LEGAL DESCRIPTION (AS PROVIDED)

(PER DEVON TITLE AGENCY, FILE NO.: 20018491, DATED: AUGUST 19, 2021)

TAX ID: 700-023-400-051-05

SCHEDULE C DESCRIPTION:

LAND SITUATED IN THE CITY OF POTTERVILLE, COUNTY OF EATON, STATE OF MICHIGAN DESCRIBED AS

COMMENCING AT THE SOUTHWEST CORNER OF SECTION 23, TOWN 3 NORTH, RANGE 4 WEST, CITY OF POTTERVILLE, EATON COUNTY, MICHIGAN; THENCE SOUTH 89°48'32" EAST, 1315.57 FEET ALONG THE SOUTH LINE OF SAID SECTION 23; THENCE NORTH 00°17'52" EAST, 2630.73 FEET ALONG THE WEST LINE OF THE EAST 1/2 OF THE SOUTHWEST 1/4 OF SAID SECTION 23; THENCE SOUTH 89°55'01" EAST, 1305.73 FEET ALONG THE EAST-WEST 1/4 LINE OF SAID SECTION 23 TO THE CENTER OF SAID SECTION 23 FOR A PLACE OF BEGINNING; THENCE NORTH 00°12'48" EAST, 1315.52 FEET ALONG THE NORTH-SOUTH 1/4 LINE OF SAID SECTION 23; THENCE SOUTH 89°51'53" EAST, 1309.47 FEET ALONG THE NORTH LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 23; THENCE SOUTH 00°02'28" WEST, 1317.11 FEET ALONG THE EAST LINE OF THE WEST 1/2 OF THE NORTHEAST 1/4 OF SECTION 23 TO A POINT ON THE EAST-WEST 1/4 LINE OF SAID SECTION 23; THENCE SOUTH 00°01'24" EAST, 778.389 FEET ALONG THE EAST LINE OF THE WEST 1/2 OF THE SOUTHEAST 1/4 OF SAID SECTION 23; THENCE ALONG THE CENTERLINE OF ABEL DRAIN THE FOLLOWING 2 COURSES: 149 FEET ALONG THE ARC OF A 213.31 FOOT RADIUS CIRCULAR CURVE TO THE RIGHT, HAVING A CHORD WHICH BEARS NORTH 78°27'46" WEST, 146.89 FEET AN NORTH 58°19'23" WEST, 1374.46 FEET; THENCE NORTH 00°12'48" WEST, 32.43 FEET TO THE CENTER OF SAID SECTION 23 AND THE PLACE OF BEGINNING, BEING PART OF THE EAST 1/2 OF SAID SECTION 23.

BEARING REFERENCE

BEARINGS ARE BASED ON PROJECT COORDINATE SYSTEM:
MICHIGAN STATE PLANE COORDINATE SYSTEM, NAD83 (CONUS) (MOL) (GRS80), SOUTH ZONE 2113,
INTERNATIONAL FEET, GROUND

(LAT: 42°38'06.71" N, LON: 84°44'50.12" W, ELEV: 910, SCALE FACTOR: 1.00012710).

DESIGN ENGINEER/SURVEYOR



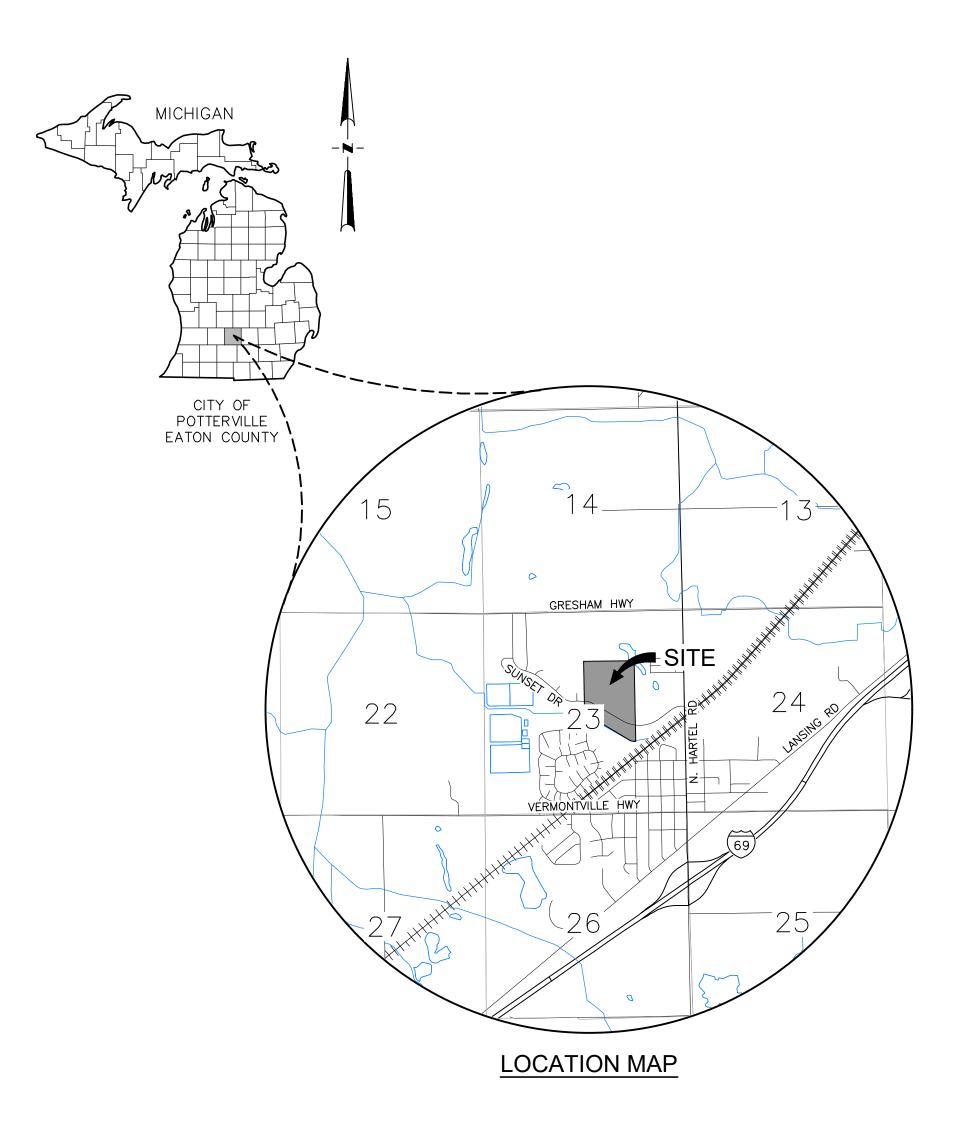
MONUMENT ENGINEERING GROUP ASSOCIATES, INC

INNOVATIVE GEOSPATIAL & ENGINEERING SOLUTIONS

298 VETERANS DRIVE, FOWLERVILLE, MI 48836 ALLAN W PRUSS, PE, PS PHONE: 517-223-3512

FINAL SITE CONDOMINIUM PLAN FOR

CAMBRIA RIDGE



CLIENT

ALLEN EDWIN HOMES
2186 E. CENTRE AVE.
PORTAGE, MI 49002
POC: DAN LARABEL
PH: 616-878-1748

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		SHEET INDEX	9/2021 PLANNING COMMISSION SUBMITTAL	7/2022 REVISIONS PER PLANNING COMMISSION	7/2022 FINAL SITE PLAN	/2022 REVISED FOR CITY/COUNTY REVIEW	3/2022 ECDC - SESC SUBMITTAL	3/2022 UTILITY REVISIONS	/2022 REV REAR YARD GRADES/TAPPING SLEEVES	5/2022 REVISED PER CITY REVIEW			
			12/29	2/17	4/27	7/8	7/19	7/19	8/3	8/15			
		GENERAL						INCL	UDED	SHI	EETS		
SHEET	G-1.0	COVER	•	•	•	•	•	•	•	•			
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SHEET	V-1.0	TOPO SURVEY & DEMO PLAN - OVERVIEW SITE PLAN	•	•	•	•	•						
SHEET	C-1.0	SITE PLAN - OVERVIEW	•	•	•	•	•						
SHEET	C-1.1	PHASING PLAN	•	•	•	•	•				Ш		
SHEET	C-3.0	UTILITY UTILITY PLAN - OVERVIEW	•	•	•	•		•					
		SANITARY AND WATER MAIN											
	C-3.1	SANITARY & WM PLAN - SUNSET DRIVE			•	•		•	•		\square		_
	C-3.2	SANITARY & WM PLAN - ROSE COURT SANITARY & WM PLAN - CAMBRIA COURT			•	•		•	•		\vdash		
	C-3.4	SANITARY & WM PLAN - CAMBRIA COURT			•	•		•	•				+
SHEET	C-4.1	SANITARY PROFILE - ROSE COURT AND SUNSET DRIVE				•		•					
SHEET	C-4.2	SANITARY PROFILE - CAMBRIA COURT				•		•					
SHEET	C-4.3	SANITARY PROFILE - GARDEN COURT				•		•					
	C-5.1	WATER MAIN PROFILE - ROSE COURT				•		•	•				-
SHEET	C-5.2 C-5.3	WATER MAIN PROFILE - CAMBRIA COURT WATER MAIN PROFILE - GARDEN COURT				•		•	•				
	0 0.0	ROADWAY AND STORM SEWER											
SHEET	C-6.1	STORM SEWER PLAN - SUNSET DRIVE			•	•	•	•					
SHEET		STORM SEWER PLAN - ROSE COURT			•	•	•	•					
SHEET		STORM & ROAD PROFILE - ROSE COURT			•	•	•	•			\vdash		
SHEET		STORM SEWER PLAN — CAMBRIA COURT STORM & ROAD PROFILE — CAMBRIA COURT			•	•	•	•					
		STORM SEWER PLAN — GARDEN COURT			•	•	•	•					
SHEET	C-6.4.1	STORM & ROAD PROFILE - GARDEN COURT			•	•	•	•					
		STORM SEWER PROFILES — PH1			•	•	•	•					_
		STORM SEWER PROFILES - PH2				•	•	•			\vdash		-
SHEET	C-6.7	STORM SEWER PROFILES — PH3 GRADING, SOIL EROSION AND SEDIMENT CONTROL			•	•	•	•					
SHEET	C-7.0	FINISH GRADING AND SESC PLAN — OVERVIEW	•	•	•	•	•	•	•				
SHEET	C-7.1	FINISH GRADING & SESC PLAN - SUNSET DRIVE			•	•	•	•	•				
	C-7.2	FINISH GRADING & SESC PLAN - ROSE COURT			•	•	•	•	•				
		FINISH GRADING & SESC PLAN - CAMBRIA COURT FINISH GRADING & SESC PLAN - GARDEN COURT			•	•	•	•	•		\vdash		
		CUL-DE-SAC DETAILS			•	•	•	•	•				
		STORM WATER MANAGEMENT											
	C-9.0	DRAINAGE AREA PLAN			•	•	•	•					
SHEET	C-9.1 C-9.2	DRAINAGE AREA CALCULATIONS PHASE 1 STORM CALCULATIONS			•	•	•	•			\vdash		
SHEET	C-9.3	PHASE 1 DETENTION BASIN DETAILS			•	•	•	•					
SHEET	C-9.4	PHASE 2 STORM CALCULATIONS			•	•	•	•		•			
SHEET	C-9.5	PHASE 2 DETENTION BASIN DETAILS			•	•	•	•					
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FIELD: DF, JH
DRAWN BY: DC, MN
DESIGN BY: KM
CHECK BY: AP

ORIGINAL ISSUE DATE: 12/29/2021

SCALE: N/A

PROJECT NO: 21-329

INNOVATIVE GEOSPATIAL & ENGINEERING SOLUTIONS

298 VETERANS DRIVE FOWLERVILLE,

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KEVIN C.

MCDEVITT

ENGINEER

6201043260

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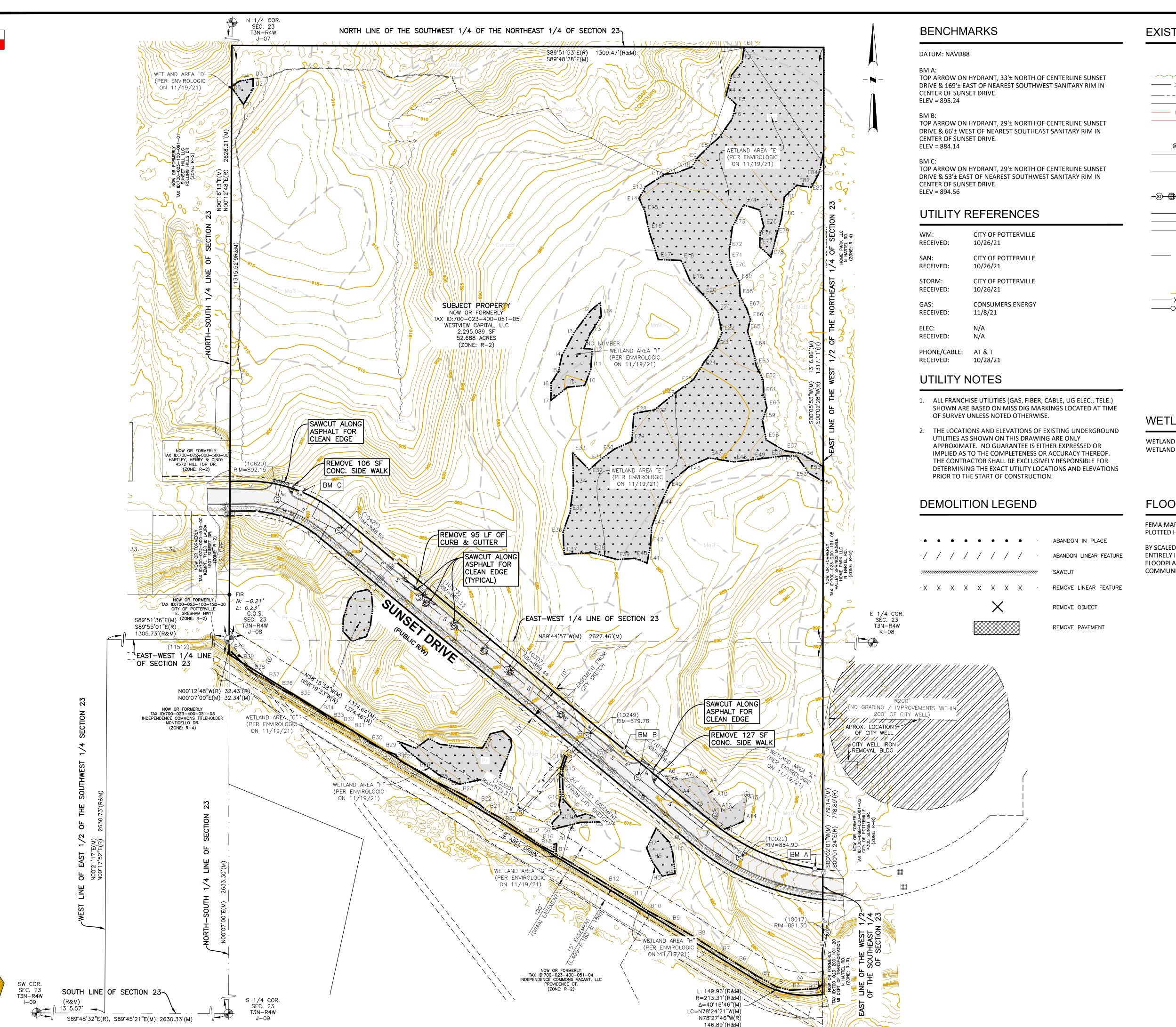
1-800-482-7171

