERLOAD PROTECTION PROVIDED BY THERMAL OVERLOAD RELAYS.
5. MOTOR STARTING TYPE BASED ON 460V., 3 PHASE, FULL VOLTAGE NON– REVERSING EXCEPT FOR MOTORS SIZED 75HP OR GREATER WHICH ARE BASED ON 460V., 3 PHASE, PART WINDING REDUCED VOLTAGE STARTING.
6. TRANSFORMER CIRCUITS BASED ON 480V TO 208/120V., 3 PHASE, 4 WIRE, DRY TYPE.
7. PROVIDE THREE PHASE WIRES AND ONE DOUBLE AMPACITY NEUTRAL FOR 110 AMPACITY CIRCUITS AND LESS. PROVIDE THREE PHASE WIRES AND TWO NEUTRAL WIRES, SIZES AS INDICATED FOR 125 AMPACITY CIRCUITS AND GREATER.
8. FOR ALL CONDUITS AND WIRES INSTALLED EXPOSED IN DIRECT SUNLIGHT ON OR ABOVE ROOFTOPS, APPLY THE CORRECTION FACTORS PER NEC 208 TABLE 310.15(B)(2)(c) FOR AMBIENT TEMPERATURE ADJUSTMENTS.

MOTOR CIRCUIT SIZING SCHEDULE
(FOR 460V., 3 PHASE MOTORS) (NOTES 3,4,5)

MOTOR HP	SWITCH/FUSE	CIRCUIT BREAKER	STARTER SIZE/TYPE	CONDUIT & WIRE PHASE	CONDUIT & WIRE E.G.	CONDUIT & WIRE CONDUIT
1/2	30/3A.	3A	1	12	12	3/4"
3/4	30/3A.	6A	1	12	12	3/4"
1	30/6A.	6A	1	12	12	3/4"
1 1/2	30/6A.	10A	1	12	12	3/4"
2	30/6A.	10A	1	12	12	3/4"
3	30/10A.	15A	1	12	12	3/4"
5	30/15A.	20A	1	12	12	3/4"
7 1/2	30/20A.	30A	1	12	10	3/4"
10	30/25A.	35A	1	12	10	3/4"
15	30/30A.	50A	2	10	10	3/4"
20	60/40A.	60A	2	8	10	3/4"
25	60/50A.	75A	2	6	10	1"
30	60/60A.	100A	3	6	10	1"
40	100/80A.	125A	3	4	8	1 1/2"
50	100/100A.	150A	3	3	8	1 1/2"
60	200/125A.	175A	4	1	6	1 1/2"
75	200/150A.	200A	4	1/0	6	1 1/2"
100	200/200A.	225A	4	2/0	6	2"
125	200/200A.	225A	5	3/0	6	2"
150	400/250A.	300A	5	4/0	4	2 1/2"
200	400/350A.	400A	5	350	4	3"

GENERAL NOTES: (APPLY TO ALL ELECTRICAL DRAWINGS)

1. THIS IS A PHASED CONSTRUCTION, COORDINATE WITH GC/CM, OWNER AND ARCHITECT FOR EXACT PHASING SCOPE AND SCHEDULES. ATTEND COORDINATION MEETING WITH OTHER TRADES TO ACCOMMODATE THE PROJECT PHASING. ALL WORK FOR LATER PHASE TO BE INCLUDED AS SEPARATE LINE ITEMS IN THE BIDS.
2. NM CABLES (ROMEX) ARE NOT ALLOWED.
3. FEEDER SIZES NOTED ARE FOR COPPER CONDUCTORS. THE USE OF ALUMINUM CONDUCTORS TO BE APPROVED BY OWNER FOR FEEDERS LARGER THAN 100A.
4. REFER TO ARCHITECTURAL SPECIFICATIONS SECTION 01030 'ALTERNATES' FOR SCHEDULE OF ALTERNATES. COORDINATE ALL DEDUCT AND ADD ALTERNATE WORK REQUIREMENTS WITH ARCHITECT AND OTHER TRADES PRIOR TO BID.
5. COORDINATE WORK WITH ARCHITECTURAL, MECHANICAL, CIVIL, STRUCTURAL AND INTERIOR DESIGN DOCUMENTS.
6. COORDINATE ALL WORK FOR LOW VOLTAGE SYSTEMS: TELECOMM, ACCESS CONTROL, SECURITY, ETC. DEVICES SHOWN ON THESE PLANS ARE FOR REFERENCE ONLY. COORDINATE COMPLETE SCOPE OF WORK FOR THESE SYSTEMS WITH LOW VOLTAGE CONSULTANTS.

ELECTRICAL LEGEND

- POLE MOUNTED LIGHTING FIXTURE
- "A" FIXTURE TYPE
- FLUORESCENT STRIP LIGHTING FIXTURE
- FLUORESCENT LIGHTING FIXTURE
- HALF SHADED LIGHTING FIXTURES WIRED TO THE EMERGENCY GENERATOR – TYPICAL FOR ALL HALF SHADED LIGHTING SYMBOLS
- FULLY SHADED LIGHTING FIXTURES WIRED TO THE EMERGENCY GENERATOR WITH NO LOCAL OR AUTOMATIC LIGHTING CONTROL – NIGHT LIGHTS – TYPICAL FOR ALL SHADED LIGHTING SYMBOLS
- LED LIGHTING FIXTURES
- WALL MOUNTED LIGHTING FIXTURE
- EXIT LIGHTING FIXTURE
- S SINGLE POLE LIGHT SWITCH
- S_2 DOUBLE POLE LIGHT SWITCH
- S_3 THREE WAY LIGHT SWITCH
- S_4 FOUR WAY LIGHT SWITCH
- S_K KEY SWITCH
- S_P SWITCH WITH PILOT LIGHT
- S_T SWITCH WITH TIMER WITH MIN. 1 HOUR SETTING
- DUPLEX RECEPTACLE
- Φ_U DUPLEX RECEPTACLE WITH USB PORT
- QUAD RECEPTACLE
- GFR DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE CONNECTED TO GENERATOR EMERGENCY POWER
- QUAD RECEPTACLE CONNECTED TO GENERATOR EMERGENCY
- GFR DUPLEX RECEPTACLE CONNECTED TO GENERATOR EMERGENCY POWER
- (J) JUNCTION BOX
- (H) HOOD OUTLET
- (R) RANGE OUTLET, 50A/2P, 3W, 125/250V, WITH GROUND (COORDINATE WITH EQUIPMENT PURCHASED)
- (D) DRYER OUTLET, 30A/2P, 3W, 125/250V, WITH GROUND, (COORDINATE WITH EQUIPMENT PURCHASED)
- COMBINATION DATA AND TELEPHONE OUTLET
- TELEPHONE OUTLET
- ∇_{WAP} WIRELESS ACCESS POINT
- FLUSH FLOOR SINGLE–GANG BOX WITH 1 DUPLEX OUTLET – NORMAL OR EMERGENCY, PROVIDE SERVICE FITTINGS WITH ALL TRIM PIECES, FLANGES, COMPONENTS AND ACCESSORIES AS REQUIRED FOR COMPLETE FLUSH INSTALLATION SUITABLE WITH THE FLOOR SURFACE, COORDINATE WITH ARCHITECT FOR FLOOR TYPES AND ALL FINISHES/COLORS. (PROVIDE FIRE RATED POKE THROUGH FOR SECOND FLOOR).
- FLUSH FLOOR SINGLE–GANG BOX WITH 2 DUPLEX OUTLETS – NORMAL OR EMERGENCY, PROVIDE SERVICE FITTINGS WITH ALL TRIM PIECES, FLANGES, COMPONENTS AND ACCESSORIES AS REQUIRED FOR COMPLETE FLUSH INSTALLATION SUITABLE WITH THE FLOOR SURFACE, COORDINATE WITH ARCHITECT FOR FLOOR TYPES AND ALL FINISHES/COLORS. (PROVIDE FIRE RATED POKE THROUGH FOR SECOND FLOOR).
- FLUSH FLOOR THREE–GANG BOX WITH 2 DUPLEX OUTLETS – NORMAL OR EMERGENCY AND VOICE AND DATA, 3/4"C FOR POWER AND 1"C FOR TELECOMM. WIREMOLD OR HUBBELL. (PROVIDE POKE THROUGH FOR SECOND FLOOR).
- FLUSH FLOOR SINGLE–GANG POKE THROUGH WITH 1 DUPLEX OUTLET, PROVIDE SERVICE FITTINGS WITH ALL TRIM PIECES, FLANGES, COMPONENTS AND ACCESSORIES AS REQUIRED FOR COMPLETE FLUSH INSTALLATION SUITABLE WITH THE FLOOR SURFACE, COORDINATE WITH ARCHITECT FOR FLOOR TYPES AND ALL FINISHES/COLORS.
- F_1 MULTI–SERVICE FURNITURE FEED FLUSH FLOOR BOX – TYPE F1 – DUAL CHANNEL FOR POWER AND TELECOMM. TO ELECTRIFIED SYSTEMS FURNITURE, MAKE FINAL CONNECTIONS TO SYSTEMS FURNITURE POWER WHIP. PROVIDE 3/4"C FOR POWER AND 2"C FOR TELECOMM. TO ABOVE ACCESSIBLE CEILING, VERIFY WITH OWNER'S IT REPRESENTATIVE. PROVIDE FINAL CONNECTIONS AND COVERPLATES SUITABLE FOR WHIP CONNECTION. PROVIDE WIREMOLD EVOLUTION SERIES 6AY OR SIMILAR BY HUBBELL, RUN CONDUITS UNDERGROUND TO NEAREST WALL/COLUMN. PROVIDE COVERS AS REQUIRED FOR THE FLOOR TYPES, REFER TO ARCHITECTURAL FINISH PLANS.
- (P) (D) JUNCTION BOX WALL MOUNTED FOR FLEXIBLE CONNECTION TO SYSTEMS (P: POWER, D: DATA). FURNITURE WHIP PROVIDED BY FURNITURE SUPPLIER. PROVIDE 2"C FOR AND 3/4"C FOR POWER TO ABOVE ACCESSIBLE CEILING, VERIFY WITH OWNER'S IT REPRESENTATIVE. COORDINATE LOCATION WITH FURNITURE SYSTEM SUPPLIER. PROVIDE FINAL CONNECTION AND COVERPLATE SUITABLE FOR WHIP CONNECTION.
- TV TELEVISION OUTLET 4–SQUARE BOX – SINGLE GANG, 60" AFF EXCEPT AS NOTED; 1"CONDUIT TO BOX FROM ABOVE SUSPENDED CEILING.
- AV AUDIO/VIDEO OUTLET, 2–GANG BACK BOX WITH 1 1/4"C TO ABOVE ACCESIBLE CEILING, TERMINATE CONDUIT WITH INSULATING BUSHING, PROVIDE PULL STRING
- CEIL CEILING MOUNTED DUPLEX RECEPTACLE, DATA/PHONE AND AV OUTLET
- CEIL CEILING MOUNTED DUPLEX RECEPTACLE
- TIME CLOCK, SINGLE GANG BOX, 48"AFF, 3/4"C. TO BOX FROM ABOVE SUSPENDED CEILING, REQUIRES DUPLEX OUTLET NEARBY FOR POWER
- MANUAL SINGLE PHASE MOTOR STARTER
- THREE PHASE COMBINATION MAGNETIC FUSIBLE MOTOR STARTER
- FUSIBLE DISCONNECT SWITCH
- NON–FUSIBLE DISCONNECT SWITCH
- MOTOR – SINGLE PHASE
- MOTOR – THREE PHASE
- LIGHTING AND/OR RECEPTACLE PANEL
- HOMERUN TO LIGHTING PANEL
- T TRANSFORMER
- C CONTACTOR
- CP CONTROL PANEL
- TS TIME SWITCH
- IC INTERCOM UNIT, PBX–STYLE, FLUSH MOUNTED, PROVIDE 3/4"CONDUIT FROM ACCESSIBLE CEILING AREA TO 4"X4" DEEP BACK BOX.
- TV TV OUTLET
- MUSHROOM TYPE EMERGENCY SHUT–OFF PUSHBUTTON
- SD SMOKE DETECTOR
- HD HEAT DETECTOR
- DSD DUCT SMOKE DETECTOR
- CR CARD READER
- CR_E EGRESS CARD READER
- DH MAGNETIC DOOR HOLDER
- DC DOOR CONTACTS
- F FIRE ALARM PULL STATION
- F FIRE ALARM STROBE
- F FIRE ALARM HORN–STROBE
- F FIRE ALARM HORN/STROBE – CEILING OR PENDANT MOUNTED
- TS TAMPER SWITCH (REFER TO MECHANICAL FOR QUANTITIES)
- FS FLOW SWITCH (REFER TO MECHANICAL FOR QUANTITIES)
- AV AUDIO/VISUAL ALARM
- FACP FIRE ALARM CONTROL PANEL – FLUSH
- FAAP FIRE ALARM ANNUNCIATOR PANEL – FLUSH
- C COMBINATION FIRE/SMOKE DAMPER – WIRE TO 120V CIRCUIT AS INDICATED ON DRAWING.
- SECURITY CAMERA
- H HANDICAP DOOR ACTIVATOR
- PUSH BUTTON STATION
- P PANIC ALARM PUSH BUTTON, TIED TO ALERTING SYSTEM (NURSE CALL AND/OR SECURITY) TO SUMMON HELP
- B DOORBELL
- OS OCCUPANCY SENSOR MULTI–TECHNOLOGY CEILING MOUNTED
- OS OCCUPANCY SENSOR MULTI–TECHNOLOGY WALL MOUNTED WITH LIGHT SWITCH
- OCCUPANCY SENSOR POWER PACK
- X KEY NOTE
- DC DOOR CONTACT
- WD WIRELESS DOORBELL
- WA VIDEO ANALYTICS