ALLEN EDWIN

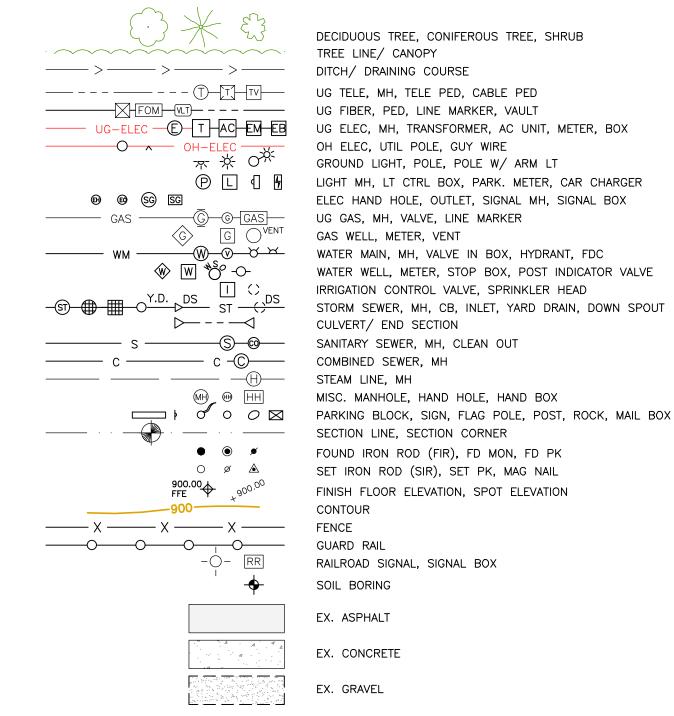
HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE. PORTAGE, MI 49002 (616) 878-1748

CLIENT:



EXISTING LEGEND



WETLAND NOTE

WETLAND LIMITS ARE PER THE WETLAND DELINEATION PERFORMED BY ENVIROLOGIC. WETLAND REPORT DATED 11/19/21.

FLOOD ZONE

FEMA MAP SCALES DO NOT SUPPLY SUFFICIENT LEVEL OF DETAIL TO PLOT ACCURATELY. ZONES IF PLOTTED HEREIN ARE APPROXIMATE.

BY SCALED MAP LOCATION AND GRAPHIC PLOTTING ONLY, THE SUBJECT PROPERTY APPEARS TO LIE ENTIRELY IN ZONE (X) AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN ACCORDING TO THE FLOOD INSURANCE RATE MAP FOR THE COUNTY OF EATON, COMMUNITY PANEL NO. (26045C0213E), EFFECTIVE DATE NOVEMBER 26, 2010.

SOILS INFO

SOIL TYPES ARE ACCORDING TO THE USDA SOIL SURVEY WEB SITE (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

COLWOOD LOAM • Co:

CONOVER LOAM, 0-4% SLOPES MARLETTE LOAM, 2-6% SLOPES MaB:

MaC: FILER LOAM, 6-12% SLOPES MaD: FILER LOAM, 12-18% SLOPES

OwC: OWOSSO-MARLETTE SANDY LOAM, 6-12% SLOPES

PARKHILL LOAM, 0-2% SLOPES

STRUCTURE SCHEDULE

EX	. SANITARY	SEWER
STRUCTURE	RIM ELEV.	PIPES
(10017) SMH	891.30	8" S IE= 877.95 8" N IE= 877.95
(10022) SMH	884.90	8" NW IE= 874.70 8" NE IE= 874.79
(10197) SMH	879.57	8" NW IE= 873.35 8" SE IE= 873.42 8" NE IE= 873.42
(10249) SMH	879.78	8" NW IE= 872.63 8" SE IE= 872.63 8" SW IE= 872.58 8" NE IE= 872.63
(10307) SMH	889.44	8" NW IE= 873.95 8" SE IE= 873.85
(10373) SMH	885.33	8" NW IE= 875.14 8" SE IE= 875.04 8" NE IE= 875.14
(10425) SMH	886.88	8" NW IE= 876.23 8" SE IE= 876.18
(10620) SMH	892.15	8" N IE= 882.05 8" SE IE= 881.99
(11512) SMH	871.16	NOT INVENTORIED AT TIME OF SURVEY
(15020) SMH	875.31	8" NE IE= 866.57 8" W IE= 866.57

ing Group

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> KEVIN C. **MCDEVITT ENGINEER** 6201043260

Kevin CM Teve Call MISS DIG 3 full working days before you dig One-Call Notification 1-800-482-7171

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CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

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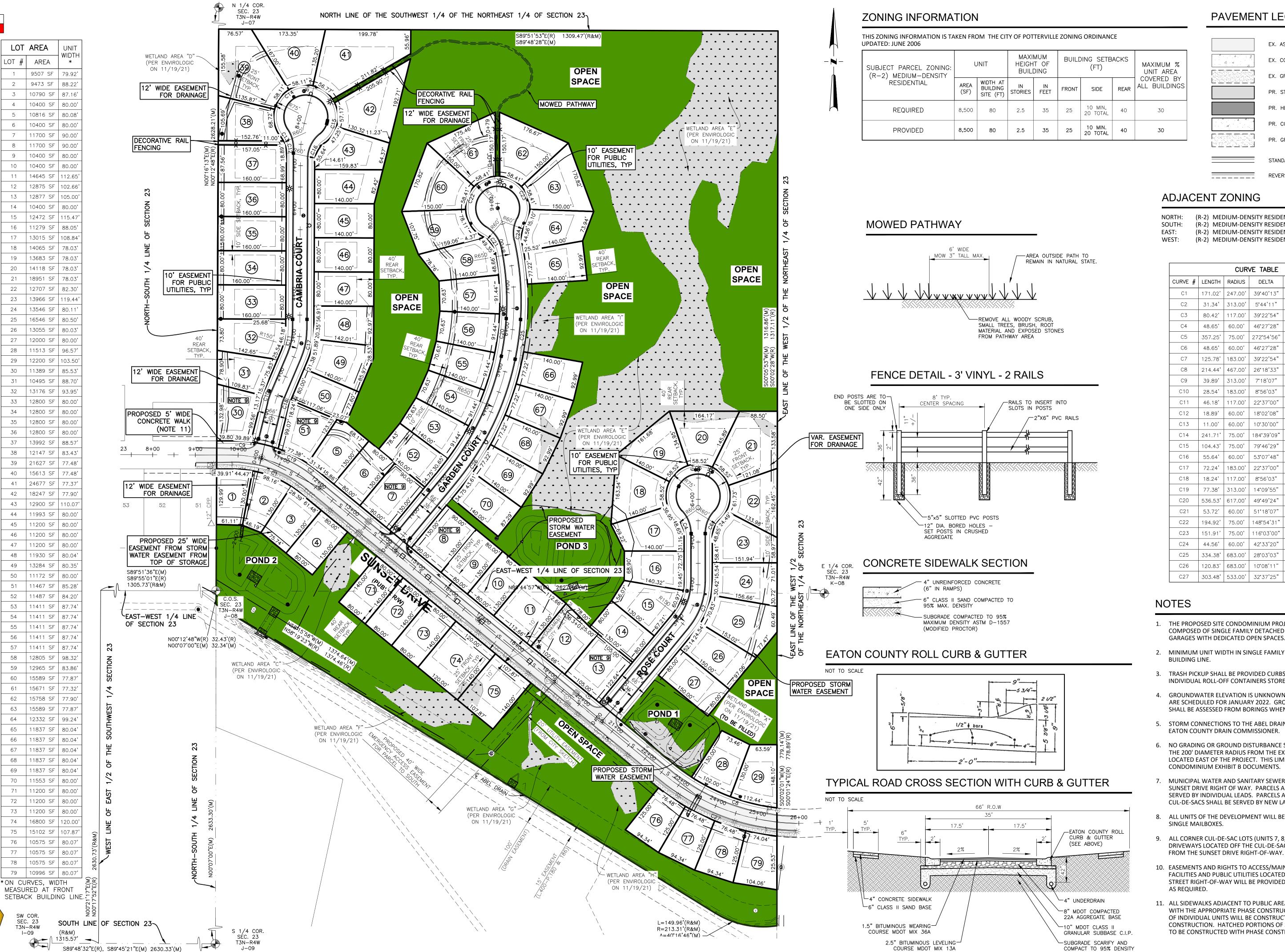
ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329 SCALE: 1" = 100'

1/2" FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

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FILE:P:\Projects\2021\21-329 Cambria Ridge\Dwg\Engineering\21-329_C-1.0_Site_Overview.dwg PLOT DATE:8/3/2022 8:13 PM

PAVEMENT LEGEND

EX. ASPHALT 4 . 4

n maarenn a

EX. CONCRETE

EX. GRAVEL

PR. STANDARD DUTY ASPHALT

PR. HEAVY DUTY ASPHALT PR. CONCRETE

PR. GRAVEL ا نقد فنداحت خذ احا

STANDARD CURB AND GUTTER

REVERSE CURB AND GUTTER

ADJACENT ZONING

(R-2) MEDIUM-DENSITY RESIDENTIAL (R-2) MEDIUM-DENSITY RESIDENTIAL (R-2) MEDIUM-DENSITY RESIDENTIAL (R-2) MEDIUM-DENSITY RESIDENTIAL

		CUR'	VE TABLE	
CURVE #	LENGTH	RADIUS	DELTA	CHORD
C1	171.02'	247.00'	39°40'13"	N69°59'26"W 167.62'
C2	31.34'	313.00'	5°44'11"	N53°23'10"W 31.32'
С3	80.42'	117.00'	39°22'54"	N19°47'20"E 78.85'
C4	48.65	60.00'	46°27'28"	N23°07'51"W 47.33'
C5	357.25	75.00'	272°54'56"	N89°54'07"W 103.33
C6	48.65	60.00'	46°27'28"	S23°19'37"W 47.33'
C7	125.78	183.00'	39°22'54"	N19°47'20"E 123.32'
C8	214.44	467.00'	26°18'33"	S70°08'44"E 212.56'
C9	39.89	313.00'	7°18'07"	N86°10'29"W 39.86'
C10	28.54	183.00'	8°56'03"	S18°25'12"W 28.51'
C11	46.18'	117.00'	22°37'00"	N11°34'43"E 45.88'
C12	18.89'	60.00'	18°02'08"	N08°44'51"W 18.81'
C13	11.00'	60.00'	10°30'00"	N33°25'19"W 10.98'
C14	241.71	75.00'	184°39'09"	S53°39'15"W 149.88
C15	104.43	75.00'	79°46'29"	N13°30'47"E 96.19'
C16	55.64	60.00'	53°07'48"	S26°50'07"W 53.67'
C17	72.24	183.00'	22°37'00"	N11°34'43"E 71.77'
C18	18.24'	117.00'	8°56'03"	S18°25'12"W 18.23'
C19	77.38	313.00'	14°09'55"	N63°20'13"W 77.19'
C20	536.53	617.00'	49°49'24"	N14°34'06"E 519.78'
C21	53.72	60.00'	51°18'07"	N35°59'40"W 51.95'
C22	194.92	75.00'	148°54'31"	S12°48'32"W 144.51
C23	151.91'	75.00'	116°03'00"	N27°04'00"W 127.24
C24	44.56	60.00'	42°33'20"	S09°40′50″W 43.55′
C25	334.38'	683.00'	28°03'03"	N02°25'42"E 331.05'
C26	120.83	683.00'	10°08'11"	N34°24'42"E 120.67'
C27	303.48	533.00'	32°37'25"	S67°49'01"E 299.40'

NOTES

- THE PROPOSED SITE CONDOMINIUM PROJECT SHALL BE ENTIRELY COMPOSED OF SINGLE FAMILY DETACHED HOMES WITH ATTACHED GARAGES WITH DEDICATED OPEN SPACES.
- MINIMUM UNIT WIDTH IN SINGLE FAMILY IS 80' WIDE AT THE FRONT BUILDING LINE.
- TRASH PICKUP SHALL BE PROVIDED CURBSIDE WITH UNITS HAVING INDIVIDUAL ROLL-OFF CONTAINERS STORED IN GARAGES.
- 4. GROUNDWATER ELEVATION IS UNKNOWN AT THIS TIME. SOIL BORINGS ARE SCHEDULED FOR JANUARY 2022. GROUNDWATER ELEVATIONS SHALL BE ASSESSED FROM BORINGS WHEN AVAILABLE.
- STORM CONNECTIONS TO THE ABEL DRAIN SHALL BE APPROVED BY THE EATON COUNTY DRAIN COMMISSIONER.
- NO GRADING OR GROUND DISTURBANCE SHALL BE ALLOWED WITHIN THE 200' DIAMETER RADIUS FROM THE EXISTING CITY WELL HEAD LOCATED EAST OF THE PROJECT. THIS LIMIT WILL BE IDENTIFIED ON THE CONDOMINIUM EXHIBIT B DOCUMENTS.
- MUNICIPAL WATER AND SANITARY SEWER IS AVAILABLE WITHIN THE SUNSET DRIVE RIGHT OF WAY. PARCELS ALONG SUNSET DRIVE SHALL BE SERVED BY INDIVIDUAL LEADS. PARCELS ALONG THE THREE CUL-DE-SACS SHALL BE SERVED BY NEW LATERAL MAINS.
- ALL UNITS OF THE DEVELOPMENT WILL BE SERVED BY TRADITIONAL SINGLE MAILBOXES.
- ALL CORNER CUL-DE-SAC LOTS (UNITS 7, 8, 13, 30 AND 51) SHALL HAVE DRIVEWAYS LOCATED OFF THE CUL-DE-SAC, A MINIMUM 50' DISTANCE
- 10. EASEMENTS AND RIGHTS TO ACCESS/MAINTENANCE OF STORM WATER FACILITIES AND PUBLIC UTILITIES LOCATED OUTSIDE OF THE PUBLIC STREET RIGHT-OF-WAY WILL BE PROVIDED TO THE CITY AND COUNTY, AS REQUIRED.
- 11. ALL SIDEWALKS ADJACENT TO PUBLIC AREAS ARE TO BE CONSTRUCTED WITH THE APPROPRIATE PHASE CONSTRUCTION. SIDEWALKS IN FRONT OF INDIVIDUAL UNITS WILL BE CONSTRUCTED WITH UNIT BUILDING CONSTRUCTION. HATCHED PORTIONS OF SIDEWALK ON THIS PLAN ARE TO BE CONSTRUCTED WITH PHASE CONSTRUCTION.