HOA	HAND–OFF–AUTOMATIC
UH	UNIT HEATER
EF	EXHAUST FAN
EWC	ELECTRIC WATER COOLER
AFF	ABOVE FINISHED FLOOR
WP	WEATHERPROOF
NEC	NATIONAL ELECTRIC CODE
SD	SERVICE DISCONNECT
GFR	GROUND FAULT CIRCUIT INTERRUPTER
MW	MICROWAVE
GD	GARBAGE DISPOSAL
REF.	REFRIGERATOR
DW	DISHWASHER

LEGEND NOTES:

1. ALL OCCUPANCY SENSORS SHALL HAVE ISOLATED AUXILIARY CONTACTS FOR USE BY MECHANICAL TRADES TO CONTROL MECHANICAL EQUIPMENT.
2. THIS IS STANDARD SYMBOL LIST – SOME OF THESE SYMBOL MAY NOT APPEAR ON DRAWINGS.

ELECTRICAL SHEET INDEX

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KEY PLAN

OWNER

Highland Township Fire Department

PROJECT NAME

Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01–28–2020
90% CD	07–31–2020
100% CONSTRUCTION DOCUMENT	08–27–2020

DRAWN BY
NH

CHECKED BY
EK

APPROVED BY
EK

SHEET NAME

ELECTRICAL LEGEND, SCHEDULES, TABLES AND GENERAL NOTES

SHEET NO.

E0–01

H:\ACAD\FILES\7\57\5811 - Highland Twp FS-2\CAD\ELEC\75811-E0-01.dwg Wed, 26 Aug 2020 - 3:59pm

RISER KEY NOTES:

1. PROVIDE ALL UNUSED SPACE IN MAIN SWITCHBOARDS MDP AND ALL DISTRIBUTION PANELS OP'S FULLY BUSSED FOR FUTURE USE.
2. PROVIDE CONCRETE PAD FOR ALL GROUND AND FLOOR MOUNTED EQUIPMENT: DISTRIBUTION PANELS, TRANSFORMERS, ETC. CONCRETE PADS NOT SPECIFICALLY INDICATED ON PLANS AND RISER DIA. REFER TO SPECIFICATIONS FOR EXACT REQUIREMENTS.
3. PROVIDE LIGHTING CONTROL RELAY PANEL AS REQUIRED TO CONTROL INTERIOR AND EXTERIOR LIGHTING AS SPECIFIED.
4. PROVIDE GROUNDING AND BONDING PER NEC 250. BOND ALL GROUNDING ELECTRODES PRESENT IN THE BUILDING, INCLUDING CONCRETE ENCASED ELECTRODES (REBARS) AND BUILDING STEEL TO THE SYSTEM GROUND.
5. VFD IS PROVIDED WITH EQUIPMENT, PROVIDE COMPLETE INSTALLATION, COORDINATE WITH MECHANICAL FOR EXACT REQUIREMENTS.
6. DISCONNECT SWITCH PROVIDED WITH EQUIPMENT, REFER TO GENERAL NOTE-G THIS SHEET.
7. COORDINATE WITH APPROVED GENERATOR SUBMITTALS FOR EXACT REQUIREMENTS AND PROVIDE SERVICES AS REQUIRED. PROVIDE BRANCH CIRCUITS FROM RP-1B.
8. EXISTING OWNER EQUIPMENT, EXACT REQUIREMENTS TO BE VERIFIED AND PROVIDE COMPLETE ELECTRICAL INSTALLATION INCLUDING FEEDER, OVERCURRENT PROTECTION, DISCONNECT SWITCH, ETC. PER EQUIPMENT NAMEPLATE DATA, INFORMATION INDICATED ON DOCUMENTS IS FOR REFERENCE ONLY.

GENERAL RISER NOTES:

A. REFER TO SHEETS E0.003 FOR WIRE SCHEDULES AND SHEETS E0.004 AND E0.005 FOR PANEL SCHEDULES.

B. REFER TO VOLTAGE DROP SCHEDULE ON SHEET E0.001 AND ADJUST FEEDERS ACCORDINGLY.

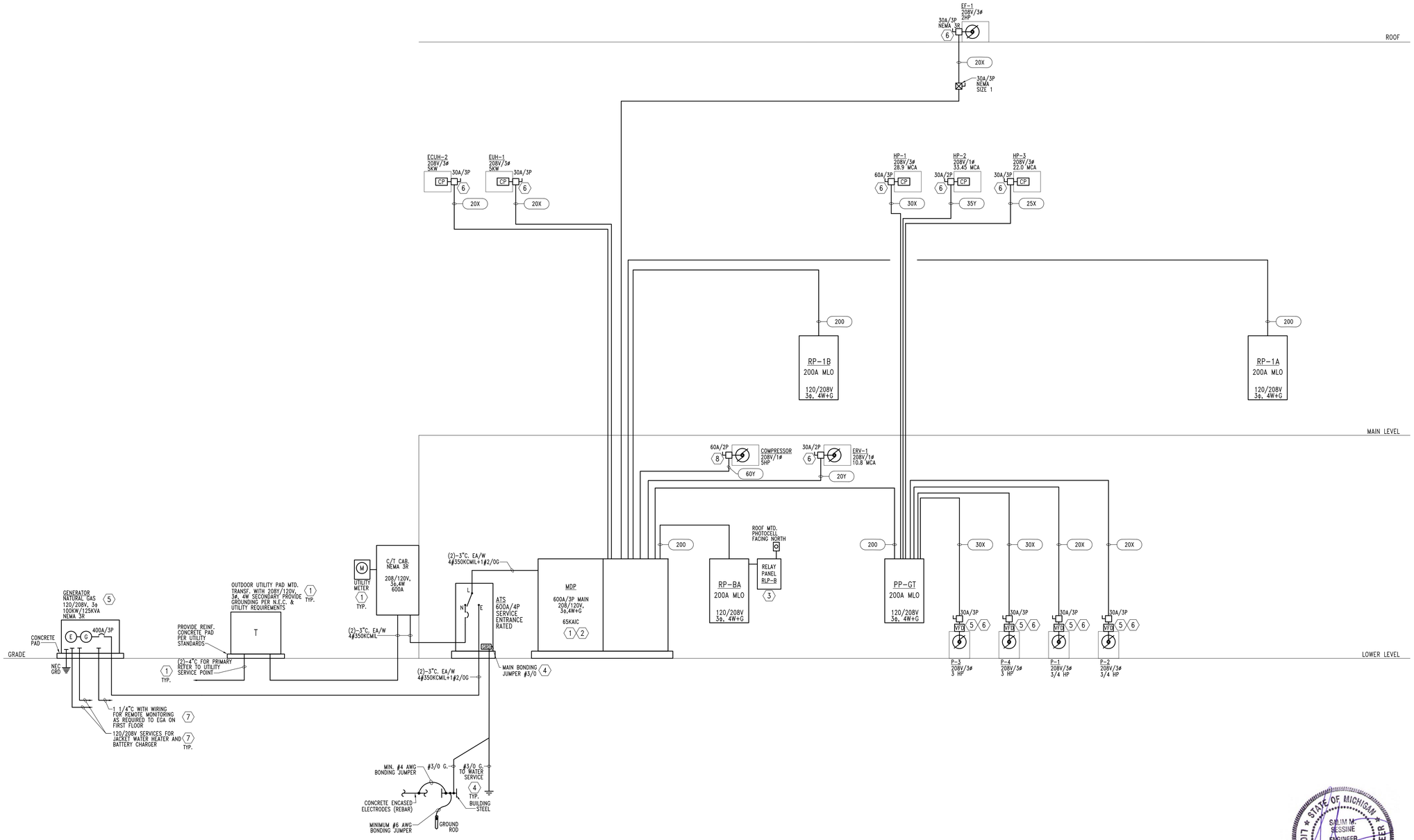
C. RUN ALL UNDERGROUND CONDUITS MIN. 4" UNDER SLAB.

D. NEW ELECTRICAL SERVICE REQUIREMENTS TO BE COORDINATED WITH DTE ENERGY.

E. ALL MOTORS AND EQUIPMENT INDICATED ON THIS RISER DIAGRAM ARE RATED 208V/3ø, UNLESS OTHERWISE NOTED.

F. ALL FLOOR AND GROUND MOUNTED EQUIPMENT (SWITCHBOARDS, DISTRIBUTION PANELS, GENERATOR, CONTROL PANELS ETC.) TO BE PAD MOUNTED, PROVIDE CONCRETE PAD AS REQUIRED PER APPROVED EQUIPMENT SUBMITTAL, COORDINATE WITH ARCHITECT.

G. COORDINATE WITH MECHANICAL FOR DISCONNECT SWITCHES SUPPLIED WITH THE EQUIPMENT, PROVIDE FOR ALL AS INDICATED IF NOT INCLUDED WITH THE EQUIPMENT.



1 / EG02 ELECTRICAL RISER DIAGRAM
Scale: No Scale

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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

DRAWN BY
NH

CHECKED BY
EK

APPROVED BY
EK

SHEET NAME

ELECTRICAL RISER DIAGRAM

SHEET NO.