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KEVIN C. MCDEVITT **ENGINEER** 6201043260

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1-800-482-7171 www.missdig.org E LOCATIONS AND ELEVATION: STING UNDERGROUND UTILITIES AS S THIS DRAWING ARE ONLY APPROXII NO GUARANTEE IS EITHER EXPRESSEI
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DETERMINING THE EXACT UTILITY LOCAT
AND ELEVATIONS PRIOR TO THE STAR
C O N S T R U C T I O

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

ORIGINAL ISSUE DATE:

12/29/2021 PROJECT NO: 21-329

SCALE: 1" = 100' 1/2"

FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-1.0



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KEVIN C.

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THE LOCATIONS AND ELEVATIONS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THIS DRAWING ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT UTILITY LOCATIONS AND ELEVATIONS PRIOR TO THE START OF C O N S T R U C T I O N .

CLIENT :

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE., PORTAGE, MI 49002 (616) 878-1748

AMBRIA RIDGE

CAMBRIA RIDG TAX ID: 700-023-40C PART OF E 1/2, SEC. 2

VS DATE

ON 2/17/2022

07/08/2022

07/12/2022

07/19/2022

07/19/2022

PLAN SUBMITTALS/REVISIONS
REVISIONS PER PLANNING COMMISSION
FINAL SITE PLAN SUBMITTAL
REVISED FOR CITY/COUNTY REVIEW
ECDC - SESC SUBMITTAL
SESC SUBMITTAL/UTILITY REVISIONS
REV REAR YARD GRADES/TAPPING SLEEVES

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 100'

O 1/2" 1"

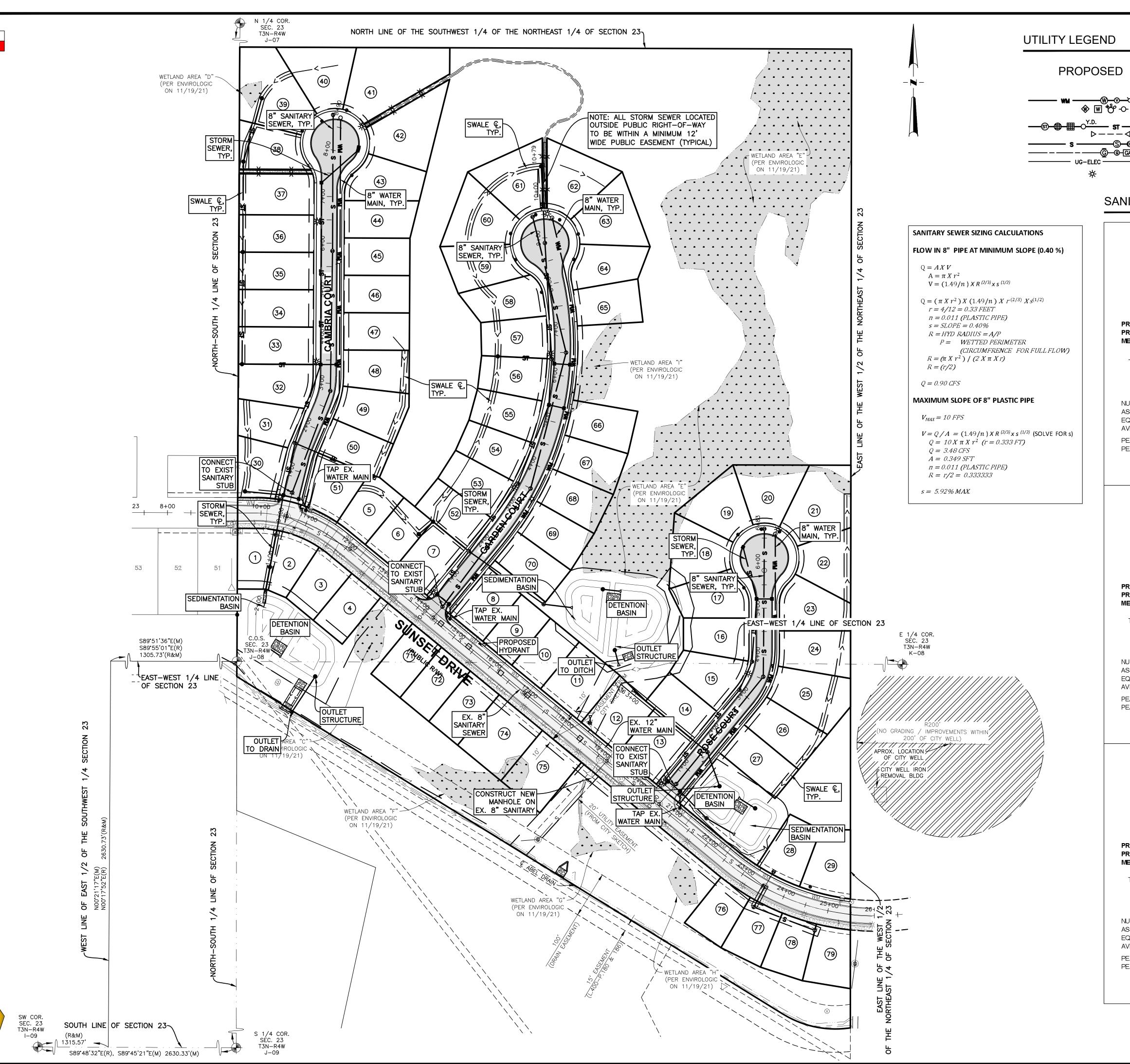
FIELD: DF, JH

DRAWN BY: DC, MN

DESIGN BY: KM

CHECK BY: AP

C-1.1



PROPOSED EXISTING WM WYSO-O- WATER MAIN, MH, VALVE IN BOX, HYDRANT WATER WELL, METER, STOP BOX, POST INDICATOR VALVE STORM SEWER, MH, CB, INLET, DOWN SPOUT, YARD DRAIN CULVERT/ END SECTION SANITARY SEWER, MH, CLEAN OUT UG GAS, MH, VALVE, LINE MARKER UG GAS, MH, VALVE, LINE MARKER UG GAS, MH, VALVE, LINE MARKER UG ELEC (ELEC, CABLE, FIBER)

SANITARY SEWER CALCULATIONS

SANITARY SEWER BASIS OF DESIGN

Monument Engineering Group Associates, Inc. 298 Veterans Drive, Fowlerville, MI 48836 (517) 223-3512

LIGHT POLE

monumentengineering.com

Developing Lifelong Relationships

Date: 3/31/2022

PROJECT NAME: Cambria Ridge - Phase 1 - Rose Court Sewer
PROJECT LOCATION: City of Potterville, Eaton County, Michigan

MEGA PROJECT NO.: 21-329

THE FOLLOWING CALCULATIONS UTILIZE A MODIFED OAKLAND COUNTY METHODOLOGY WHERE 1 UNIT EQUALS ONE MULTI-FAMILY RESIDENTIAL DWELLING WITH AN ASSUMED NUMBER OF PERSONS PER DWELLING OF 2.5.

NUMBER OF UNITS = 15 UNITS FACING ROSE COURT

ASSUMED NUMBER OF PEOPLE PER UNIT = 3.2

EQUIVALENT POPULATION = UNITS x PEOPLE PER UNIT = 15 x 3.2 = 48 PEOPLE AVERGAGE DAILY FLOW = POPULATION x 100 GPDPC = 48 x 100 = 4800 GPD

PEAKING FACTOR = $(18 + (P^0.5) / (4 + (P^0.5)) = 4.31825186$ PEAK HOUR FLOW = PEAKING FACTOR x AVERAGE DAILY FLOW = 4.3183 x 4800 = **20728 GPD**

4.3183 x 4800 = **20728 GPD** = **0.0321 CFS** = **14.4 GPM**

SANITARY SEWER BASIS OF DESIGN

Monument Engineering Group Associates, Inc. 298 Veterans Drive, Fowlerville, MI 48836 (517) 223-3512 monumentengineering.com

Developing Lifelong Relationships

Date: <u>3/31/2022</u>

= <u>20.9 GPM</u>

PROJECT NAME: Cambria Ridge - Phase 2 - Cambria Court Sewer
PROJECT LOCATION: City of Potterville, Eaton County, Michigan
MEGA PROJECT NO.: 21-329

THE FOLLOWING CALCULATIONS UTILIZE A MODIFED OAKLAND COUNTY METHODOLOGY WHERE 1 UNIT EQUALS ONE MULTI-FAMILY RESIDENTIAL DWELLING WITH AN ASSUMED NUMBER OF PERSONS PER DWELLING OF 2.5.

NUMBER OF UNITS = 22 UNITS FACING CAMBRIA COURT

ASSUMED NUMBER OF PEOPLE PER UNIT = 3.2

EQUIVALENT POPULATION = UNITS x PEOPLE PER UNIT = 22 x 3.2 = 70.4 PEOPLE

AVERGAGE DAILY FLOW = POPULATION x 100 GPDPC = 70.4 x 100 = 7040 GPD

PEAKING FACTOR = (18 + (P^0.5) / (4 + (P^0.5)) = 4.282278289

PEAK HOUR FLOW = PEAKING FACTOR x AVERAGE DAILY FLOW = 4.2823 x 7040 = 30147 GPD

= 0.0467 CFS

SANITARY SEWER BASIS OF DESIGN

Monument Engineering Group Associates, Inc. 298 Veterans Drive, Fowlerville, MI 48836 (517) 223-3512

monumentengineering.com

Developing Lifelong Relationships

Date: <u>3/31/2022</u>

PROJECT NAME: Cambria Ridge - Phase 3 - Garden Court Sewer
PROJECT LOCATION: City of Potterville, Eaton County, Michigan

MEGA PROJECT NO.: 21-329

THE FOLLOWING CALCULATIONS UTILIZE A MODIFED OAKLAND COUNTY METHODOLOGY WHERE 1 UNIT EQUALS ONE MULTI-FAMILY RESIDENTIAL DWELLING WITH AN ASSUMED NUMBER OF PERSONS PER DWELLING OF 2.5.

NUMBER OF UNITS = 21 UNITS FACING GARDEN COURT

ASSUMED NUMBER OF PEOPLE PER UNIT = 3.2

EQUIVALENT POPULATION = UNITS x PEOPLE PER UNIT = 21 x 3.2 = 67.2 PEOPLE

AVERGAGE DAILY FLOW = POPULATION x 100 GPDPC = 67.2 x 100 = 6720 GPD

PEAKING FACTOR = $(18 + (P^0.5) / (4 + (P^0.5)) = 4.286979389$ PEAK HOUR FLOW = PEAKING FACTOR x AVERAGE DAILY FLOW = 4.287 x 6720 = **28809 GPD**

= 0.0446 CFS = 20.0 GPM 298 VETERANS DRIVE
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MICHIGAN 48836
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KEVIN C.
MCDEVITT

ENGINEER
NO.
6201043260

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CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE., PORTAGE, MI 49002 (616) 878-1748

3, T3N-R4W

CAMBRIA RIDGE
(ID: 700-023-400-051-0F E 1/2, SEC. 23, T3N)
OF E 1/2, SEC. 23, T3N)
OTTERVILLE, FATON COUNT

TAX I PART OI CITY OF POTI

TAL 4/27/202
ITY REVIEW 07/08/20;
L 07/12/20;
REVISIONS 07/19/20;
/TAPPING SLEEVES 08/03/20;

REVISIONS PER PLANNING COMMISSION
INAL SITE PLAN SUBMITTAL
REVISED FOR CITY/COUNTY REVIEW
CCDC — SESC SUBMITTAL
SESC SUBMITTAL/UTILITY REVISIONS
REV REAR YARD GRADES/TAPPING SLE

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 100'

0 1/2" 1"

FIELD: DF, JH

DRAWN BY: DC, MN

DESIGN BY: KM

CHECK BY: AP

C-3.0

PROPOSED

EXISTING

WATER MAIN, MH, VALVE IN BOX, HYDRANT WATER WELL, METER, STOP BOX, POST INDICATOR VALVE

STORM SEWER, MH, CB, INLET, DOWN SPOUT, YARD DRAIN ── S ───────────────────── SANITARY SEWER, MH, CLEAN OUT

DETENTION POND

| WILL BE BUILT AS |

GAS GAS UG GAS, MH, VALVE, LINE MARKER UG-ELEC UG ELEC (ELEC, CABLE, FIBER)

SEE CONTINUATION ON SHEET C-3.4 FOR GARDEN COURT MAIN. CONTRACTOR TO VERIFY DEPTH & LOCATION PRIOR TO CONSTRUCTION CONNECT TO EX. WATER (g) CONNECT TO EX. SANITARY SEWER. CONTRACTOR TO ' WM SERVICE, TYP. VERIFY DEPTH & LOCATION CONNECT TO EX. 8" TAP EX. 12" WM 6" SANITARY PRIOR TO CONSTRUCTION SAN W/8"X6" REDUCER WITH TAPPING LEAD, TYP. _ SLEEVE & BOX CONSTRUCT NEW 4490 ≤15+00 MANHOLE ON EX. 8" SANITARY SUNSET DRIVE S-11 (4' DIA.) FIRE HYDRANT |RIM = 885.31'ASSEMBLY (PUBLIC R/W) IE 8" NE=875.26 12" X 6" TAPPING SLEEVE 12" x 8" TAPPING SLEEVE AND VALVE AND VALVE W/BOX RIM = 876.73LOTS 71 THROUGH 75 WILL BE

OPEN

SPACE

- WETLAND AREA "C"

(PER ENVIROLOGIC

ON 11/19/21

BUILT AS PART OF PHASE 4

WETLAND AREA "F"

(PER ENVIROLOGIC

ON 11/19/21

	SUNSET DRIVE (WEST) - SANITARY SEWER LEAD TABLE							
	HOUSE	LEAD IE AT	RISER AT	LENGTH	SLOPE	LEADIEAT	RISER AT	
UNIT	F.G.	MAIN (FT.)*	MAIN (FT.)	(FT.)	(PERCENT)	END or ESMT	END or ROW	
1*	895.30	883.67		5.4	2.0	883.78	5.2	
2*	895.30	881.57						
3*	891.50	878.57						
4*	887.50	UNK						
5*	891.80	UNK		8.1	2.0			
6*	889.80	UNK		8.6	2.0			
7	891.00	878.28		48	2.0	879.24	5.2	
8*	891.10	880.43		6.7	2.0	880.56	5.8	
9*	893.90	UNK		7.2	2.0			
10*	893.30	873.28	873.3		2.0	873.49	13.1	
11*	891.50	874.15	874.2		2.0	874.35	9.1	
12*	882.40	873.05		7.7	2.0	873.20	3.5	
71	890.80	879.95	5.0	48	2.0	880.91	3.2	
72	893.70	882.62	8.0	48	2.0	883.58	3.8	
73	893.70	882.73	8.5	48	2.0	883.69	4.0	
74	893.60	882.60	8.8	48	2.0	883.56	2.6	
75	885.00	874.03	1.0	48	2.0	874.99	2.7	

* UNITS WITH EXISTING LEAD TO THE MAIN. LEAD IE AT MAIN IS ACTUALLY AT THE END OF THE EXISTING LEAD FROM THE AS-BUILT SEWER PLANS. ON LEADS MARKED WITH IE="UNK" (UNKNOWN), NO INVERT WAS IDENTIFIED IN THE ASBUILT PLANS. INSTALL LENGTH OF LEAD SHOWN IN TABLE AT 2% TO END FROM THE FIELD LOCATED LEAD END.

UTILITY NOTES

- 1. SANITARY "MH" SHALL HAVE EJIW 1040 FRAME WITH TYPE A COVER, WITH WORDS "CITY OF POTTERVILLE" AND "SANITARY" INSCRIBED.
- 2. MAIN LINE SANITARY SEWER SHALL BE PVC SDR 23.5.

SANITARY LEADS SHALL BE PVC SDR 26.

- 3. ALL WATER STRUCTURES SHALL HAVE EJIW 1040 FRAME WITH TYPE C COVERS. WORDS "CITY OF POTTERVILLE" AND "WATER DEPT" SHALL BE INSCRIBED.
- 4. WATER MAIN TO BE INSTALLED WITH 5.5' MINIMUM COVER PER MUNICIPALITY DESIGN STANDARDS.
- 5. ALL WATER MAIN SHALL BE AWWA C900 PVC PIPE EXCEPT FOR AS SHOWN ON THE FIRE HYDRANT ASSEMBLY DETAIL.
- 6. ALL WATER LEADS SHALL BE 1 INCH TYPE K COPPER AND INSTALLED TO THE RIGHT OF WAY LINE PER THE DETAIL IDENTIFIED ON SHEET C-11.1.
- 7. MAINTAIN MINIMUM 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.
- 8. MAINTAIN 10' HORIZONTAL SEPARATION BETWEEN WATER MAIN AND ADJACENT SEWERS.
- 9. SEE DETAIL SHEETS C-11.0 AND 11.1 FOR WATER MAIN AND SANITARY DETAILS.

KEVIN C. MCDEVITT ENGINEER 6201043260

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CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

ORIGINAL ISSUE DATE: 12/29/2021

NOOLOT	140.	<u> </u>	JZJ
CALE:	1" =	50'	
0	1/2"	1"	

DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-3.1

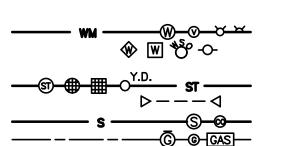
SANITARY SEWER QUANTITIES

QTY	UNIT	ITEM
332	LF	6" PVC SDR 23.5

WATER MAIN QUANTITIES

QTY	UNIT	ITEM
335	LF	1" TYPE K, COPPER WATER SERVICE
11	EA	CURB STOP AND BOX
1	EA	12"X8" TSV & BOX
1	EA	12"X6" TSV & BOX
1	EA	FIRE HYDRANT ASSEMBLY

PROPOSED **EXISTING**



CONSTRUCT NEW-

EX. 8" SANITARY

MANHOLE ON

S-3 (4' DIA.)

WETLAND AREA "G" -

IN BOX

(PER ENVIROLOGIC

ON 11/19/21

12" x 8" TAPPING

SLEEVE AND VALVE

RIM = 879.70

RIM = 880.33IE 8" NE=873.64 IE 8" SW=873.64

5 LF OF 8"

49 LF OF 8

S-13 (4' DIA.) RIM = 887.54 IE 8" NE=875.49

IE 8" E=875.49

|PVC @ 1.00%|

PVC @ 3.22%

S-12 (4' DIA.) RIM = 891.50 IE 8" W=880.00

PVC @ 0.40%

WETLAND AREA "G" -

(PER ENVIROLOGIC

ON 11/19/21

15' EASEMENT

(L.400-P.180 & 186)

WATER WELL, METER, STOP BOX, POST INDICATOR VALVE

SEE CONTINUATION ON

SHEET C-3.1 FOR

CAMBRIA COURT

CONNECT TO EX. WATER

VERIFY DEPTH & LOCATION

PRIOR TO CONSTRUCTION

MAIN. CONTRACTOR TO

TAP EX. 12" WM

SLEEVE & BOX

DETENTION POND WILL BE BUILT AS PART OF PHASE

WITH TAPPING

STORM SEWER, MH, CB, INLET, DOWN SPOUT, YARD DRAIN

UG-ELEC UG ELEC (ELEC, CABLE, FIBER)

S-2 (4' DIA.) RIM = 892.12

IE 8" SW=874.83

IE 8" N=874.83

OPEN SPACE

REMOVE EXISTING BULKHEAD AND CONSTRUCT S-14 ON

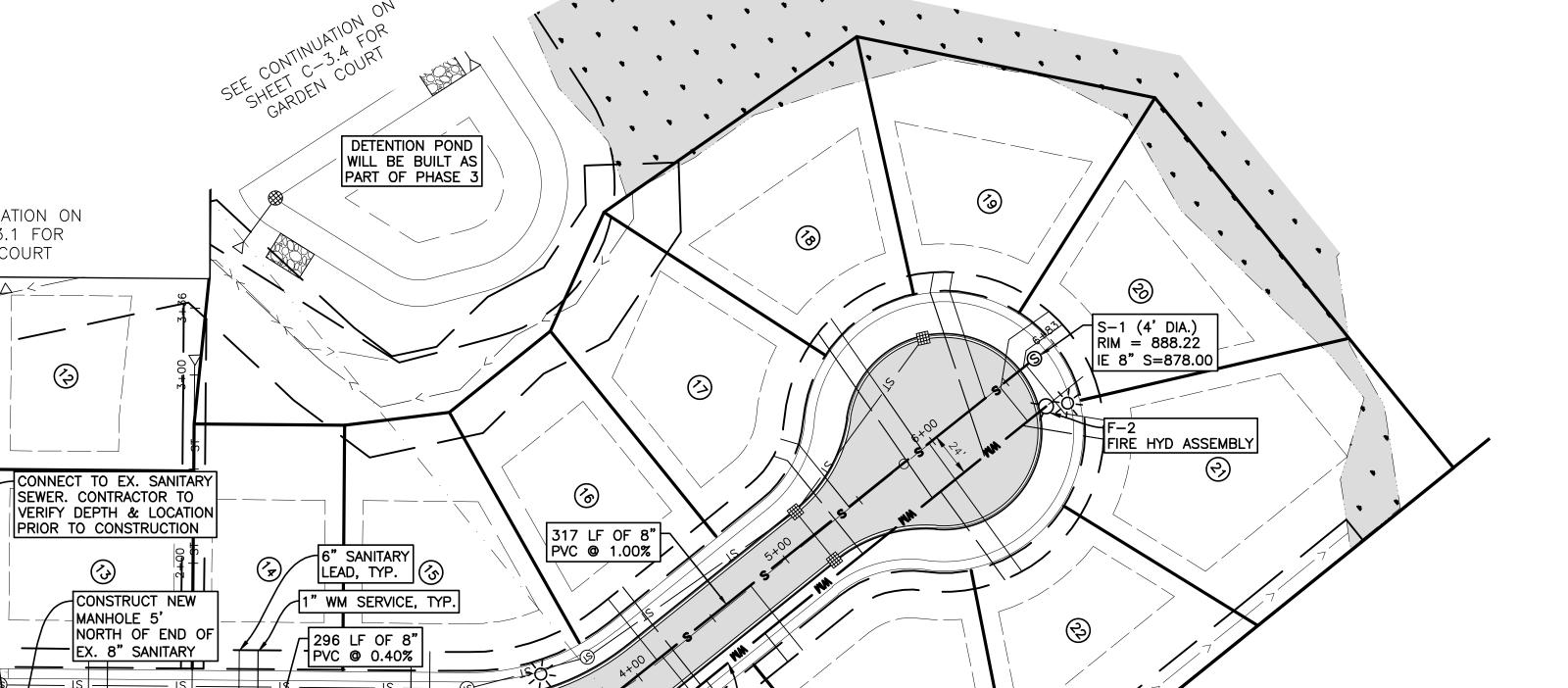
END OF EXISTING 8" SAN

SEWER STUB

RIM 884.97

8" SW=874.96 IE 6" E=881.62

IE 6" N=880.42



657 LF 8" C900

FIRE HYD ASSEMBLY

PVC WATER MAIN

ROSE COURT - SANITARY SEWER LEAD TABLE LEAD IE AT RISER AT END (PERCENT) END or ESMT or ROW 3.3 880.30 3.8 4.6 881.60 4.0 880.00 4.8 880.10 4.7 880.50 4.8 4.8 880.70 5.5 880.61 881.62 5.6 883.24 5.9 884.00 5.5 881.67 6.5 880.60 4.3 880.50 2.6 4.2 883.32 876.29 3.9 2.0 5.2 890.50 879.50 78 893.70 882.58 3.9 6.1 2.0 882.70 5.1 79 893.00 881.73 0.0 13.3 2.0 882.00

- 1. SANITARY "MH" SHALL HAVE EJIW 1040 FRAME WITH TYPE A COVER, WITH WORDS "CITY OF POTTERVILLE" AND "SANITARY" INSCRIBED.
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SANITARY LEADS SHALL BE PVC SDR 26.

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- 8. MAINTAIN 10' HORIZONTAL SEPARATION BETWEEN WATER MAIN AND ADJACENT SEWERS.
- 9. SEE DETAIL SHEETS C-11.0 AND 11.1 FOR WATER MAIN AND SANITARY DETAILS.

UTILITY NOTES

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6201043260 Kevin CM Ferry

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DETERMINING THE EXACT UTILITY LOCATIC
AND ELEVATIONS PRIOR TO THE START
C O N S T R U C T I O N

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

ORIGINAL ISSUE DATE:

12/29/2021 PROJECT NO: 21-329

> SCALE: 1" = 50'1/2"

FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-3.2

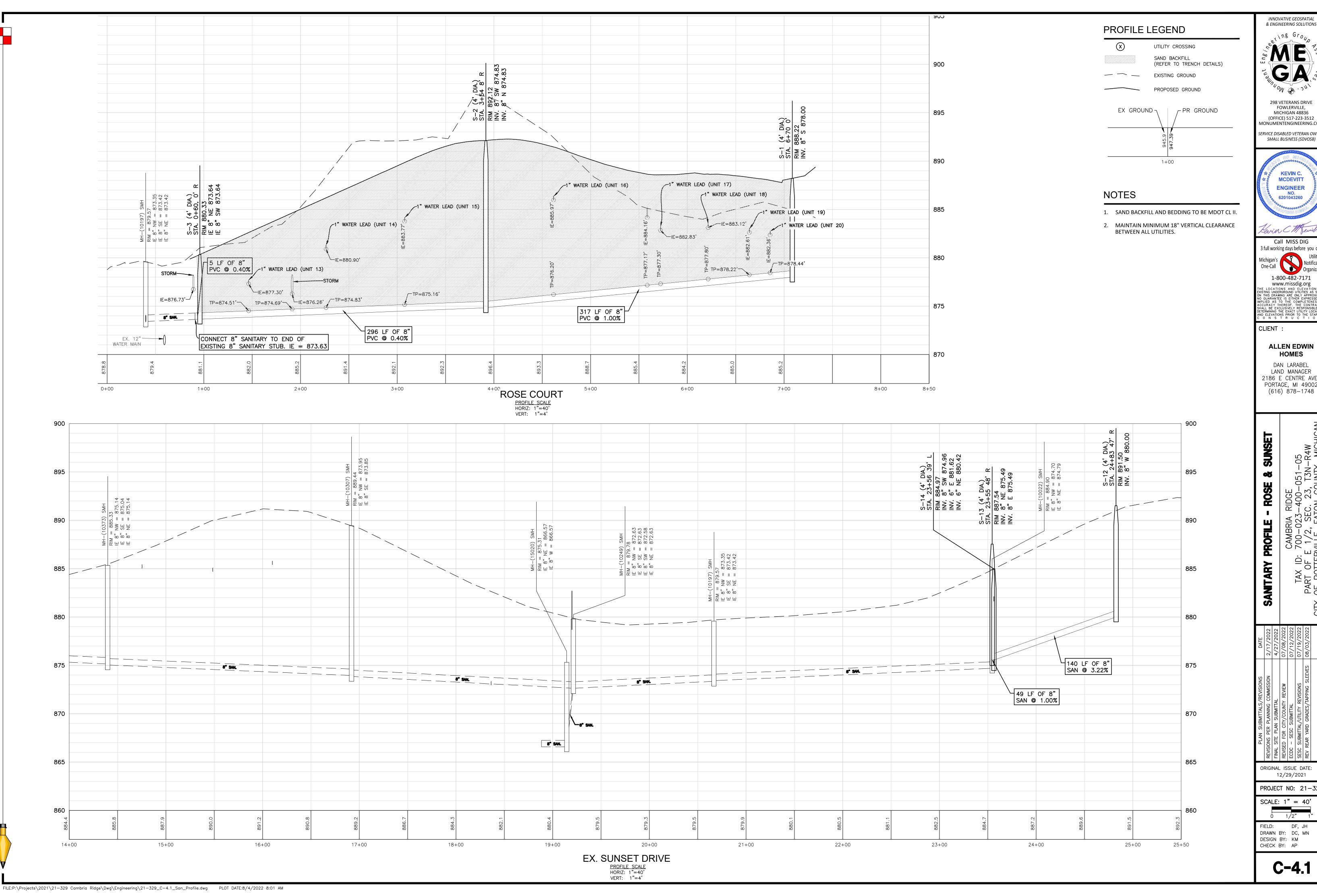
SANITARY SEWER QUANTITIES

QTY	UNIT	ITEM
802	LF	8" PVC SDR 26
918	LF	6" PVC SDR 23.5
5	EA	4' MANHOLE

WATER MAIN QUANTITIES

QTY	UNIT	ITEM
657	LF	8" C900 PVC WATER MAIN
890	LF	1" TYPE K, COPPER WATER SERVICE
1	EA	12"x8" TSV AND BOX
2	EA	FIRE HYDRANT ASSEMBLY
21	EA	CURB STOP AND BOX

FILE:P:\Projects\2021\21-329 Cambria Ridge\Dwg\Engineering\21-329_C-3.1_Util_Detail.dwg PLOT DATE:8/3/2022 8:19 PM



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EXISTING UNDERGROUND UTILITIES AS SHOW
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IMPLIED AS TO THE COMPLETENESS C
ACCURACY THEREOF. THE CONTRACTC
SHALL BE EXCLUSIVELY RESPONSIBLE FO
DETERMINING THE EXACT UTILITY LOCATION
AND ELEVATIONS PRIOR TO THE START
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CLIENT :

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ORIGINAL ISSUE DATE: 12/29/2021