E0-02

LIGHTING FIXTURE SCHEDULE :

"A" LED RECESSED HIGH LUMEN 2'X4' TROFFER, 2.375" DEEP SHALLOW HOUSING, GRID CEILING MOUNTED, HIGH ANGLE LIGHTING DISTRIBUTION, CURVED LINEAR PRISM CENTER LENS WITH LOW GLARE, 120–277V, 0–10V DIMMING, 32W, 4000LM, 3500K, .
ORACLE #OVHP–LED–4000L–DIM10–MVOLT–35K–85 OR APPROVED EQUAL.

"AE" SAME AS "A" EXCEPT WITH BUILT–IN EMERGENCY BATTERY BACK–UP, MIN. 14W TO PROVIDE 1400LM FOR 90 MINUTES.

"B" NOT USED

"C" LED SURFACE MOUNTED STRIP FIXTURE, (SURFACE MOUNTED ON CEILINGS AND PENDANT MOUNTED IN OPEN CEILING AREAS), 4' LONG SMALL PROFILE, 22 GAUGE CONSTRUCTION WITH WHITE FINISH, 120–277V INPUT VOLTAGE, 35W, 0–10V DIMMING AND 4000LM AT 3500K.
LITHONIA #CDS–L48–MVOLT–DM–35–80CRI–WH OR APPROVED EQUAL.

"CE" SAME AS "C" EXCEPT WITH EMERGENCY BATTERY BACK–UP, MIN. 14W TO PROVIDE 1400LM FOR 90 MINUTES.

"D" LED RECESSED DOWNLIGHT, 6" APERTURE, CLEAR SPECULAR LOW IRIDESCENT ALZAK FINISH REFLECTOR AND WHITE TRIM, 120–277V INPUT VOLTAGE, 0–10V DIMMING CAPABILITY, 20W, 1500 LM WITH 3500°K. FIXTURE IS IC RATED HOUSING.
MAXILUME #HH6LED–1500L–MVOLT–35K–HH6–6501 OR APPROVED EQUAL.

"D1" SAME AS TYPE "D" EXCEPT WET LOCATION SHOWER RATED LIGHTING FIXTURE.

"D2" SAME AS TYPE "D" EXCEPT 46W, 4000 LM.

"DE" SAME AS TYPE "D" WITH BUILT–IN EMERGENCY BATTERY BACK–UP, MIN. 10W TO PROVIDE 1000LM FOR 90 MINUTES.

"EA" LED EMERGENCY WALL MOUNTED BATTERY LIGHTING UNIT, 12V NI–CAD BATTERY WITH (2)–6W LED LAMPS, WHITE FINISH.
LIGHTALARMS OR APPROVED EQUAL.

"F" NOT USED.

"G" NOT USED.

"H" LED HIGH BAY FIXTURE, UL WET LOCATION LISTED AND DLC QUALIFIED, 13" DIAMETER, BLACK FINISH, CLEAR LENS, 19000 LUMENS, 4000°K, 150W, UNIVERSAL VOLTAGE DRIVER, 0–10V DIMMING.
ORACLE #ORHB1–LED–19000L–MVOLT–40K–WD–BK OR APPROVED EQUAL.

"I" NOT USED.

"J" LED WALL MOUNTED AT 16'AFF OR AS DIRECTED BY ARCHITECT, LUMINAIRE, WET LOCATION LISTED, ALUMINUM HOUSING, GOOSENECK MOUNTING STYLE, FINISHED SELECTED BY ARCHITECT/OWNER, 120V 0–10V DIMMING, 24W 3000LM.
MBVA14–M024LDD–W–41–UNV SERIES OR APPROVED EQUAL

"K" NOT USED.

"LE" LED WALL MOUNTED LUMINAIRE, WET LOCATION LISTED, ALUMINUM HOUSING, ALUMINUM DOOR FRAME WITH FLAT CLEAR POLYCARBONATE LENS, FULLY GASKETED, SHARP CUT–OFF WITH MEDIUM THROW DISTRIBUTION, 120V ELECTRONIC BALLAST, 42W TRT LAMP, BUILT–IN PHOTOCELL AND EMERGENCY BALLAST, BRONZE FINISH, MOUNT AT 10'–0" AFF OR AS DIRECTED BY ARCHITECT.
LITHONIA #WST–LED–P2–40K–VF–MVOLT–PE–E7WH–DDBXD OR APPROVED EQUAL.

"M" NOT USED.

"N" LED UNDER CABINET LIGHTING FIXTURE, 9", 18", 24, 36", 48" LONG, PROVIDE FOR CONTINUOUS ROW AS INDICATED ON PLANS, FROSTED LENS, ALUMINUM FRAME 120–277V. HPF ELECTRONIC DIMMING DRIVER, MAX. 7W/FT, 330LM/FT.
HALO HU10 #HU1024D930P OR APPROVED EQUAL.

"X" LED EXIT SIGN, SINGLE FACE, POLYCARBONATE HOUSING CONSTRUCTION, UNIVERSAL DIRECTIONAL ARROW KNOCKOUTS, FULLY OVERLAPPING LIGHT SEAL 6" HIGH RED LETTERS 25 YEAR LIFE LED LAMPS, 277 VOLT INPUT, 6 VOLT SEALED MAINTENANCE–FREE BATTERY 90 MINUTE DISCHARGE, 24 HOUR RECHARGE.
LIGHTALARMS #QLXNS00–R OR APPROVED EQUAL.

"X1" SAME AS "X" EXCEPT COMBO UNIT WITH (2)–SIDE MOUNTED HEADS AND 24W EXTRA BATTERY REMOTE CAPACITY.
LIGHTALARMS #GR624M–R–U–2–LD1 OR APPROVED EQUAL.

LIGHTING CONTROL MATRIX SCHEDULE

LIGHTING CONTROL TAG	ROOM/SPACE TYPE	CONTROLS	AUTOMATIC LIGHTING CONTROL	LOCAL CONTROL	MANUAL ON	PARTIAL AUTO ON	BI–LEVEL	DAYLIGHT		AUTOMATIC PARTIAL OFF (IF APPLIES)	AUTOMATIC FULL OFF	SCHEDULED FULL OFF	NOTES
								SIDE LIGHT	TOP LIGHT				
BASED ON ASHRAE 90.1–2013 TABLE 9.6.1 – CONTROL FUNCTIONS				a	b	c	d	e	f	g	h	i	
LC1	COMMONITY/ KITCHEN/ LAUNDRY/ OFFICE	LOCAL/OS/ DIM	OCCUPANCY SENSOR	YES	YES		YES	*		NO	YES		* DAYLIGHT SENSORS AS REQUIRED
LC2	FITNESS ROOM/ LIBRARY/ COMPUTER ROOM	LOCAL/OS/ DIM	OCCUPANCY SENSOR	YES	YES		YES	*		NO	YES		* DAYLIGHT SENSORS AS REQUIRED
LC3	CORRIDOR	LOCAL	RELAY PANEL TIMER (TIME CLOCK)	YES	NO	NO	NO			YES		YES	REMOTE LOCAL CONTROLS FOR THE SAFETY OF THE RESIDENTS.
LC4	STAIRS	PARTIAL DIM	OCCUPANCY SENSOR	YES	NO	NO	YES			YES	NO		OCC. SENSOR TO DIMM STAIR LIGHTING FIXTURES TO 50%
LC5	UTILITY ROOM (ELEC./MECH./IT)	LOCAL	NONE	YES	YES	NO	NO			NO	NO	NO	
LC6	STORAGE/ EQUIPMENT ROOM	LOCAL/OS	OCCUPANCY SENSOR	YES	YES		NO			NO	YES		
LC7	LOBBY/ RECEPTION/ SEATING	LOCAL/DIM	RELAY PANEL TIMER (TIME CLOCK)	YES	NO	NO	NO	*		NO		YES	* DAYLIGHT SENSORS AS REQUIRED
LC8	RESTROOM/TRASH ROOM	LOCAL/OS	OCCUPANCY SENSOR	YES	NO	NO	NO			NO	YES		

LIGHTING CONTROL NOTES:

1. CONTRACTOR TO PROVIDE MOTION SENSORS, DAYLIGHT SENSORS, ROOM CONTROLLERS, AND ACCESSORIES AS REQUIRED FOR A FULLY OPERATIONAL INSTALLATION PER 2015 MICHIGAN ENERGY CODE. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO REVIEW MANUFACTURER'S INSTALLATION INSTRUCTIONS PRIOR TO ROUGH–IN. PROVIDE ADDITIONAL ROOM CONTROLLERS/POWER PACKS AND ASSOCIATED WIRING FOR MULTIPLE SWITCH LEG LOCATIONS. SEE PLANS FOR EXACT SWITCH LEGS WITH–IN EACH AREA OR ROOM. ELECTRICAL CONTRACTOR SHALL PROVIDE LIGHTING CONTROL MANUFACTURER'S DEVICE LAYOUT AS PART OF SHOP DRAWINGS SUBMITTALS.
2. ELECTRICAL CONTRACTOR IS TO INCLUDE THE SCOPE OF A LIGHTING CONTROLS DESIGNER/INSTALLER AS SUBCONTRACTOR TO ELECTRICAL CONTRACTOR TO PROVIDE FINAL DESIGN, DOCUMENTATION, PROGRAMMING, AND INSTALLATION OF THE LIGHTING CONTROLS. CONTRACT DOCUMENTS INCLUDE INTENDED FUNCTIONALITY ONLY.
3. TO PREVENT FALSE ACTIVATION, MOUNT CEILING MOUNT SENSORS AWAY FROM DIFFUSERS AND THE PATH OF STRONG AIR TURBULENCE A MINIMUM OF FOUR FEET FOR STANDARD SENSITIVITY AND SIX FEET FOR MAXIMUM SENSITIVITY.
4. LOCATE AND AIM SENSORS IN THE CORRECT LOCATION REQUIRED FOR COMPLETE AND PROPER VOLUMETRIC COVERAGE WITHIN THE RANGE OF COVERAGE(S) OF CONTROLLED AREAS PER THE MANUFACTURER'S RECOMMENDATIONS. ROOMS SHALL HAVE ONE HUNDRED (100%) PERCENT COVERAGE TO COMPLETELY COVER THE CONTROLLED AREA TO ACCOMMODATE ALL OCCUPANCY HABITS OF SINGLE OR MULTIPLE OCCUPANTS AT ANY LOCATION WITHIN THE ROOM(S).
5. PROVIDE THE QUANTITY OF ROOM CONTROLLERS AND POWER PACKS NEEDED TO CONTROL SWITCH LEGS AND VOLTAGES INDICATED.
6. UNLESS OTHERWISE INDICATED, ADJUST MOTION SENSOR TIME TO TURN OFF CONTROLLED LIGHTING AFTER 20 MINUTES.
7. INCLUDE TESTING BY AN INDEPENDENT THIRD PARTY TESTING AGENCY OR INDEPENDENT COMMISSIONING AGENT AS REQUIRED BY THE MICHIGAN ENERGY CODE (ASHRAE 90.1–2013). TEST, CERTIFY AND PROVIDE DOCUMENTATION OF LIGHTING CONTROL DEVICES AND CONTROL SYSTEMS TO ENSURE THAT CONTROL HARDWARE AND SOFTWARE ARE CALIBRATED, ADJUSTED, PROGRAMMED AND IN PROPER WORKING CONDITION IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS, THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND ANSI/ASHRAE/IES STANDARD 90.1–2013, SECTION 9.4.3 FUNCTION TESTING).
8. PROVIDE DAY LIGHT SENSORS WHERE LIGHTING FIXTURES FALL WITHIN TOP/SIDE LIGHTED AREAS FOR BOTH PRIMARY AND SECONDARY ZONES AS DEFINED BY ASHRAE 90.1–2013, SECTION 9.4.1.1–a AND SECTION 9.4.1.1–f.
9. INTEGRATE CONTROLS FOR UNDERCABINET LIGHTING TO PROVIDE AS MANUAL ON/AUTOMATIC OFF BY SAME SENSOR(S) SERVING GENERAL LIGHTING IN SPACE/ROOM.
10. IN ROOMS WITH PARTIAL ON CONTROL, PROGRAM ASSOCIATED SWITCH FOR FULL ON AND MANUAL OFF IN ADDITION TO AUTOMATIC OFF VIA OCCUPANCY SENSOR.
11. FOR AUTOMATIC DAYLIGHT RESPONSIVE CONTROLS SET DAYLIGHT SENSOR TO MAINTAIN THE SAME LIGHTING LEVELS AS THE LEVELS OUTSIDE THE DAYLIGHT AREA.