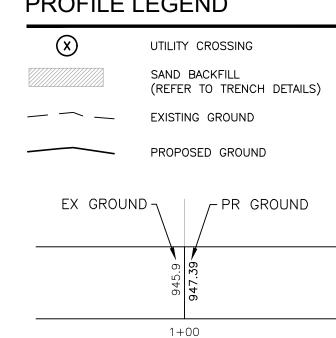
PROJECT NO: 21-329 SCALE: 1" = 40'

0 1/2" 1

FIELD: DF, JH
DRAWN BY: DC, MN
DESIGN BY: KM
CHECK BY: AP

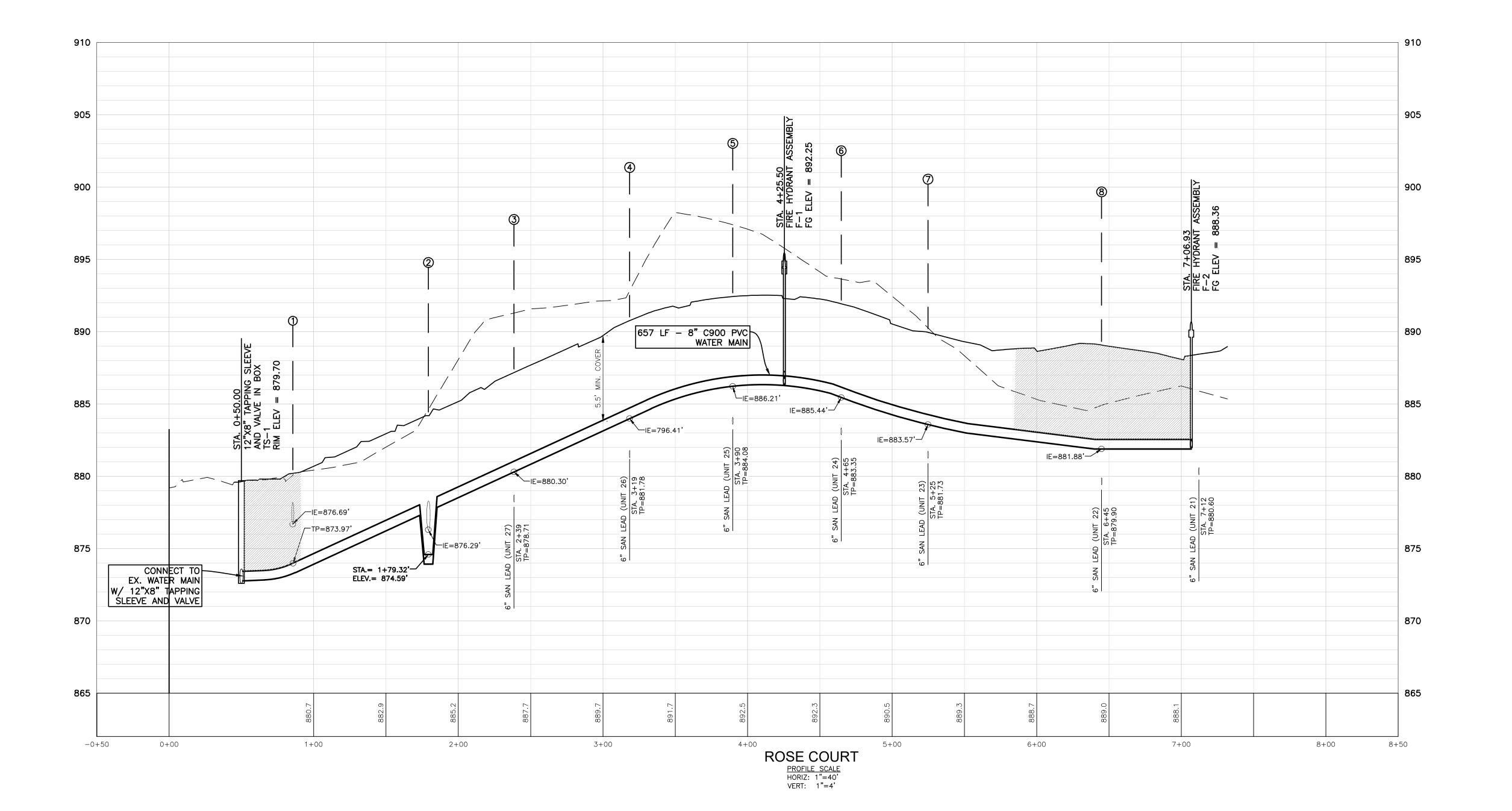
C-4.1

PROFILE LEGEND



NOTES

- 1. SAND BACKFILL AND BEDDING TO BE MDOT CL II.
- 2. MAINTAIN MINIMUM 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.



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CLIENT :

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE., PORTAGE, MI 49002 (616) 878-1748

> 3RIA RIDGE -023-400-051-05 , SEC. 23, T3N-R4W

CAMBRIV TAX ID: 700-02 PART OF E 1/2, S

AL SITE PLANNING COMMISSION 2/17/2022

AL SITE PLAN SUBMITTAL 4/27/2022

ASED FOR CITY/COUNTY REVIEW 07/08/202

C — SESC SUBMITTAL

SC SUBMITTAL/UTILITY REVISIONS 07/19/202

A REAR YARD GRADES/TAPPING SLEEVES 08/03/202

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 40'

0 1/2" 1"

FIELD: DF, JH
DRAWN BY: DC, MN
DESIGN BY: KM
CHECK BY: AP

C-5.1

PROPOSED

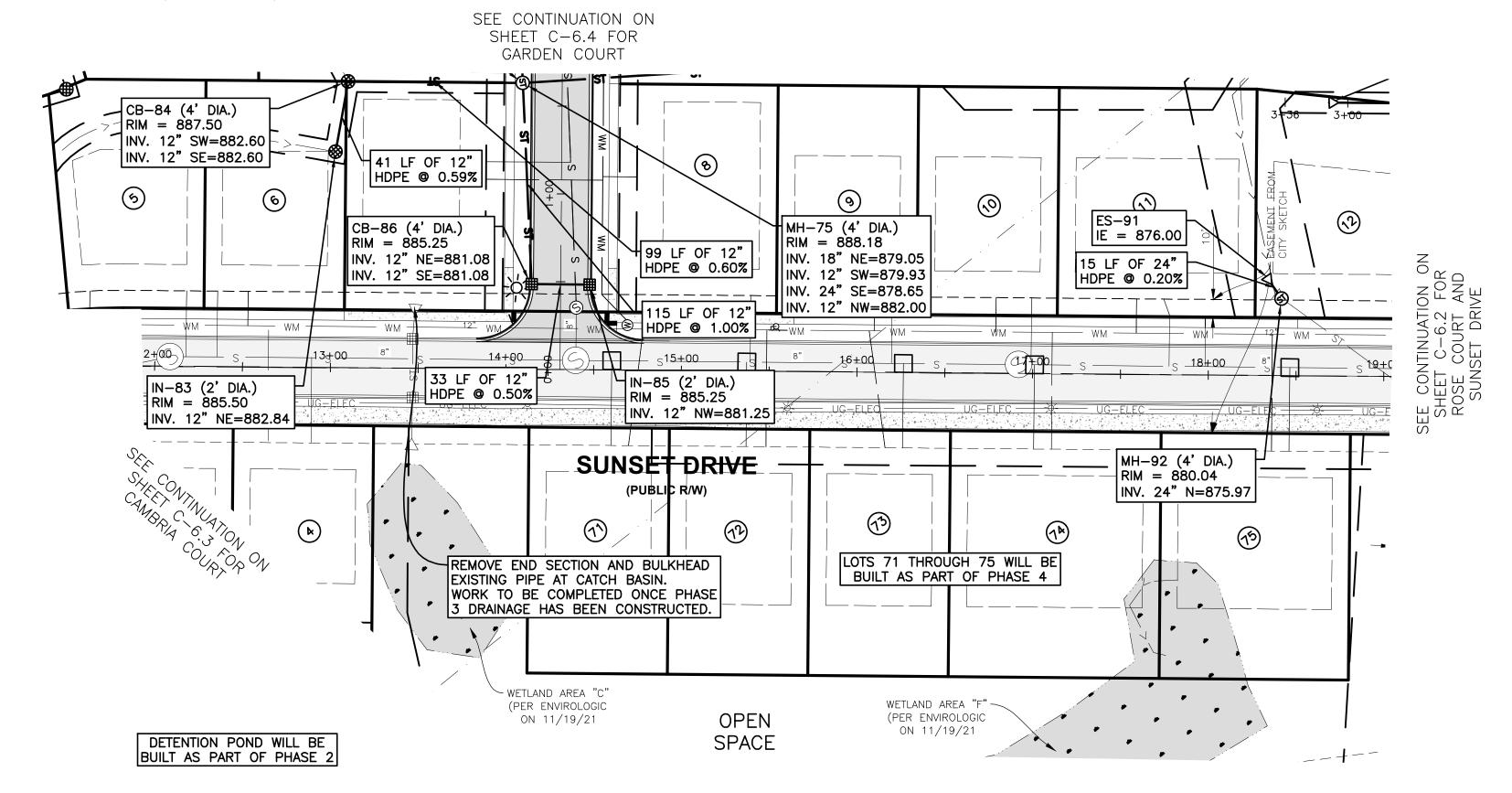
EXISTING

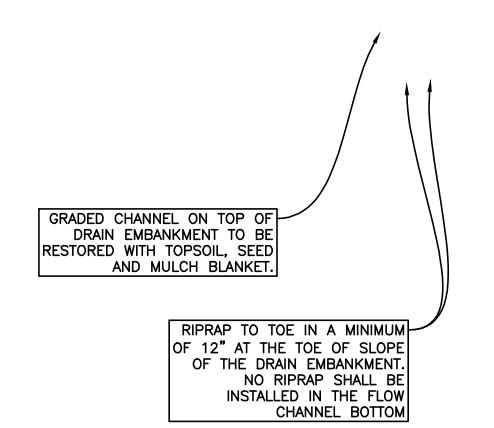
GAS GAS UG GAS, MH, VALVE, LINE MARKER

WATER MAIN, MH, VALVE IN BOX, HYDRANT WATER WELL, METER, STOP BOX, POST INDICATOR VALVE

STORM SEWER, MH, CB, INLET, DOWN SPOUT, YARD DRAIN

SANITARY SEWER, MH, CLEAN OUT UG-ELEC UG ELEC (ELEC, CABLE, FIBER)





STORM SEWER NOTES

- 1. "IN" & "CB" STRUCTURES SHALL HAVE EJIW 1020 FRAME WITH TYPE M1 GRATE.
- 2. CURB "IN" & "CB" STRUCTURES SHALL HAVE EJIW 7010 FRAME WITH TYPE M1 GRATE.
- 3. STORM "MH" STRUCTURES SHALL HAVE EJIW 1040 FRAME WITH A TYPE A PERFORATED COVER.
- 4. MAINTAIN MINIMUM 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.

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C O N S T R U C T I O N

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329 SCALE: 1" = 50'

FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-6.1

STORM SEWER QUANTITIES

QTY	UNIT	ITEM
322	LF	12" HDPE
214	LF	18" HDPE
138	LF	24" HDPE
4	EA	2' INLET
6	EA	4' MANHOLE
1	EA	18" FLARED END SECTION
3	EA	24" FLARED END SECTION
2	EA	CONTROL STRUCTURES

PROPOSED **EXISTING**

SANITARY SEWER, MH, CLEAN OUT UG-ELEC UG ELEC (ELEC, CABLE, FIBER)

WETLAND AREA "G" ~

(PER ENVIROLOGIC ON 11/19/21

15' EASEMENT

(L.400-P.180 & 186)

WETLAND AREA "G" — (PER ENVIROLOGIC ON 11/19/21

WATER MAIN, MH, VALVE IN BOX, HYDRANT WATER WELL, METER, STOP BOX, POST INDICATOR VALVE

STORM SEWER, MH, CB, INLET, DOWN SPOUT, YARD DRAIN

SEE CONTINUATION ON

SHEET C-6.1 FOR SUNSET DRIVE

9 LF OF 8"

|PVC @ 3.00%|

CB-6 (4' DIA.) RIM = 879.97

33 LF OF 8" PVC @ 1.00%

ES-9 IE = 876.35

INV. 8" SE=877.32 INV. 8" W=877.32

248 LF OF 12" HDPE @ 1.65%

MH-14 (4' DIA.) RIM = 884.47

78 LF OF 24" | INV. 24" S=876.27 | INV. 24" NW=876.27 | INV. 24" NW=876.27

OPEN SPACE

ROSECOURT

CS-13 (4' DIA.) RIM = 879.00

IE = 876.35

42 LF OF 24" HDPE @ 0.24%

|E| = 876.45

INV. 24" N=876.35

GAS GAS UG GAS, MH, VALVE, LINE MARKER

MH-5 (7' DIA.) RIM = 880.08

INV. 12" NE=877.05 INV. 8" E=877.05

INV. 18" SE=876.80

IN-7 (2' DIA.)