CONDUIT & WIRE SCHEDULE
(600V & BELOW)

3-WIRE SYSTEM			4-WIRE SYSTEM		
WIRE TAG	CU/AL	CONDUIT & WIRE	WIRE TAG	CU/AL	CONDUIT & WIRE
20X	CU	3/4"C. 3#12 + 1#12G.	20	CU	3/4"C. 4#12 + 1#12G.
25X	CU	3/4"C. 3#10 + 1#10G.	25	CU	3/4"C. 4#10 + 1#10G.
30X	CU	3/4"C. 3#10 + 1#10G.	30	CU	3/4"C. 4#10 + 1#10G.
35X	CU	3/4"C. 3#8 + 1#10G.	35	CU	3/4"C. 4#8 + 1#10G.
40X	CU	3/4"C. 3#8 + 1#10G.	40	CU	3/4"C. 4#8 + 1#10G.
50X	CU	1"C. 3#6 + 1#10G.	50	CU	1"C. 3#6 + 1#10G.
55X	CU	3/4"C. 3#6 + 1#10G.	55	CU	3/4"C. 4#6 + 1#10G.
60X	CU	1 1/4"C. 3#4 + 1#10G.	60	CU	1 1/4"C. 4#4 + 1#10G.
70X	CU	1 1/4"C. 3#4 + 1#8G.	70	CU	1 1/4"C. 4#4 + 1#8G.
85X	CU	1 1/4"C. 3#3 + 1#8G.	85	CU	1 1/4"C. 4#3 + 1#8G.
100X	CU	1 1/4"C. 3#2 + 1#8G.	100	CU	1 1/4"C. 4#2 + 1#8G.
	AL	2"C. 3#1/0 + 1#6G.		AL	2"C. 4#1/0 + 1#6G.
110X	CU	1 1/2"C. 3#1 + 1#6G.	110	CU	1 1/2"C. 4#1 + 1#6G.
	AL	2"C. 3#10 + 1#4G.		AL	2"C. 4#10 + 1#4G.
125X	CU	2"C. 3#1/0 + 1#6G.	125	CU	2"C. 4#1/0 + 1#6G.
	AL	2"C. 3#2/0 + 1#4G.		AL	2"C. 4#2/0 + 1#4G.
150X	CU	2"C. 3#1/0 + 1#6G.	150	CU	2"C. 4#1/0 + 1#6G.
	AL	2"C. 3#3/0 + 1#4G.		AL	2"C. 4#3/0 + 1#4G.
175X	CU	2"C. 3#2/0 + 1#6G.	175	CU	2"C. 4#2/0 + 1#6G.
	AL	2 1/2"C. 3#4/0 + 1#4G.		AL	2 1/2"C. 4#4/0 + 1#4G.
200X	CU	2"C. 3#3/0 + 1#6G.	200	CU	2"C. 4#3/0 + 1#6G.
	AL	3"C. 3#250KCMIL + 1#4G.		AL	3"C. 4#250KCMIL + 1#4G.
225X	CU	2 1/2"C. 3#4/0 + 1#4G.	225	CU	2 1/2"C. 4#4/0 + 1#4G.
	AL	3"C. 3#300KCMIL + 1#2G.		AL	3"C. 4#300KCMIL + 1#2G.
250X	CU	3"C. 3#250KCMIL + 1#4G.	250	CU	3"C. 4#250KCMIL + 1#4G.
	AL	3"C. 3#350KCMIL + 1#2G.		AL	3"C. 4#350KCMIL + 1#2G.
300X	CU	3"C. 3#350KCMIL + 1#4G.	300	CU	3"C. 4#350KCMIL + 1#4G.
	AL	4"C. 3#500KCMIL + 1#2G.		AL	4"C. 4#500KCMIL + 1#2G.
350X	CU	4"C. 3#500KCMIL + 1#3G.	350	CU	4"C. 4#500KCMIL + 1#3G.
	AL	(2) 2 1/2"C. EA/W 3#4/0 + 1#1G.		AL	(2) 2 1/2"C. EA/W 4#4/0 + 1#1G.
400X	CU	4"C. 3#600KCMIL + 1#3G.	400	CU	4"C. 4#600KCMIL + 1#3G.
	AL	(2) 3"C. EA/W 3#250KCMIL + 1#1G.		AL	(2) 3"C. EA/W 4#250KCMIL + 1#1G.
450X	CU	(2) 2 1/2"C. EA/W 3#4/0 + 1#2G.	450	CU	(2) 2 1/2"C. EA/W 4#4/0 + 1#2G.
	AL	(2) 3"C. EA/W 3#300KCMIL + 1#1/0G.		AL	(2) 3"C. EA/W 4#300KCMIL + 1#1/0G.
500X	CU	(2) 3"C. EA/W 3#250KCMIL + 1#2G.	500	CU	(2) 3"C. EA/W 4#250KCMIL + 1#2G.
	AL	(2) 3"C. EA/W 3#350KCMIL + 1#1/0G.		AL	(2) 3"C. EA/W 4#350KCMIL + 1#1/0G.
600X	CU	(2) 3"C. EA/W 3#350KCMIL + 1#1G.	600	CU	(2) 3"C. EA/W 4#350KCMIL + 1#1G.
	AL	(2) 4"C. EA/W 3#500KCMIL + 1#2/0G.		AL	(2) 4"C. EA/W 4#500KCMIL + 1#2/0G.
700X	CU	(2) 4"C. EA/W 3#500KCMIL + 1#1/0G.	700	CU	(2) 4"C. EA/W 4#500KCMIL + 1#1/0G.
	AL	(3) 3"C. EA/W 3#350KCMIL + 1#3/0G.		AL	(3) 3"C. EA/W 4#350KCMIL + 1#3/0G.
800X	CU	(2) 4"C. EA/W 3#600KCMIL + 1#1/0G.	800	CU	(2) 4"C. EA/W 4#600KCMIL + 1#1/0G.
	AL	(3) 4"C. EA/W 3#500KCMIL + 1#3/0G.		AL	(3) 4"C. EA/W 4#500KCMIL + 1#3/0G.
1000X	CU	(3) 3"C. EA/W 3#400KCMIL + 1#2/0G.	1000	CU	(3) 3"C. EA/W 4#400KCMIL + 1#2/0G.
	AL	(3) 4"C. EA/W 3#600KCMIL + 1#4/0G.		AL	(3) 4"C. EA/W 4#600KCMIL + 1#4/0G.
1200X	CU	(3) 4"C. EA/W 3#600KCMIL + 1#3/0G.	1200	CU	(3) 4"C. EA/W 4#600KCMIL + 1#3/0G.
	AL	(4) 4"C. EA/W 3#500KCMIL + 1#250KCMIL G.		AL	(4) 4"C. EA/W 4#500KCMIL + 1#250KCMIL G.
1600X	CU	(4) 4"C. EA/W 3#600KCMIL + 1#4/0G.	1600	CU	(4) 4"C. EA/W 4#600KCMIL + 1#4/0G.
	AL	(5) 4"C. EA/W 3#600KCMIL + 1#350KCMIL G.		AL	(5) 4"C. EA/W 4#600KCMIL + 1#350KCMIL G.

GENERAL WIRING NOTES:

1. FOR 2–WIRE SYSTEMS USE Y AS SUFFIX, SIMILAR TO X FOR THE 3–WIRE SYSTEM.
2. THE USE OF ALUMINUM WIRES HAVE TO BE APPROVED BY THE ENGINEER AND OWNER PRIOR TO BID, NO ALUMINUM WIRES ALLOWED FOR 100A AND LESS.

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

H:\ACAD\FILES\75\75811 - Highland Twp FS–2\CAD\ELEC\75811-E0-03.dwg Wed, 26 Aug 2020 - 3:59pm

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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01–28–2020
90% CD	07–31–2020
100% CONSTRUCTION DOCUMENT	08–27–2020

DRAWN BY
NH

CHECKED BY
EK

APPROVED BY
EK

SHEET NAME

WIRE AND LIGHTING FIXTURE SCHEDULES AND CONTROL MATRIX

SHEET NO.

E0–03

MAIN DISTRIBUTION PANEL MDP 120/208V, 3PH,4W+G, 600A/3P MAIN					
POSITION	CIRCUIT BREAKER		EQUIPMENT	CONNECTED LOAD (KVA)	DEMAND LOAD (KVA)	FEEDER SIZE (COPPER) (SEE RISER FOR AL)
	FRAME	TRIP				
1	200A/3P	200 A	PP-GT	33.1	24.8	2"C, 4#3/0 + 1#6G
2	200A/3P	200 A	RP-1A	51.5	40.3	2"C, 4#3/0 + 1#6G
3	200A/3P	200 A	RP-1B	42.5	34.5	2"C, 4#3/0 + 1#6G
4	200A/3P	200 A	RP-BA	15.6	13.1	2"C, 4#3/0 + 1#6G
5	30A/3P	20 A	EUH-1 5.0KW	5.0	4.0	3/4"C, 3#12 + 1#12G
6	30A/3P	20 A	SPARE		0.0	3/4"C, 3#12 + 1#12G
8	30A/2P	15 A	ERV-1 10.8 MCA	1.9	1.5	3/4"C, 3#12 + 1#12G
9	60A/3P	35 A	SPARE	0.0	0.0	3/4"C, 3#8 + 1#10G
10	30A/3P	20 A	ECUH-2 13.9 A	5.0	4.0	3/4"C, 3#12 + 1#12G
10	60A/2P	60 A	COMPRESSOR	15.0	12.0	1 1/4"C, 2#4 + 1#10G
11	30A/3P	20 A	SPARE			
12	30A/3P	30 A	SPARE			
13	60A/3P	60 A	SPARE			
14	60A/2P	60 A	SPARE			
15	3P		SPACE			
16	3P		SPACE			
17	3P		SPACE			
18	3P		SPACE			
			TOTAL DEMAND LOAD:	170 KVA 471 A	134 KVA 373 A	

PROJECT: **HIGHLAND TWP FS-2** **100A** **MLO** CLASS: **120/208V,3PH,4W+G.** PANEL:
PROJ NO: **75811** DATE: **08/26/20** MOUNTING: **SURF.** **RP-BA**