121 LF OF 18" HDPE @ 0.24%

RIM = 880.14

INV. 18" SE=876.51 INV. 18" NW=876.51

69 LF OF 18" HDPE @ 0.23%

|RIM| = 879.97INV. 8" NW=877.65

66 LF OF 12" HDPE @ 0.77%

જિ

DETENTION POND WILL BE CB-1 (4' DIA.) RIM = 887.12 INV. 12" S=883.12 BUILT AS PART OF PHASE 3 115 LF OF 12" HDPE @ 0.33% 135 LF OF 12" HDPE @ 0.81% RIM = 892.31ES-15 IE = 876.00 INV. 12" N=881.65 INV. 12" SW=881.65 (2) MH-4 (4' DIA.) RIM = 891.17 CB-2 (4' DIA.) RIM = 888.33 INV. 12" NE=881.14 INV. 12" E=884.00 INV. 12" SW=881.14 INV. 12" S=882.74 INV. 12" N=882.74 208 LF OF 24" HDPE @ 0.13% IN-10 (2' DIA.) RIM = 888.33

INV. 12" W=884.33

€}

└── 33 LF OF 12"

(S)

|HDPE @ 1.00%|

STORM SEWER NOTES

- 1. "IN" & "CB" STRUCTURES SHALL HAVE EJIW 1020 FRAME WITH TYPE M1 GRATE.
- CURB "IN" & "CB" STRUCTURES SHALL HAVE EJIW 7010 FRAME WITH TYPE M1 GRATE.
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DETERMINING THE EXACT UTILITY LOCATIC
AND ELEVATIONS PRIOR TO THE START
C O N S T R U C T I O N

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

COURT ROS

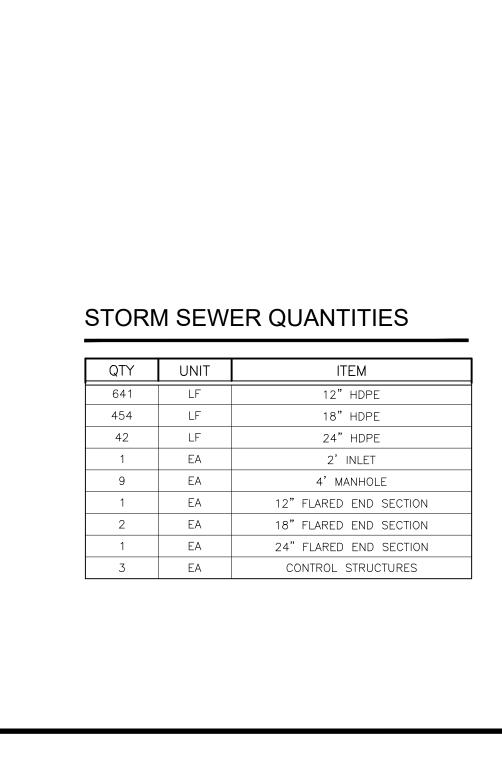
STORM

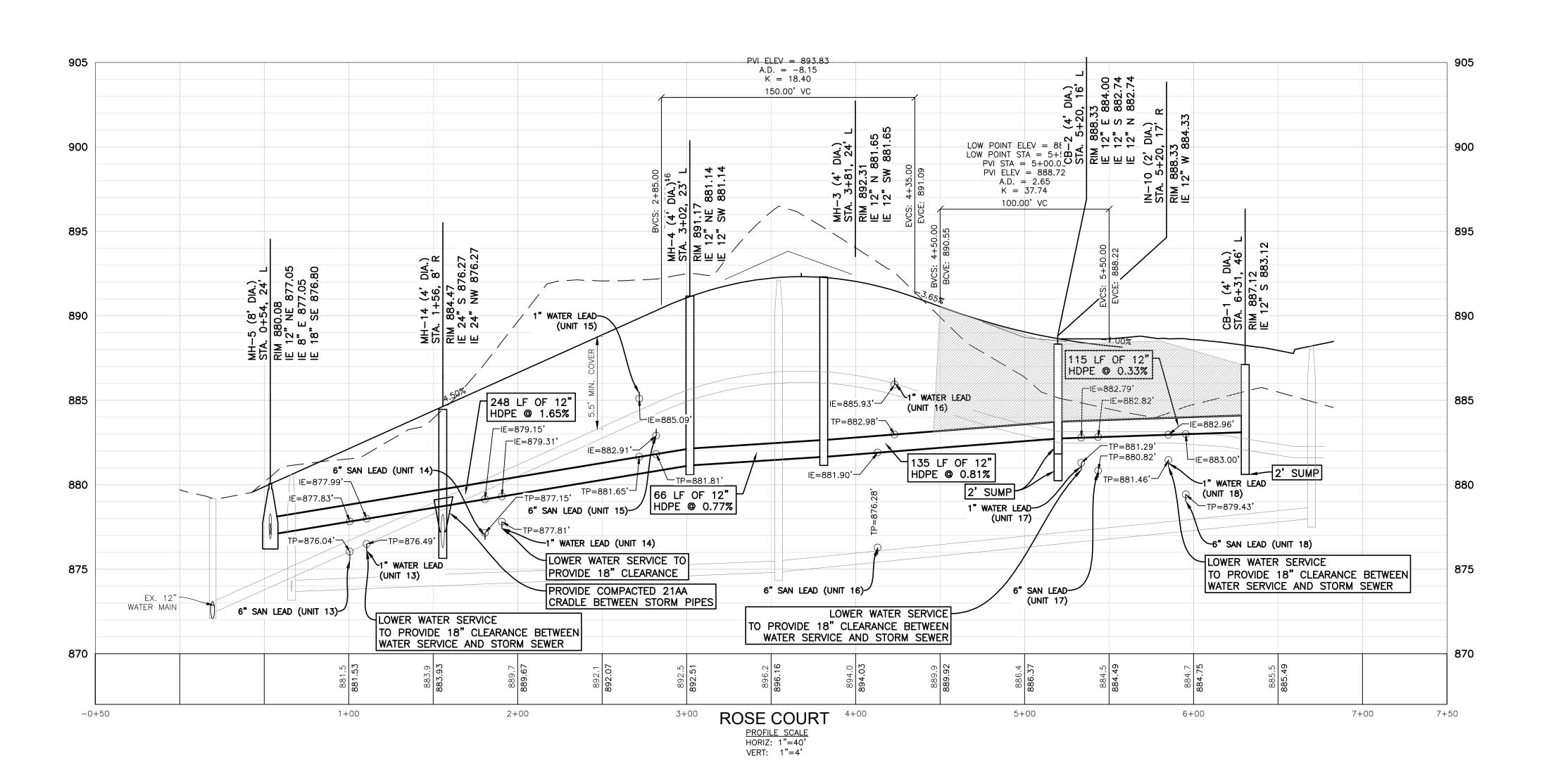
ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329 SCALE: 1" = 50'

1/2" FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-6.2





PROFILE LEGEND

UTILITY CROSSING SAND BACKFILL (REFER TO TRENCH DETAILS) ____ EXISTING GROUND PROPOSED GROUND EX GROUND \ PR GROUND

NOTES

- 1. SAND BACKFILL AND BEDDING TO BE MDOT CL II.
- 2. MAINTAIN MINIMUM 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.

ering Group 298 VETERANS DRIVE FOWLERVILLE, MICHIGAN 48836 (OFFICE) 517-223-3512 MONUMENTENGINEERING.COM SERVICE DISABLED VETERAN OWNEL SMALL BUSINESS (SDVOSB)



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THE LOCATIONS AND ELEVATIONS O
EXISTING UNDERGROUND UTILITIES AS SHOW
ON THIS DRAWING ARE ONLY APPROXIMAT
NO GUARANTEE IS EITHER EXPRESSED C
IMPLIED AS TO THE COMPLETENESS C
ACCURACY THEREOF. THE CONTRACT(
SHALL BE EXCLUSIVELY RESPONSIBLE F(
DETERMINING THE EXACT UTILITY LOCATION
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CLIENT:

ROSE

& ROAD PROFILE

ALLEN EDWIN HOMES

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STORM

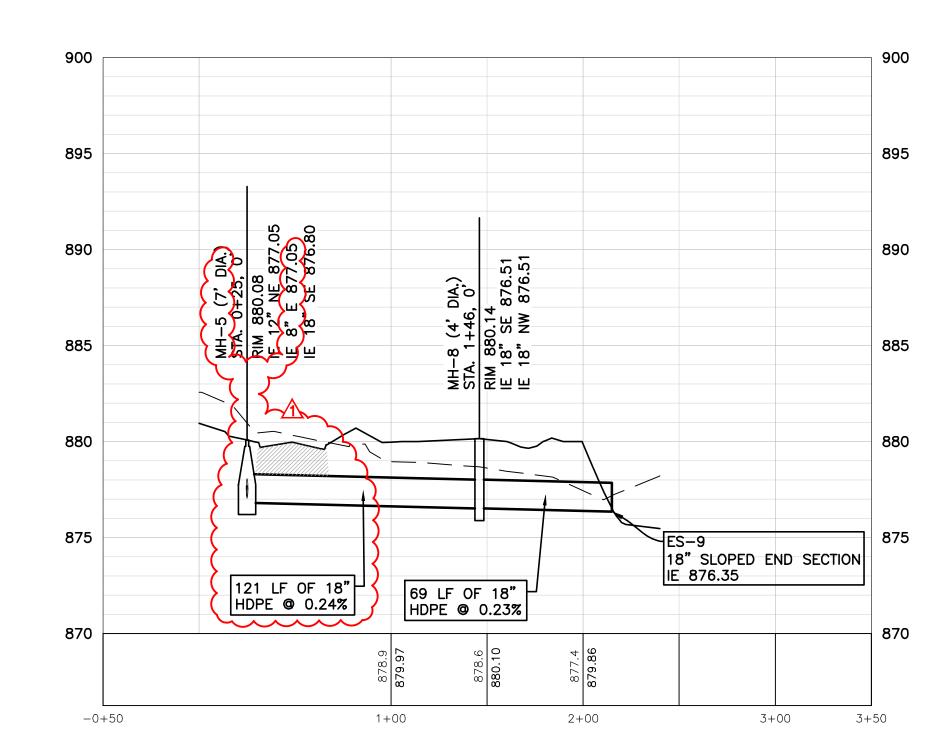
ORIGINAL ISSUE DATE:

12/29/2021 PROJECT NO: 21-329

SCALE: 1" = 40'1/2"

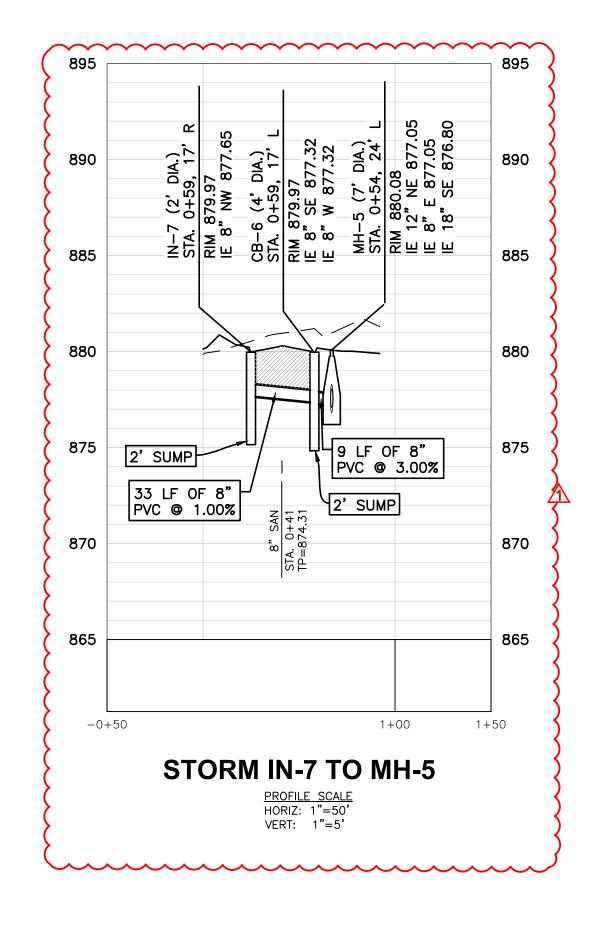
FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

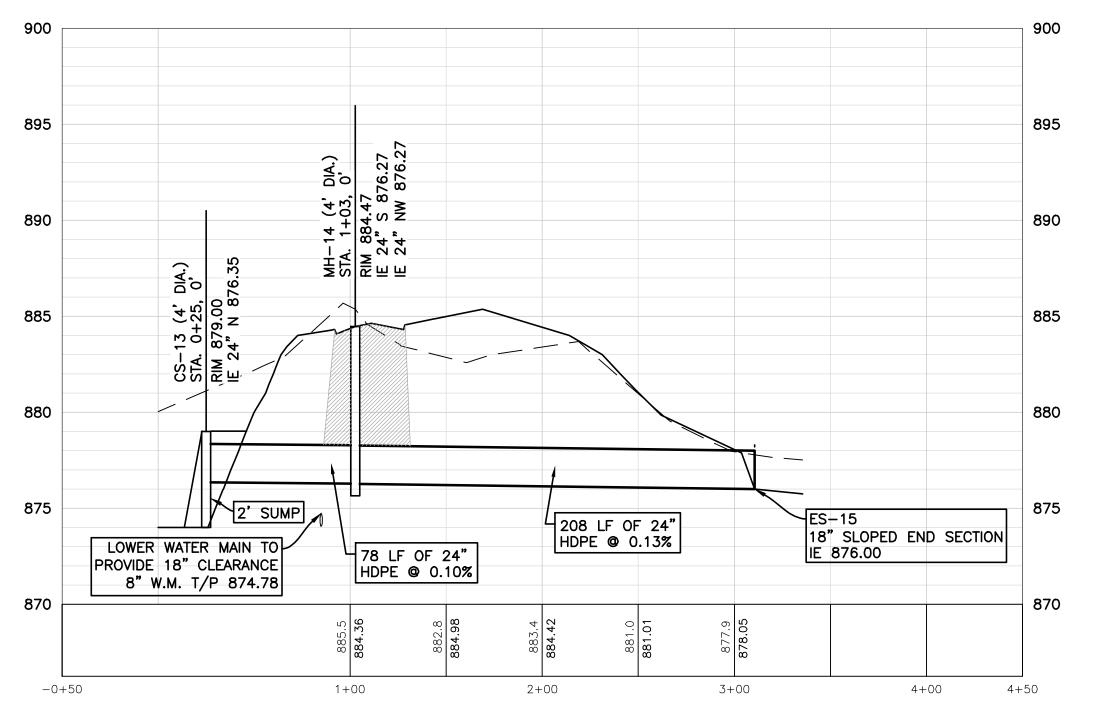
C-6.2.1



STORM MH-5 to ES-9

PROFILE SCALE
HORIZ: 1"=50'
VERT: 1"=5'





STORM CS-14 to ES-16

PROFILE SCALE
HORIZ: 1"=50'
VERT: 1"=5'

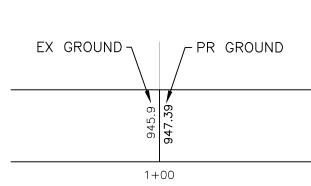
PROFILE LEGEND

UTILITY CROSSING

SAND BACKFILL
(REFER TO TRENCH DETAILS)

EXISTING GROUND

PROPOSED GROUND



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3, T3N-R4W

CAMBRIA RIDGE

): 700-023-400-05'

E 1/2, SEC. 23, T3

STORM
TAX ID:
PART OF
CITY OF POTTE

07/08/2022 07/12/2022 07/19/2022 ES 08/03/2022 ITTAL 08/19/2022 09/06/2022 SION 09/28/2021

SITE PLAN SUBMITTAL

D FOR CITY/COUNTY REVIEW

SESC SUBMITTAL
SUBMITTAL/UTILITY REVISIONS

AR YARD GRADES/TAPPING SLEEVES

D PER CITY/EGLE WATER RESUBMITT

D HYDRANT DETAIL

ORIGINAL ISSUE DATE:

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SCALE: 1" = 40'

Ö 1/2" 1'"

FIELD: DF, JH

DRAWN BY: DC, MN

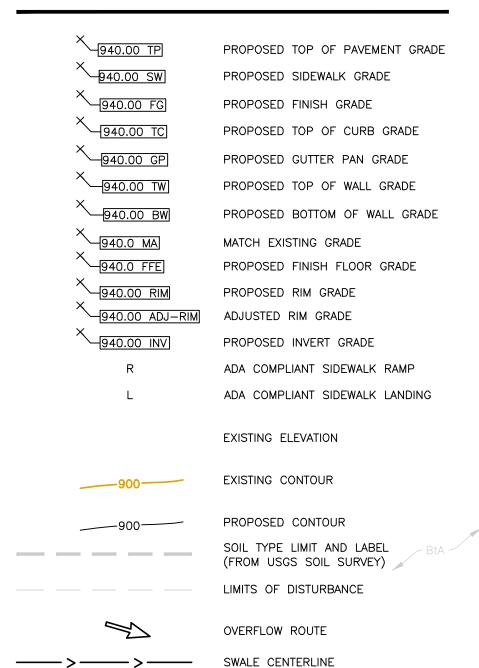
DESIGN BY: KM

CHECK BY: AP

C-6.5



GRADING LEGEND



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- 3. EROSION AND ANY SEDIMENTATION FROM WORK ON THIS SITE SHALL BE CONTAINED ON THE SITE AND NOT ALLOWED TO COLLECT ON ANY OFF-SITE AREAS OR IN WATERWAYS. WATERWAYS INCLUDE BOTH NATURAL AND MAN-MADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES AND PONDS.
- 4. CONTRACTOR SHALL APPLY TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES WHEN REQUIRED AND AS DIRECTED ON THESE PLANS. CONTRACTOR SHALL REMOVE TEMPORARY MEASURES AS SOON AS PERMANENT STABILIZATION OF SLOPES, DITCHES AND OTHER CHANGES HAS BEEN ACCOMPLISHED.
- 5. STAGING OF THE WORK WILL BE DONE BY THE CONTRACTOR AS DIRECTED IN THESE PLACES AND AS REQUIRED TO INSURE PROGRESSIVE STABILIZATION OF DISTURBED
- 6. SOIL EROSION CONTROL PRACTICES WILL BE ESTABLISHED IN EARLY STAGES OF CONSTRUCTION BY THE CONTRACTOR. SEDIMENT CONTROL PRACTICES WILL BE APPLIED AS A PERIMETER DEFENSE AGAINST ANY TRANSPORTING OF SILT OFF THE SITE.
- 7. A CERTIFIED STORM WATER OPERATOR WILL BE NAMED ON THE MDEQ NOTICE OF COVERAGE FOR NPDES AS REQUIRED.
- 8. ALL DISTURBED AREAS ARE TO BE TOP SOILED AND SEEDED WITH THE FOLLOWING MIN RATIO: TOP-SOIL 3" IN DEPTH, GRASS SEED 210 LBS PER ACRE, FERTILIZER 150 LBS PER ACRE, STRAW MULCH 3" DEPTH 1.5 TO 2 TONS PER ACRE.
- 9. HYDRO-SEEDING IS NOT ACCEPTABLE FOR SLOPES EXCEEDING 1%. ON SLOPES OVER 1%, STABILIZATION SHALL BE DONE WITH SEED AND STRAW MULCH WITH A TACKIFIER, OR STRAW BLANKETS PEGGED IN PLACE.

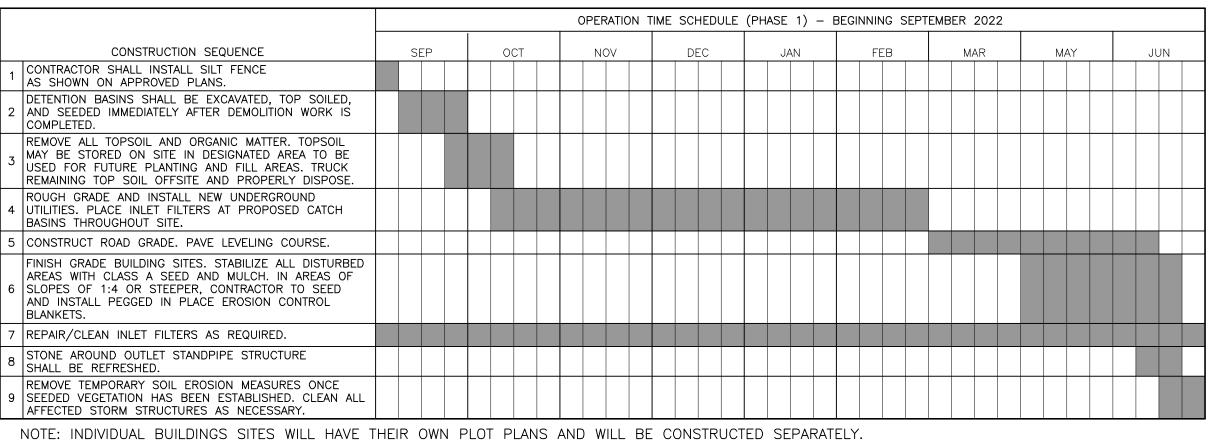
DTMB SOIL EROSION & SEDIMENTATION CONTROL MEASURES (SEE DETAIL PLANS)

MICHIGAN DEPARTMENT OF TECHNOLOGY, MANAGEMENT, AND BUDGET (DTMB)

KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
E6	MULCH		FOR USE IN AREAS SUBJECT TO EROSIN SURFACE FLOWS OR SEVERE WIND OR NEWLY SEEDED AREAS.
E8	PERMANENT SEEDING	XION WOODEN WOODEN	STABILIZATION METHOD UTILIZED ON SITI WHERE EARTH CHANGE HAS BEEN COMPLETED (FINAL GRADING ATTAINED).
SEI	DIMENT CONTROLS		
KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
S51	SILT FENCE		USE ADJACENT TO CRITICAL ARE TO PREVENT SEDIMENT LADEN SH FLOW FROM ENTERING THESE ARI
S53	STABILIZED CONSTRUCTION ACCESS		USED AT EVERY POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR LEAVES A CONSTRUCTION SIT
S55	SEDIMENT BASIN		AT THE OUTLET OF DISTURBED AREAS AND AT THE LOCATION O A PERMANENT DETENTION BASIN.
S58	INLET PROTECTION FABRIC DROP		USE AT STORMWATER INLETS, ESPECIALLY AT CONSTRUCTION S
ER	OSION & SEDIMEN	T CONTROLS	
KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
ES31	CHECK DAM		USED TO REDUCE SURFACE FLOW VELOCITIES WITHIN CONSTRUCTED AND EXISTING FLOW CORRIDORS.

SOIL EROSION CONTROL MAINTENANCE SCHEDULE AND NOTES

- 1. CONTRACTOR MUST OBTAIN A SOIL EROSION AND SEDIMENTATION CONTROL PERMIT FROM THE EATON COUNTY DRAIN COMMISSIONER'S OFFICE PRIOR TO COMMENCING WORK.
- 2. EARTHWORK SHALL BE LIMITED TO THE PROPOSED SITE AS SHOWN ON THE PLAN.
- 3. CONTRACTOR SHALL INSPECT THE SOIL EROSION/SEDIMENTATION CONTROL DEVICES ONCE A WEEK AND/OR WITHIN 24 HOURS OF A RAINFALL EVENT WHICH RESULTS IN A STORM WATER DISCHARGE FROM THE SITE. ANY DAMAGE TO EROSION CONTROL MEASURES MUST BE REPAIRED IMMEDIATELY.
- 4. ALL MUD OR DEBRIS TRACKED ONTO EXISTING PUBLIC ROADS FROM THE SITE DUE TO CONSTRUCTION SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
- 5. SILT FENCE MAINTENANCE SHALL INCLUDE THE REMOVAL OF ANY BUILT-UP SEDIMENT WHEN THE SEDIMENT HEIGHT ACCUMULATES TO 1/3 TO 1/2 OF THE HEIGHT OF THE FENCE. THE CONTRACTOR IS RESPONSIBLE TO REMOVE, REPLACE, RETRENCH OR RE-BACKFILL THE SILTATION FENCE SHOULD IT FAIL OR BE DAMAGED DURING CONSTRUCTION.
- 6. PERMANENT STABILIZATION MUST BE COMPLETED WITHIN 30 DAYS OF FINAL GRADING.
- 7. ACCESS ROADS MUST BE MAINTAINED AS NECESSARY, TO KEEP THEM EFFECTIVE, NEW LAYERS OF STONE MAY BE ADDED AS OLD LAYERS BECOME COMPACTED. STEPS SHOULD ALSO BE TAKEN TO REPAIR THE ACCESS ROADS IF RUTS OR PONDING WATER APPEARS.
- 8. INLET FILTERS SHOULD BE INSPECTED FOR BUILDUP OF SILT AND OTHER DEBRIS. THIS IS EVIDENT IF GEOTEXTILE/SOD STRUCTURE IS CAUSING FLOODING. MAINTENANCE WOULD CONSIST OF REMOVING OF SEDIMENTS WITH A STIFF BRISTLE BROOM OR SQUARE POINT SHOVEL. IF INLET FILTER IS BEYOND THIS LEVEL OF REPAIR, IT MAY BE NECESSARY TO REPLACE BOTH THE SOD AND GEOTEXTILE FILTER.
- 9. IF SOIL EROSION/SEDIMENT CONTROL MEASURES ARE INADEQUATE FOR THE SITE. THE PROPER EROSION CONTROL AUTHORITY MUST BE NOTIFIED.



AREA DISTURBED

AREA

(SFT)

8,747

854

2,418

12,019 0.28

AREA

(ACRE)

0.20

0.02

0.06

PROJECT TOTAL AREA DISTURBED: 1,180,495 SFT (26.4 ACRES)

PHASE 1 DISTURBED AREA: 303,233 SFT (9.3 ACRES) PHASE 2 DISTURBED AREA: 361,970 SFT (8.3 ACRES) PHASE 3 DISTURBED AREA: 342,859 SFT (7.9 ACRES) PHASE 4 DISTURBED AREA: 99,484 SFT (2.3 ACRES)

NOTE: TOTAL AREA DOES NOT EQUAL TOTAL PHASES DUE TO OVERLAP OF GRADING AT PHASE LINES.

SOILS INFO

SOIL TYPES ARE ACCORDING TO THE USDA SOIL SURVEY WEB SITE (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

— SOIL TYPE LIMIT AND LABEL COLWOOD LOAM

MARLETTE LOAM, 2-6% SLOPES

CvraaB: CONOVER LOAM, 0-4% SLOPES

FILER LOAM, 6-12% SLOPES

FILER LOAM, 12-18% SLOPES MaD:

OWOSSO-MARLETTE SANDY LOAM, 6-12% SLOPES OwC:

PARKHILL LOAM, 0-2% SLOPES Pr:

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ELERMINING THE EXACT UTILITY LOCAL

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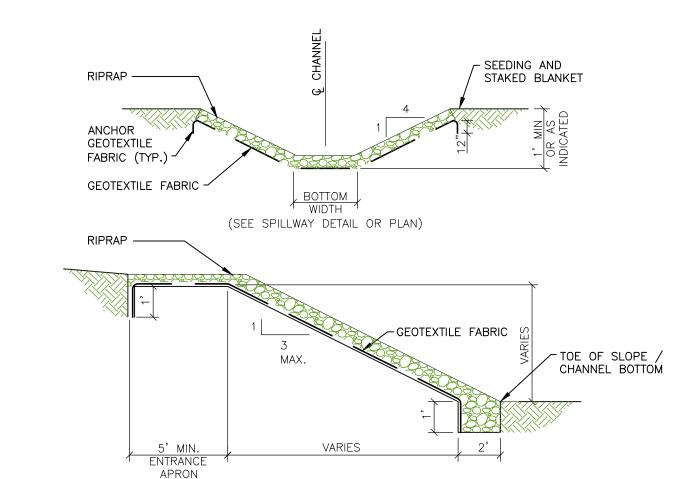
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PROJECT NO: 21-329 SCALE: 1" = 100'

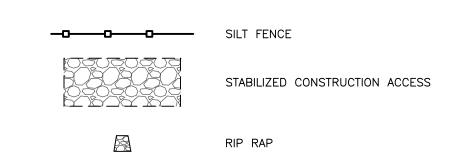
1/2" FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM

CHECK BY: AP **C-7.0**

RIPRAP SPILLWAY DETAIL



SESC LEGEND



PHASE 1 **EROSION CONTROL QUANTITIES**

Disturbed Area: 303,233 SFT (9.3 ACRES)

WILL BE PERMITTED SEPARATELY.

QTY	UNIT	ITEM				
620	LF	SILT FENCE				
4314	EA	INLET FILTER				
1	EA	STABILIZED CONSTRUCTION ACCESS				
103	SY	RIP-RAP				
NOTE: QUANT	NOTE: QUANTITIES ARE FOR PHASE 1 ONLY. FUTURE PHASES					

UNIT	Highest		LOWEST	BASEMENT	wo
NO.	Side	FFE	FG	FLOOR	/DL
1	893.26	895.30	886.30	886.30	wo
2	893.26	895.30	886.30	886.30	wo
3	889.50	891.50	882.50	882.50	WO
4	885.45	887.50	878.50	878.50	wo
5	889.76	891.80	889.90	882.80	
6	887.83	889.80	887.90	880.80	
7	889.00	891.00	888.82	882.00	
8	889.08	891.10	889.15	882.10	
9	891.85	893.90	888.40	884.90	DL
10	891.85	893.90	884.90	884.90	wo
11	889.46	891.50	882.50	882.50	wo
12	880.35	882.40	880.50	873.40	
69	891.55	893.60	884.60	884.60	wo
70	891.55	893.60	888.10	884.60	DL
71	888.78	890.80	881.80	881.80	wo
72	891.69	893.70	891.80	884.70	
73	891.69	893.70	891.80	884.70	
74	891.56	893.60	884.60	884.60	wo
75	883.00	885.00	879.50	876.00	DL

940.00 SW	PROPOSED SIDEWALK GRADE
940.00 FG	PROPOSED FINISH GRADE
940.00 TC	PROPOSED TOP OF CURB GRADE
940.00 GP	PROPOSED GUTTER PAN GRADE
×	PROPOSED TOP OF WALL GRADE
×940.00 BW	PROPOSED BOTTOM OF WALL GRAD
940.0 MA	MATCH EXISTING GRADE
940.0 FFE	PROPOSED FINISH FLOOR GRADE
940.00 RIM	PROPOSED RIM GRADE
×	ADJUSTED RIM GRADE
×[940.00_INV]	PROPOSED INVERT GRADE
R	ADA COMPLIANT SIDEWALK RAMP
L	ADA COMPLIANT SIDEWALK LANDING
110.00 X	EXISTING ELEVATION
900	EXISTING CONTOUR
900	PROPOSED CONTOUR
	SOIL TYPE LIMIT AND LABEL (FROM USGS SOIL SURVEY)
	LIMITS OF DISTURBANCE
	OVERFLOW ROUTE

PROPOSED TOP OF PAVEMENT GRADE

DTMB SOIL EROSION & SEDIMENTATION **CONTROL MEASURES**

MICHIGAN DEPARTMENT OF TECHNOLOGY, MANAGEMENT, AND BUDGET (DTMB)