BRANCH CIRC.						CODE			REMARKS
NO.	POLES	BKR.	BUS A	BUS B	BUS C	L	R	E	
1	1	20	50			L			LIGHTING VIA RLP & PC
3	1	20		350		L			LIGHTING
5	1	20			200			E	CARD READER
7	1	20	1000					E	TBB
9	1	20		1000				E	TBB
11	1	20			540		R		3 REC.
13	1	20	540				R		3 REC.
15	1	20		1000				E	DOOR OPERATOR
17	1	20			400			E	FS, TS & A/V
19	1	20	864					E	SP-1
21	1	20							SPARE
23	1	20			1200			E	B-1
25									SHUNT TRIP
27	1	20		360				E	GUH-2 & 3
29	1	20			150			E	GUH-4
31	1	20							SPARE
33	1	20							SPARE
35	1	20							SPARE
37	1	20							SPARE
39	1	20							SPARE
41	1	20							SPARE
43	1	20							SPARE
45	1	20							SPARE
47	1	20							SPARE
49	1	20							SPARE
51	1	20							SPARE
53	1	20							SPARE
55	1	20							SPARE
57	1	20							SPARE
59	1	20							SPARE
2	1	20	720				R		4 REC.
4	1	20		540			R		3 REC.
6	1	20			540		R		3 REC.
8	1	20	800					E	MONITOR
10	1	20		400				E	FACP
12	1	20			100			E	GWH-1
14	1	20	600					E	IRH-1
16	1	20		600				E	IRH-2
18	1	20			600			E	IRH-3
20	1	20	600					E	IRH-4
22	1	20		600				E	IRH-5
24	1	20			600			E	IRH-6
26	1	20	600					E	IRH-7
28	1	20		600				E	IRH-8
30	1	20							SPARE
32	1	20							SPARE
34	1	20							SPARE
36	1	20							SPARE
38	1	20							SPARE
40	1	20							SPARE
42	1	20							SPARE
44	1	20							SPARE
46	1	20							SPARE
48	1	20							SPARE
50	1	20							SPARE
52	1	20							SPARE
54	1	20							SPARE
56	1	20							SPARE
58	1	20							SPARE
60	1	20							SPARE

LIGHTING LOAD	50	350		400 VA	NEC 220.42	=	400 VA
RECEPTACLE LOAD	1,260	540	1,080	2880 VA	NEC 220.44	=	2880 VA
EQUIPMENT LOAD	4,464	4,560	3,250	12274 VA	80%	=	9819 VA
						=	
TOTAL LOAD	5,774	5,450	4,330	15554 VA		=	13099 VA
				43 A			36 A
				CONNECTED LOAD			DEMAND LOAD

PROJECT: **HIGHLAND TWP FS-2** **200A** **MLO** CLASS: **208/120V,3PH,4W+G.** PANEL:
PROJ NO: **75811** DATE: **08/26/20** MOUNTING: **FLUSH** **RP-1B**

BRANCH CIRC.				VA		CODE			REMARKS
NO.	POLES	BKR.	BUS A	BUS B	BUS C	L	R	E	
1	1	20	750			L			LIGHTING
3	1	20		750		L			LIGHTING
5	1	20			200			E	FANS
7	1	20	234			L			LIGHTING VIA RLP
9	1	20		160		L			LIGHTING
11	1	20			300	L			TRAFFIC LIGHTS
13	1	20	1000			L			REC. FOR SIGN VIA RLP
15	1	20		750				E	ECUH-3
17	1	20			1200				SPARE
19	1	20	720				R		4 REC.
21	1	20		540			R		REC.
23	1	20			1200			E	DOOR OPERATOR
25	1	20	400				R		2 REC.
27	1	20		400			R		REC.
29	1	20			400		R		REC.
31	1	20	1000					E	WASHER GFCI
33	2			2500				E	DRYER
35		30			2500			E	
37	1	20							SPARE
39	1	20							SPARE
41	1	20							SPARE
43	1	20	540				R		3 REC.
45	1	20		720			R		4 REC.
47	1	20			720		R		4 REC.
49	1	20	720				R		4 REC.
51	1	20		800			R		REC.
53	1	20			200			E	CO/NO2 SENSOR
55	1	20							SPARE
57	1	20		400				E	PA SYSTEM
59	1	20			400			E	RADIO SYSTEM
61	1	20	400				R		RECEPTACLE
63	1	20							SPARE
65	1	20							SPARE
67	1								SPACE
69	1								SPACE
71	1								SPACE
73	1								SPACE
75	1								SPACE
77	1								SPACE
79	1								SPACE
81	1								SPACE
83	1								SPACE
2	1	20	1000					E	O.H. DOOR
4	1	20		1000				E	O.H. DOOR
6	1	20			1000			E	O.H. DOOR
8	1	20	400					E	CEILING J-BOX
10	1	20		400				E	CEILING J-BOX
12	1	20			720		R		4 REC.
14	3		400					E	
16				400				E	CEILING J-BOX
18		30			400			E	
20	3		400					E	
22				400				E	CEILING J-BOX
24		30			400			E	
26	1	20	1000					E	O.H. DOOR
28	1	20		1000				E	O.H. DOOR
30	1	20			1000			E	O.H. DOOR
32	1	20	400					E	CEILING J-BOX
34	1	20		400				E	CEILING J-BOX
36	1	20			720		R		4 REC.
38	3		400					E	
40				400				E	CEILING J-BOX
42		30			400			E	
44	3		400					E	
46				400				E	CEILING J-BOX
48		30			400			E	
50	1	20	1560					E	ENGINE EXHAUST
52	1	20		1560				E	ENGINE EXHAUST
54	1	20			1560			E	ENGINE EXHAUST
56	1	20	1560					E	ENGINE EXHAUST
58	1	20		1560				E	ENGINE EXHAUST
60	1	20			1560			E	ENGINE EXHAUST
62	1	20	100					E	GUH-1
64	1	20		528				E	EF-3
66	1	20							SPARE
68	1	20							SPARE
70	1	20							SPARE
72	1	20							SPARE
74	1								SPACE
76	1								SPACE
78	1								SPACE
80	1								SPACE
82	1								SPACE
84	1								SPACE

LIGHTING LOAD	1,984	910	300	3194 VA	NEC 220.42		3068 VA
REC. LOAD	2,780	2,460	2,560	7800 VA	NEC 220.44	=	7800 VA
EQUIPMENT	8,620	11,698	11,220	31538 VA	75%	=	23654 VA
TOTAL LOAD	13,384	15,068	14,080	42532 VA		=	34521 VA
				118 A			96 A
				CONNECTED LOAD			DEMAND LOAD

PROJECT: **HIGHLAND TWP FS-2** **200A** **MLO** CLASS: **208/120V,3PH,4W+G.** PANEL:
PROJ NO: **75811** DATE: **08/26/20** MOUNTING: **FLUSH** **RP-1A**

BRANCH CIRC.				VA		CODE			REMARKS
NO.	POLES	BKR.	BUS A	BUS B	BUS C	L	R	E	
1	1	20	412						LIGHTING VIA RLP
3	1	20		168		L			LIGHTING VIA RLP & PC
5	1	20			299	L			LIGHTING
7	1	20	490			L			EXTERIOR LIGHTING
9	1	20		1200		L			SIGN VIA RLP
11	2				410	L			EXTERIOR LIGHTING VIA RLP
13		20	410			L			
15	1	20		192		L			EXTERIOR LIGHTING VIA RLP
17	1	20			50			E	GUH-5
19	1	20							SPARE
21	1	20							SPARE
23	1	20			720		R		4 REC.
25	1	20	500					E	CARD READER
27	1	20		400			R		REC.
29	1	20			900		R		5 REC.
31	1	20	400				R		REC.
33	1	20		360			R		MONITOR
35	1	20			400		R		REC.
37	1	20	720				R		4 REC.
39	1	20		900			R		5 REC.
41	1	20			900			E	WASHER GFCI
43	2		2500					E	DRYER
45		30		2500				E	
47	1	20							SPARE
49	1	20							SPARE
51	1	20							SPARE
53	1	20			540		R		3 REC.
55	1	20	540				R		3 REC.
57	1	20		360			R		2 REC.
59	1	20			1000			E	DOOR OPERATOR
61	2		1000					E	EBB-1
63		20		1000				E	
65	1	20			400		R		OUTDOOR WP/GFR REC.
67	1	20							SPARE
69	1	20							SPARE
71	1	20							SPARE
73	1								SPACE
75	1								SPACE
77	1								SPACE
79	1								SPACE
81	1								SPACE
83	1								SPACE
2	1	20	400				R		2 WP REC.
4	1	20		1200			R		REC.S
6	1	20			540		R		3 REC.
8	1	20	360				R		2 REC.
10	1	20		720			R		4 REC.
12	1	20			1000			E	EWC GFCI
14	1	20	900				R		4 REC.
16	1	20		720			R		4 REC.
18	1	20			900		R		5 REC.
20	1	20	600					E	MONITOR
22	1	20		540			R		3 REC.
24	1	20			540		R		3 REC.
26	1	20	540				R		3 REC.
28	1	20		540			R		3 REC.
30	1	20			540		R		3 REC.
32	1	20							SPARE
34	1	20		1000				E	MW
36	1	20			1200			E	GD
38	1	20	1000					E	DW
40	1	20		1000				E	MW
42	1	20			900			E	REC.
44	1	20	900					E	REC.
46	1	20		900				E	REF. GFCI
48	1	20			900			E	REF. GFCI
50	3		2667					E	
52				2667				E	RANGE
54		50			2667			E	
56	1	20	900					E	HOOD
58	1	20		400				E	COMBINATION FIRE/SMOKE DAMPER
60	1	20			200			E	RANGE GAS SHUT-OFF
62	2		1500					E	ECUH-1
64		20		1500				E	
66		1	20						SPARE
68	1	20							SPARE
70	1	20							SPARE
72	1	20							SPARE
74	1	20							SPARE
76	1	20							SPARE
78	1	20							SPACE
80	1								SPACE
82	1								SPACE
84	1								SPACE

LIGHTING LOAD	1,312	1,560	709	3580 VA	NEC 220.42		3203 VA
REC. LOAD	3,860	5,740	5,480	15080 VA	NEC 220.44	=	12540 VA
EQUIPMENT	11,567	10,967	8,817	31350 VA	75%		23513 VA
TOTAL LOAD	16,738	18,267	15,005	50010 VA		=	39256 VA
				139 A			109 A
				CONNECTED LOAD			DEMAND LOAD

PROJECT: **HIGHLAND TWP FS-2** **200A** **MLO** CLASS: **208/120V,3PH,4W+G.** PANEL:
PROJ NO: **75811** DATE: **08/26/20** MOUNTING: **SURFACE** **PP-GT**

BRANCH CIRC.				VA		CODE			REMARKS
NO.	POLES	BKR.	BUS A	BUS B	BUS C	L	R	E	
1	3		2948					E	
3				2948				E	HP-1 28.9 MCA
5		30			2948			E	
7	3		3479					E	HP-2 33.5 MCA
9		35		3479				E	
11	1								SPACE
13	3		2244					E	
15				2244				E	HP-3 22.0 MCA
17		25			2244			E	
19	1	20							SPARE
21	1	20							SPARE
23	1	20							SPARE
25	1	20							SPARE
27	1	20							SPARE
29	1	20							SPARE
31	1	20							SPARE
33	1	20							SPARE
35	1	20							SPARE
37	1								SPACE
39	1								SPACE
41	1								SPACE
2	3		1320					E	
4				1320				E	P-3 3 HP
6		20			1320			E	
8	3		1320					E	
10				1320				E	P-4 3 HP
12		20			1320			E	
14	3		444					E	
16				444				E	P-1 3/4 HP
18		20			444			E	
20	3		444					E	
22				444				E	P-2 3/4 HP
24		20			444			E	
26	1	20							SPARE
28	1	20							SPARE
30	1	20							SPARE
32	1	20							SPARE
34	1	20							SPARE
36	1	20							SPARE
38	1								SPACE
40	1								SPACE
42	1								SPACE

LIGHTING LOAD					NEC 220.42		
REC. LOAD					NEC 220.44	=	
EQUIPMENT	12,199	12,199	8,720	33117 VA	75%	=	24838 VA
TOTAL LOAD	12,199	12,199	8,720	33117 VA		=	24838 VA
				92 A			69 A
				CONNECTED LOAD			DEMAND LOAD

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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

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NH

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APPROVED BY
EK

SHEET NAME

ELECTRICAL PANEL SCHEDULES

SHEET NO.

E0-04

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

Schedule								
Symbol	Label	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Lumens Per Lamp	VOLT
	"SA"	ANP LIGHTING	BVA2401-P117LD4-T3-4 SERIES MVOLT	DECORATIVE POLE-POST MOUNTS: FINISH AND POLE/POST TO BE SELECTED BY ARCHITECT	117W LED	1	13,707LM	MVOLT 120-277V
	"SA1"	ANP LIGHTING	BVA2401-P117LD4-T3-4 SERIES MVOLT TWIN MOUNTED AT 90°	SAME AS TYPE "SA" EXCEPT TWIN UNIT WITH TWO LUMINAIRES	(2)-117W LED	2	13,707LM	MVOLT 120-277V
	"SB"	HYDREL	TPS2 SERIES	OUTDOOR ARCHITECTURA LJ-BOX MOUNTED FLOOD LIGHT, SPOT DISTRIBUTION	64W LED	1	4,100LM	MVOLT 120-277V

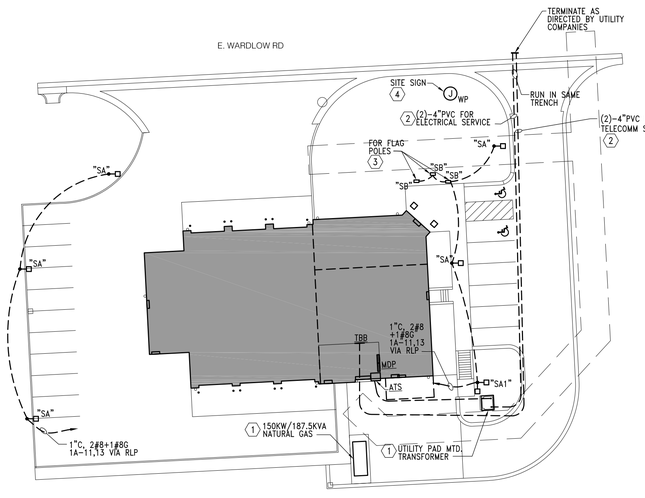
GENERAL SITE PLAN NOTES:

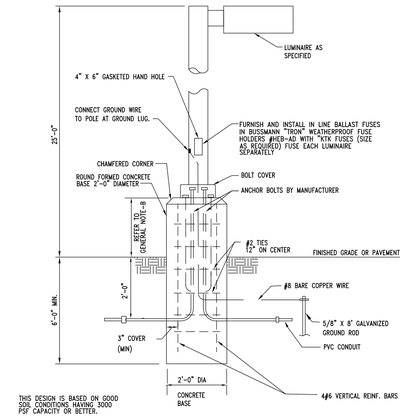
A. REFER TO SHEET E0.001 FOR ELECTRICAL LEGEND.

B. LOCATE SITE LIGHTING POLES MIN. 3' BEHIND THE CURB NEXT TO DRIVE WAYS AND PARKING (VEHICLE TRAFFIC AREAS). 6" CONCRETE BASE SHALL BE USED THEN, IN LIEU OF THE 3'-0" SHOWN ON THE SITE LIGHTING POLE DETAIL THIS SHEET, COORDINATE WITH ARCHITECT/OWNER.

KEYED NOTES:

1. EXACT LOCATION FOR UTILITY TRANSFORMER TO BE VERIFIED WITH UTILITY CO. AND ARCHITECT/OWNER. MAINTAIN THE REQUIRED CLEARANCES AROUND THE EQUIPMENT AND AWAY FROM THE BUILDING.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE BASE BID PRICE FOR FURNISHING AND INSTALLING ELECTRICAL AND TELEPHONE/CABLE TV UNDERGROUND SERVICE RUNS AS INDICATED ON THE SITE PLAN. THE EXACT SERVICE POINT IS TO BE DETERMINED BY THE UTILITY COMPANIES. PROVIDE ADDITIONAL ADD AND DEDUCT PER LINEAR FOOT UNIT PRICES FOR SERVICE RUN LENGTHS GREATER THAN AND LESS THAN THE LENGTHS SHOWN.
3. EXACT LOCATIONS AND QUANTITIES OF FLAG POLES SHALL BE COORDINATED WITH CIVIL AND ARCHITECT/OWNER, PROVIDE ONE FLOOD LIGHT FOR EACH FLAG POLE.
4. PROVIDE WP J-BOXES MOUNTED ON 6" AFG CONCRETE BASE ON DEDICATED GFCI BRANCH BREAKER FOR SITE SIGNS, EXACT LOCATIONS AND QUANTITIES TO BE COORDINATED WITH CIVIL AND ARCHITECT/OWNER.
5. PROVIDE POWER, RACEWAYS AND WP BOXES FOR ACCESS CONTROL AND SECURITY SYSTEM DEVICES. EXACT LOCATIONS AND REQUIREMENTS TO BE COORDINATED WITH SYSTEM PROVIDER AND ARCHITECT/OWNER. PROVIDE 2"C IN ADDITION TO THE POWER CONDUIT FOR LOW VOLTAGE WIRING AND PROVIDE ADDITIONAL CONDUITS FOR INTERWIRING WITH DOORS AND MOTORIZED GATES AS REQUIRED.
6. EXACT LOCATION AND REQUIREMENTS FOR BUILDING EQUIPMENT (COMPACTOR, MOTORIZED GATES, ETC.) TO BE COORDINATED WITH ARCHTIECT/OWNER. INFORMATION INDICATED IN DOCUMENTS IS FOR REFERENCE ONLY.





SITE LIGHTING POLE DETAIL – TYPE "SA"&"SA1"
NOT TO SCALE

N

1 Electrical Site Plan
1" = 30'-0"

STATE OF MICHIGAN
SALIM M. SESSINE
ENGINEER
No. 34939
LICENSED PROFESSIONAL ENGINEER

H:\ACAD\FILES\75\75811 - Highland Twp FS\2\CAD\ELEC\75811-E1-00.dwg Wed, 26 Aug 2020 - 4:00pm

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KEY PLAN

OWNER
Highland Township Fire Department

PROJECT NAME
Highland Township Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

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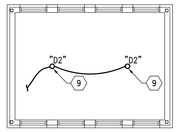
EK

SHEET NAME
ELECTRICAL SITE PLAN

SHEET NO.
E1-00



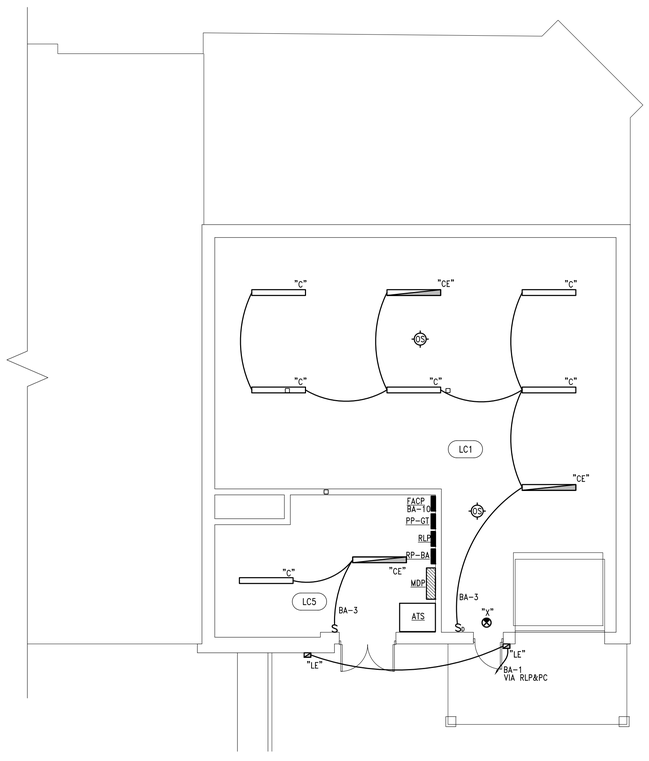
3 Clerestory - Lighting
1/8" = 1'-0"

KEYED LIGHTING NOTES:

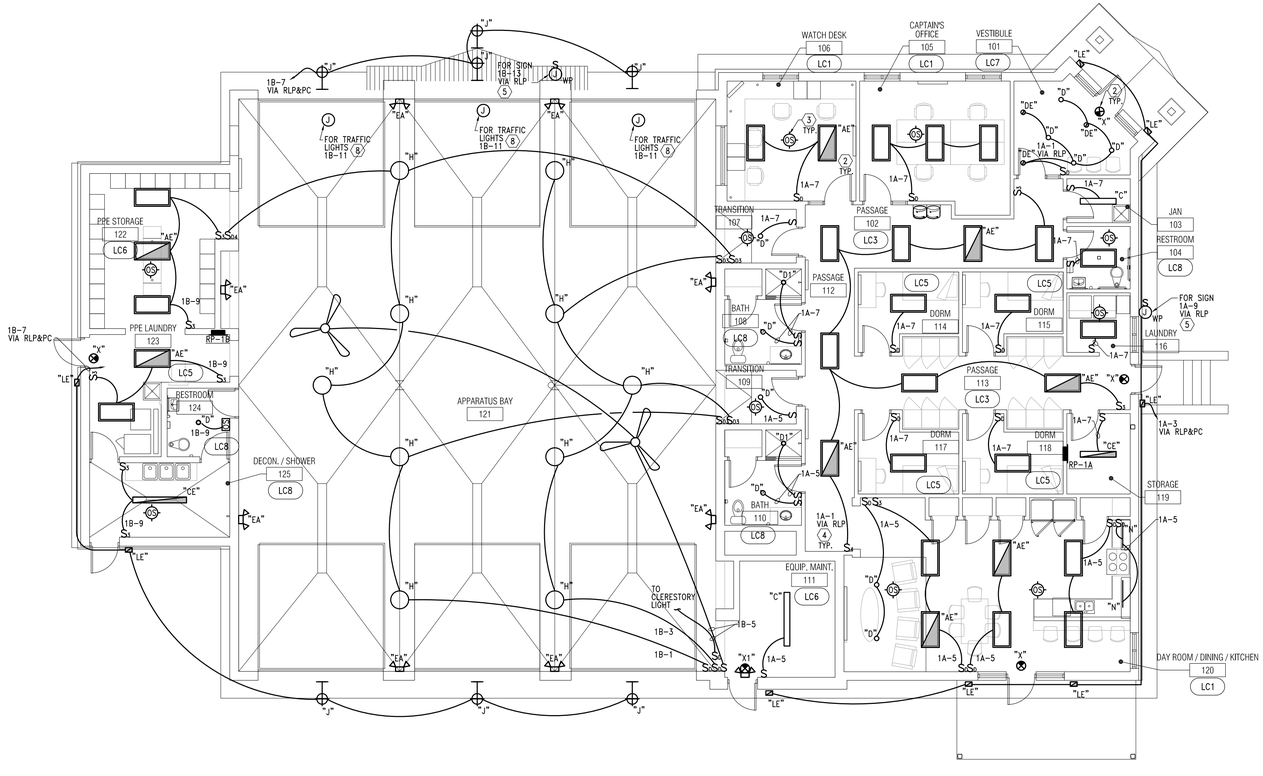
1. PROVIDE RELAY PANELS OVERRIDE SWITCHES. LOCATIONS SHALL BE COORDINATED WITH ARCHITECT/OWNER.
2. ALL EXIT LIGHTS, BUILT-IN EMERGENCY BATTERY UNITS AND FIXTURES WITH BUILT-IN EMERGENCY BATTERY BACK-UP SHALL BE WIRED TO ROOM OR AREA NORMAL LIGHTING CIRCUIT AHEAD OF LOCAL AND AUTOMATIC LIGHTING CONTROL.
3. PROVIDE OCCUPANCY SENSORS AS REQUIRED, DEVICES INDICATED ARE FOR REFERENCE ONLY, REFER TO GENERAL NOTE-D AND SPECIFICATIONS.
4. VIA RLP MEANS THAT LIGHTING CIRCUIT IS CONTROLLED VIA RELAY PANEL, REFER TO GENERAL LIGHTING NOTE-E ABOVE.
5. PROVIDE WP J-BOX WITH SWITCH FOR OUTDOOR SIGNS. EXACT LOCATIONS, QUANTITIES AND REQUIREMENTS TO BE VERIFIED WITH OWNER AND SIGN MANUFACTURER.
6. PROVIDE LIGHTING CONTROL STATIONS TO CONTROL LIGHTING IN COMMON AREAS. AS INDICATED. EXACT LOCATION OF LIGHTING CONTROL STATIONS TO BE COORDINATED WITH INTERIOR DESIGNER & ARCHITECT/OWNER PRIOR TO ROUGH IN.
7. PROVIDE LINE/LOW VOLTAGE SWITCHES AND OVERRIDES FOR ROOMS/AREAS WIRED VIA THE LIGHTING CONTROL RELAY PANEL.
8. PROVIDE TRAFFIC LIGHTS AND CONTROLS, COORDINATE WITH ARCHITECT/OWNER FOR EXACT REQUIREMENTS. EXACT LOCATIONS FOR TRAFFICE LIGHTS AND ASSOCIATED CONTROLS TO BE AS DIRECTED BY ARCHITECT/OWNER, CONTROLS NOT INDICATED ON PLAN, INFORMATION INDICATED IS FOR REFERENCE ONLY.
9. LIGHT FIXTURE "D2" LOCATED IN APPARATUS BAY MUST PROVIDE FIELD BOX AROUND FIXTURE HOUSING TO KEEP INSULATION 3"-6" AWAY FROM HOUSING.

GENERAL LIGHTING NOTES:

A. ALL LIGHTING FIXTURES INDICATED ON THESE PLANS ARE TYPE "A" UNLESS OTHERWISE NOTED.
B. REFER TO SHEET E.001 FOR ELECTRICAL LEGEND AND SHEET E.003 FOR LIGHTING FIXTURE SCHEDULE AND SHEET E.003 FOR LIGHTING CONTROL MATRIX.
C. REFER TO SPECIFICATIONS FOR ADDITIONAL LAMP AND BALLAST REQUIREMENTS.
D. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, ELEVATIONS AND SECTIONS FOR EXACT LOCATION OF ALL CEILING, PENDANT & WALL MOUNTED LIGHTING FIXTURES.
E. ALL EXIT LIGHTS AND EMERGENCY LIGHTS (EW) SHALL BE WIRED TO ROOM OR AREA NORMAL LIGHTING CIRCUIT AHEAD OF LOCAL CONTROLS, SEE KEY NOTE THIS SHEET.
F. IN ADDITION TO THE LOCAL SWITCHES SHOWN, PROVIDE A COMPLETE OCCUPANCY SENSOR AND RELAY PANEL BASED AUTOMATIC LIGHTING CONTROL SYSTEM. SYSTEM SHALL BE AS DESCRIBED IN SPECIFICATION SECTION 260500. DEVICES INDICATED ON PLAN ARE FOR REFERENCE ONLY. SYSTEM SHALL BE LAYED OUT ON A PERFORMANCE BASIS, TYPICAL FOR ALL ROOMS/AREAS AS SPECIFIED.
G. ALL WIRING SHALL BE SIZED PROPERLY FOR FULL COMPLIANCE WITH THE NEC REQUIREMENTS FOR AMPACITY AND MAXIMUM VOLTAGE DROP LIMITATIONS.
H. COORDINATE LOCATION OF ALL SWITCHES WITH DOOR LOCATIONS SHOWN ON THE ARCHITECTURAL PLANS.
I. ALL LIGHTING FIXTURES SHALL BE EQUIPPED WITH LENSES OR SHIELDS FOR PROTECTION OF THE LAMPS OR WITH LAMPS THAT WILL NOT SHATTER.
J. PROPOSED EQUAL LIGHTING FIXTURES TO BE SUBMITTED FOR ENGINEER & ARCHITECT/OWNERS REVIEW AND APPROVAL PRIOR TO BID.
K. FOR ALL ROOMS WITH MECHANICAL EQUIPMENT (FURNACE ROOMS, MECHANICAL ROOMS AND CLOSETS ETC.) EXACT LOCATIONS FOR LIGHTING FIXTURES TO BE COORDINATED WITH DUCTWORK AND PIPING.
L. REFER TO ENLARGED UNIT PLANS SHEET E.401 FOR UNITS TYPICAL LIGHTING LAYOUTS.
M. ALL ELECTRICAL DEVICES SHALL BE LISTED FOR THE INTENDED USE.



2 Lower Level Floor Plan - Lighting
1/8" = 1'-0"



1 Main Level Floor Plan - Lighting
1/8" = 1'-0"

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KEY PLAN

OWNER
Highland Township
Fire Department

PROJECT NAME
Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.
18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

DRAWN BY
NH

CHECKED BY
EK

APPROVED BY
EK

SHEET NAME
FLOOR PLANS - LIGHTING

SHEET NO.
E2-00

KEYED POWER NOTES:

1. EXACT LOCATION AND REQUIREMENTS FOR EQUIPMENT TO BE COORDINATED WITH EQUIPMENT VENDOR. APPROVED SUBMITTALS AND NAMEPLATE DATA. INFORMATION INDICATED ON THESE PLANS IS FOR REFERENCE ONLY.
2. ALL RECEPTACLES LOCATED WITHIN 6'-0" OF A WATER SOURCE AND ALL IN THE KITCHENS SHALL BE GFR TYPE. PROVIDE GFR RECEPTACLES REGARDLESS OF SYMBOL USED ON PLAN FOR THESE LOCATIONS. FOR LOCATIONS THAT ARE NOT ACCESSIBLE, LOCATE BLANK PLATE GFR ABOVE THE RECEPTACLE AT +44"AFF OR NEAR ROOM WALL SWITCH(ES) OR PROVIDE GFCI BRANCH BREAKERS IN PANELBOARDS AS DIRECTED BY OWNER TO COMPLY WITH NEC 210.8.
3. DUPLEX RECEPTACLES AND DATA OUTLETS FOR FLAT SCREEN TV SHALL BE MOUNTED AT 5'-0"AFF UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT/OWNER FOR EXACT QUANTITIES, LOCATIONS AND MOUNTING HEIGHTS.
4. EXACT LOCATIONS FOR ALL FLOOR OUTLETS TO BE COORDINATED WITH ARCHITECT/OWNER.
5. PROVIDE (2)-20A/1P, 120V DEDICATED BRANCH CIRCUITS FOR ALL FIRE/SMOKE DAMPERS, WIRE TO RP-1A-** REFER TO PANEL SCHEDULES, COORDINATE AND REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATIONS AND QUANTITIES. NOT ALL FIRE/SMOKE DAMPERS ARE INDICATED ON THESE PLANS.
6. COORDINATE WITH MECHANICAL FOR EXACT REQUIREMENTS FOR FIRE PROTECTION SYSTEM, INCLUDING NUMBER OF FLOW/TAMPER SWITCHES.
7. PROVIDE POWER FOR DRY PIPE SYSTEM COMPRESSOR. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH FIRE SUPPRESSION CONTRACTOR. LOCATION INDICATED ON PLAN IS FOR REFERENCE ONLY.
8. EXACT LOCATIONS FOR FIRE ALARM CONTROL AND ANNUNCIATOR PANELS AND SECURITY SYSTEM PANELS TO BE COORDINATED WITH ARCHITECT/OWNER. PROVIDE FLUSH MOUNTING FOR ALL, UNLESS LOCATED IN UNFINISHED SPACES.
9. EXACT LOCATIONS FOR ALL ELECTRICAL EQUIPMENT TO BE COORDINATED, REFER TO GENERAL NOTE-F.
10. INDOOR AC UNIT IS FED FROM THE OUTDOOR ACCU UNIT, COORDINATE WITH MECHANICAL FOR COMPLETE INSTALLATION REQUIREME NTS, INCLUDING INTERWIRING OF THE UNIT.
11. FOR ALL CARD READERS PROVIDE DOUBLE GANG J-BOX WITH SINGLE MUD RING Ø48" AFF FOR CARD READER, RUN 1/2"C FROM CARD READER OR STRIKE ACTUATOR FOR LOW VOLTAGE WIRING. PROVIDE 120V POWER IN THE CEILING FOR STRIKE AS INDICATED, FOR MORE DETAILS REFER TO SHEET E5-01. ALSO PROVIDE REQUIRED WIRING FOR INTERCOM REMOTE UNLOCK SYSTEM COORDINATE WITH DOOR INSTALLER.
REFER TO ARCHITECTURAL PLANS AND DOOR HARDWARE SCHEDULES FOR EXACT LOCATIONS AND REQUIREMENTS. COORDINATE ALL WORK WITH ARCHITECT AND SECURILTY/ACCESS CONTROL SYSTEM PROVIDER.
12. PROVIDE RED MUSHROOM EMERGENCY POWER ON/OFF BUTTON AND ALL REQUIRED BRANCH CIRCUIT TRANSFORMER, CONTACTORS, BOXES ETC. TO SHUT-OFF GAS RANGE SOLENOID VALVE, INTERLOCK GAS SOLENOID SHUT-OFF VALVE WITH FIRE ALARM SYSTEM, COORDINATE ALL REQUIREMENTS.
13. FOR ALL ELECTRICAL DEVICES AT MILLWORK COORDINATE EXACT LOCATIONS, ROUTING OF CONDUITS, ETC. WITH ARCHITECT AND MILLWORK VENDOR.

GENERAL POWER NOTES:

A. REFER TO SHEET E.001 FOR ELECTRICAL LEGEND.

B. PROVIDE COMPLETE ADDRESSABLE FIRE ALARM SYSTEM FOR THE BUILDING. FIRE ALARM SYSTEM SHALL INCLUDE ALL CONTROL, MONITORING, POWER SUPPLIES, INITIATING DEVICES, INDICATING APPLIANCES, CONTROL MODULES AND WIRING AS REQUIRED BY AUTHORITIES HAVING JURISDICTION FOR AN APPROVED INSTALLATION, REFER TO SPECIFICATIONS. SYSTEM SHALL BE LAYED OUT ON A PERFORMANCE BASIS, DEVICES INDICATED ON PLANS ARE FOR REFERENCE ONLY.

C. PROVIDE FIRE STOPPING SYSTEM WHERE REQUIRED TO MAINTAIN THE FIRE RESISTANCE RATING OF THE ASSEMBLIES.

D. EXACT LOCATIONS AND REQUIREMENTS FOR ALL EQUIPMENT SHALL BE VERIFIED WITH ARCHITECT/OWNER AND EQUIPMENT SUPPLIER PRIOR TO INSTALLATION.

E. COORDINATE EXACT LOCATIONS, MOUNTING HEIGHTS & REQUIREMENTS FOR ALL DEVICES WITH LATEST ARCHITECTURAL FURNITURE & EQUIPMENT LAYOUTS & ELEVATIONS.

F. COORDINATE EXACT LOCATIONS FOR ALL ELECTRICAL EQUIPMENT, PANELBOARDS, DISCONNECTS, STARTERS, CONTROL PANELS, ETC. WITH ARCHITECTURAL PLANS AND ALL OTHER TRADES INCLUDING MECHANICAL TO MAINTAIN REQUIRED WORKING CLEARANCES AND DEDICATED EQUIPMENT SPACE. DETERMINE EXACT LOCATIONS AND VERIFY WITH ALL OTHER TRADES PRIOR TO BEGINNING OF CONSTRUCTION TO AVOID INTERFERENCES WITH MECHANICAL, STRUCTURAL, ETC.

G. MAINTAIN A MINIMUM OF 24" HORIZONTAL SEPARATION BETWEEN BOXES INSTALLED ON OPPOSITE SIDES OF FIRE RATED WALLS TO COMPLY WITH NEC 300.21.

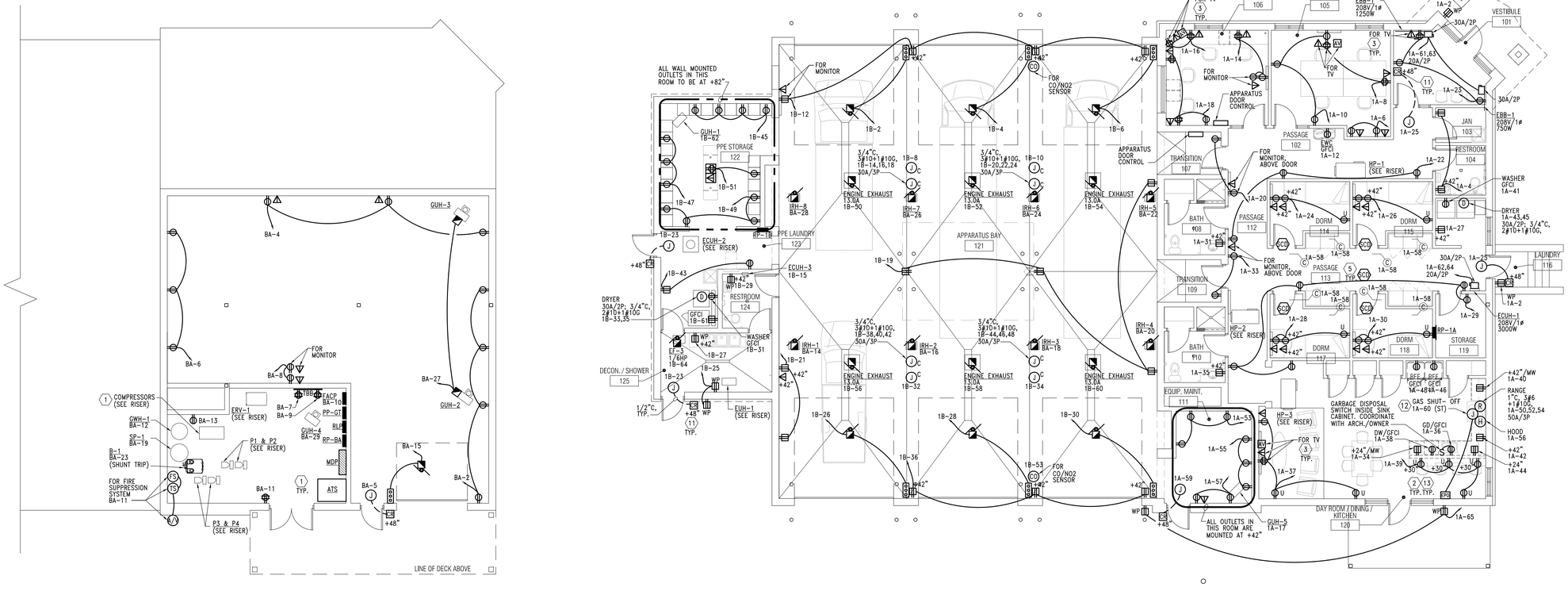
H. ALL WIRING DEVICES SHALL BE OF TAMPER RESISTANT CONSTRUCTION AND WITH AFCI PROTECTION.

I. ALL DEVICES AT COUNTER LOCATIONS TO BE MOUNTED ABOVE THE COUNTER AT +42"AFF OR AS NOTED ON THESE PLANS. COORDINATE WITH ARCHITECT/OWNER AND MILLWORK CONTRACTOR FOR EXACT LOCATIONS.

J. LOCATE DISCONNECT SWITCHES FOR MECHANICAL AND BUILDING EQUIPMENT TO MAINTAIN WORKING CLEARANCES. LOCATIONS ON THESE PLANS ARE FOR REFERENCE ONLY.

K. GROUND FAULT PROTECTION FOR DEVICES INSTALLED AT LOCATIONS NOT READILY ACCESSIBLE, PROVIDE GROUND FAULT BLANK FACE DEVICE AT ACCESSIBLE LOCATION OR PROVIDE GFCI BRANCH BREAKER IN PANELBOARD.

L. ALL ROOF MOUNTED EQUIPMENT TO BE NEMA 3R WEATHERPROOF RATED, INCLUDING STARTERS, DISCONNECTS, ETC.



1 Main Level Floor Plan - Power
1/8" = 1'-0"

2 Lower Level Floor Plan - Power
1/8" = 1'-0"

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KEY PLAN

OWNER

Highland Township
Fire Department

PROJECT NAME

Highland Township
Fire Station No. 2

2550 E. Wardlow Rd.
Highland, MI 48356

PROJECT NO.

18-122B

ISSUES / REVISIONS

SCHEMATIC DESIGN	01-28-2020
90% CD	07-31-2020
100% CONSTRUCTION DOCUMENT	08-27-2020

DRAWN BY
NH

CHECKED BY
EK

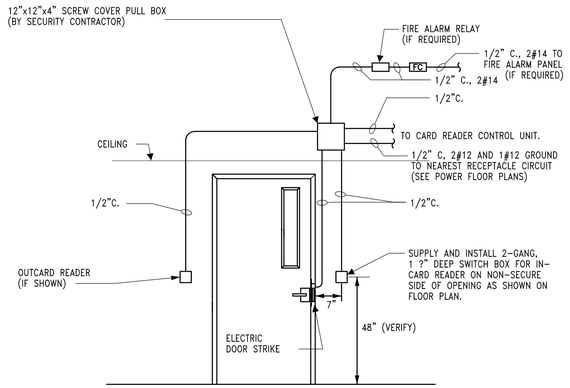
APPROVED BY
EK

SHEET NAME

FLOOR PLANS - POWER

SHEET NO.

E3-00

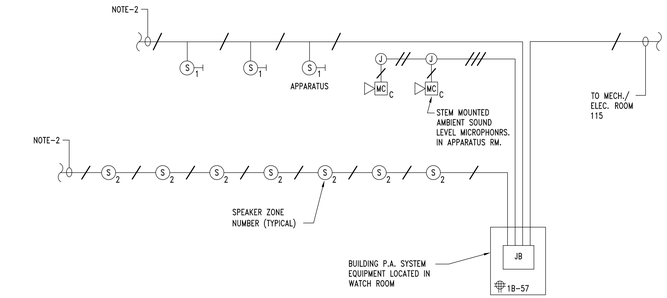


NOTES:

1. REFER TO ACCESS CONTROLR CONSULTANT DRAWINGS FOR EXACT REQUIREMENTS, THIS DETAIL IS FOR REFERENCE ONLY.

CARD READER DOOR DETAIL (TYPICAL)

SCALE: NONE



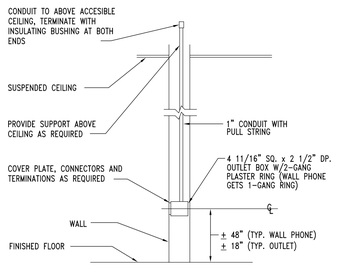
	SPEAKER ZONE SCHEDULE
ZONE	AREA SERVED
1	APPARATUS ROOM AREA AND WALL MOUNTED SPEAKERS
2	CEILING MOUNTED SPEAKERS

NOTES:

1. ALL WIRE SHALL BE INSTALLED IN CONDUIT 3/4" MINIMUM.
2. COORDINATE WITH OWNER AND SYSTEM MANUFACTURER TO DETERMINE MAXIMUM PERFORMANCE AND COVERAGE, COMPLETE FUNCTIONAL SYSTEM AND DESIGN WITH ALL COMPONENTS SHALL BE INCLUDED IN BASE BID.

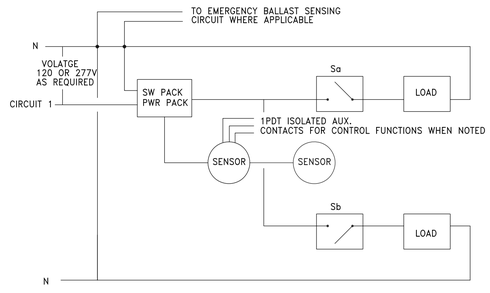
P.A. RISER DIAGRAM

NO SCALE



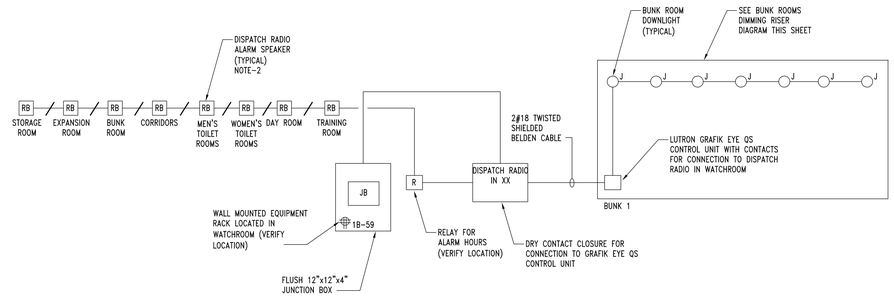
TYPICAL TELECOMMUNICATION OUTLET DETAIL

No Scale



TYPICAL FUNCTIONAL LIGHTING CONTROL AS APPLICABLE

NO SCALE refer to manufacturer wiring diagram and modify to meet the design intent Provide switch packs, power packs etc.. as required.



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DISPATCH RADIO ALARM RISER DIAGRAM

NO SCALE

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ELECTRICAL DETAILS

SHEET NO.

E5-00