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E12	PERMANENT SEEDING		USE ALONG SHORELINES, WATERWAYS, OR WHERE CONCENTRATED FLOWS OCCUR. SLOWS VELOCITY, REDUCES SEDIMENT LOAD, AND REDUCES EROSION.
SE	DIMENT CONTROLS	3	
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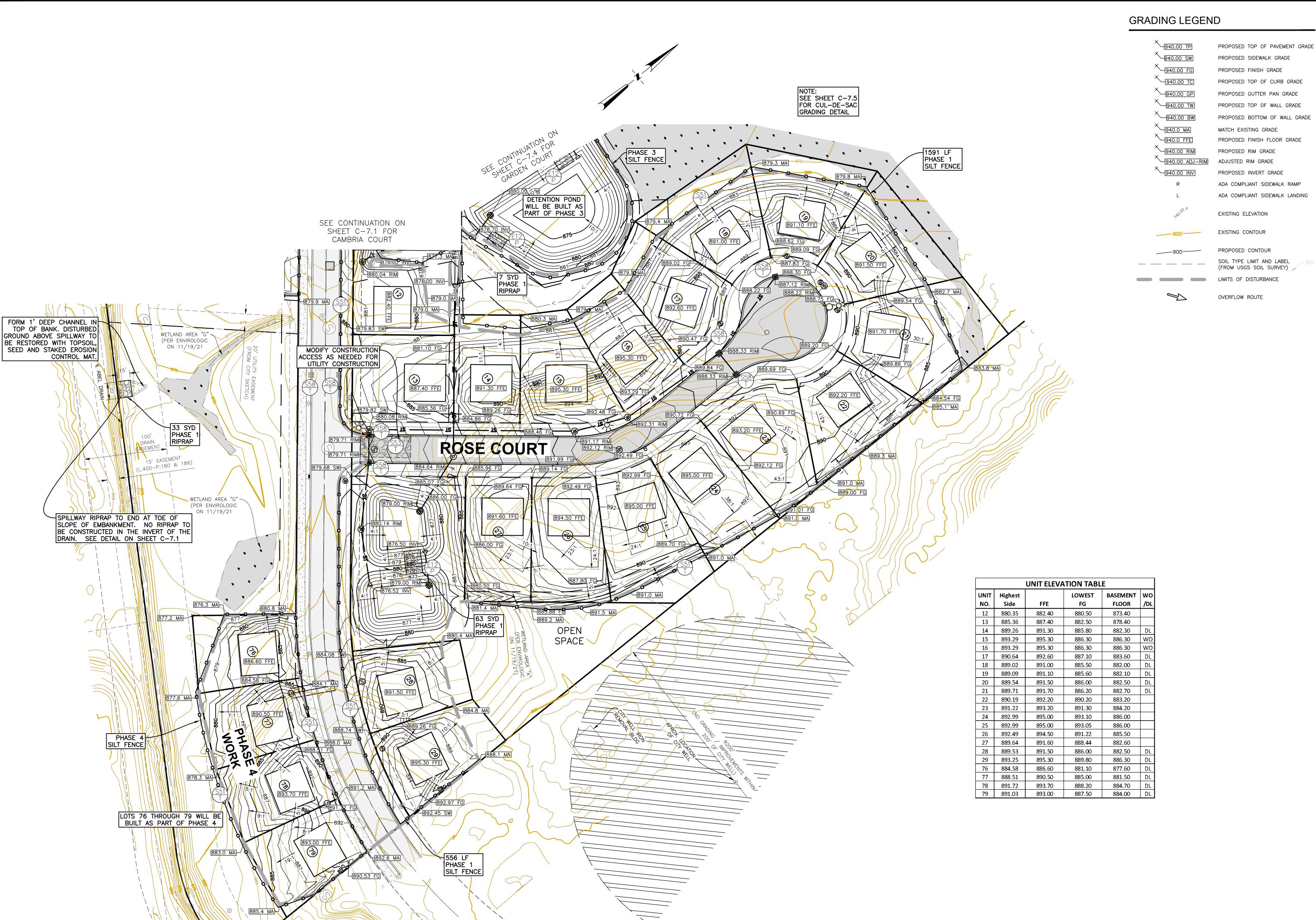
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CHECK BY: AP



PROPOSED TOP OF PAVEMENT GRADE

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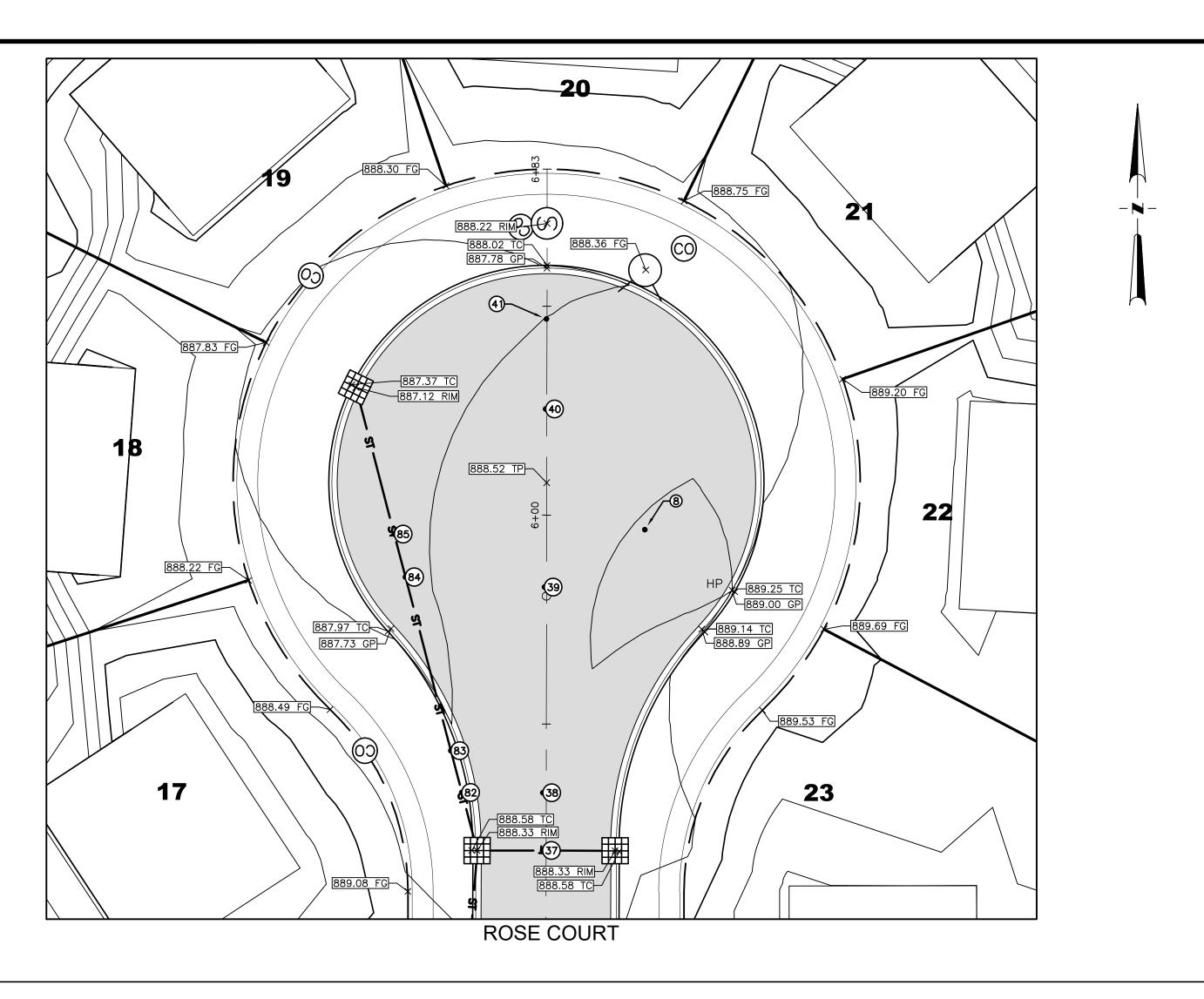
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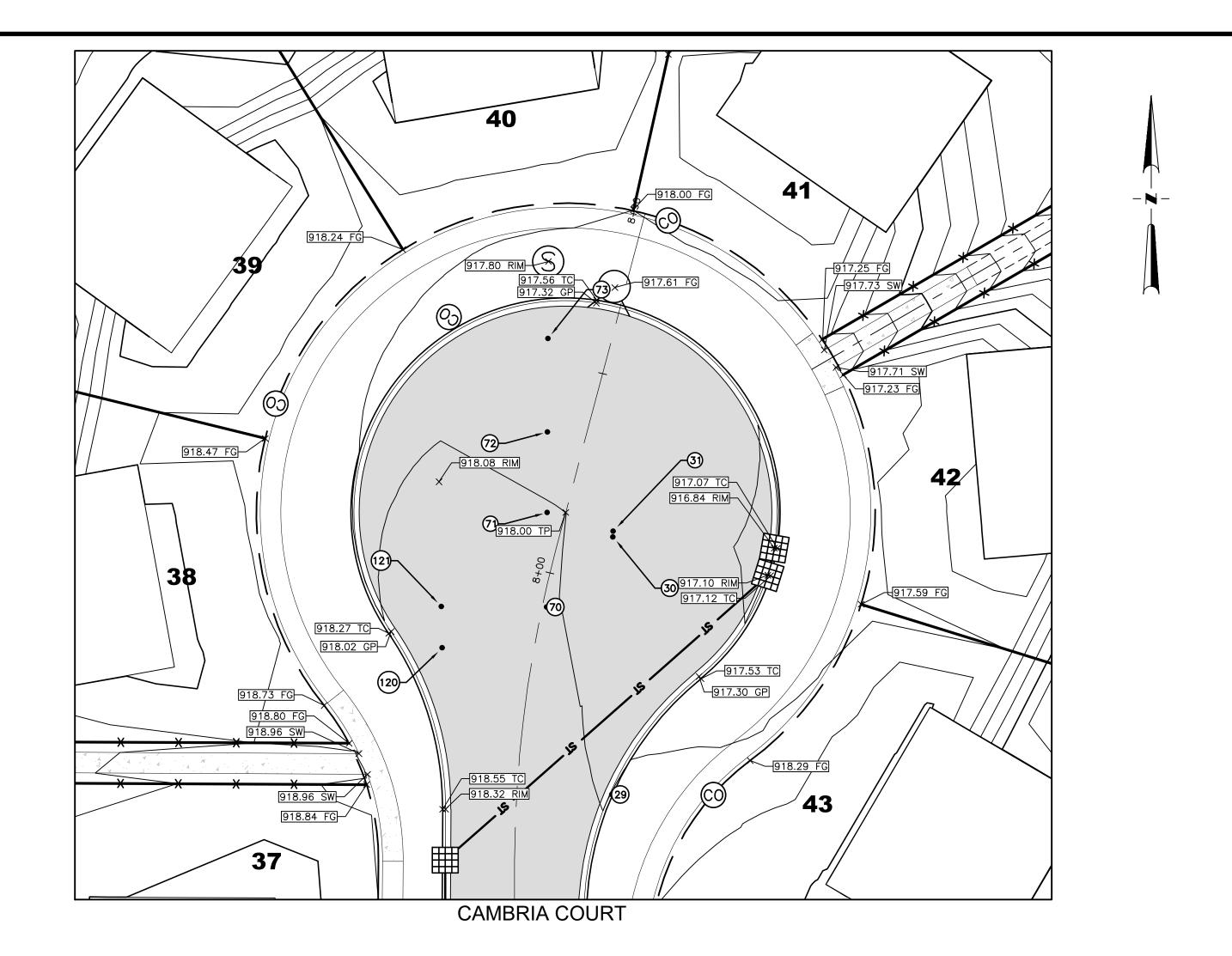
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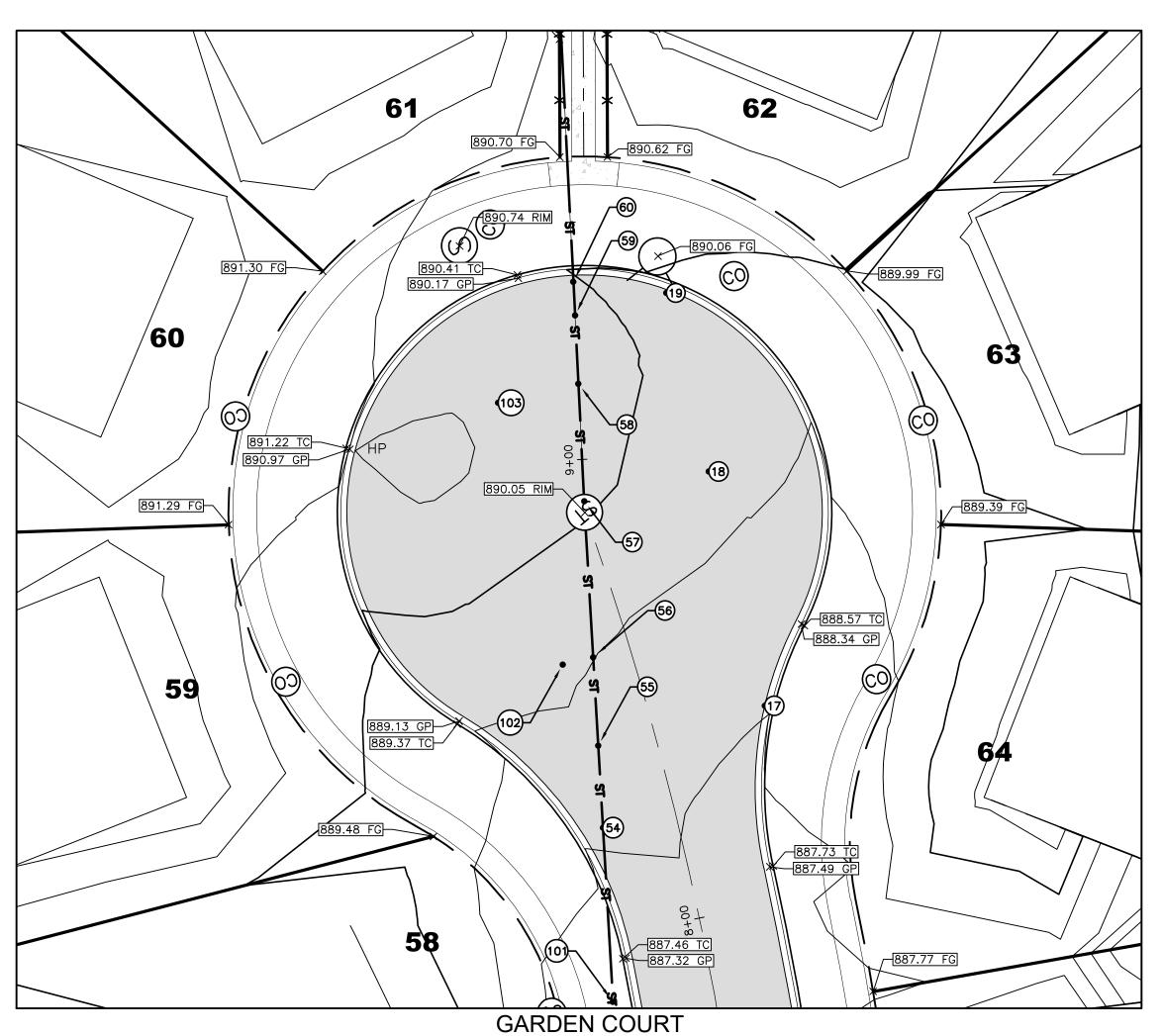
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GRADING LEGEND

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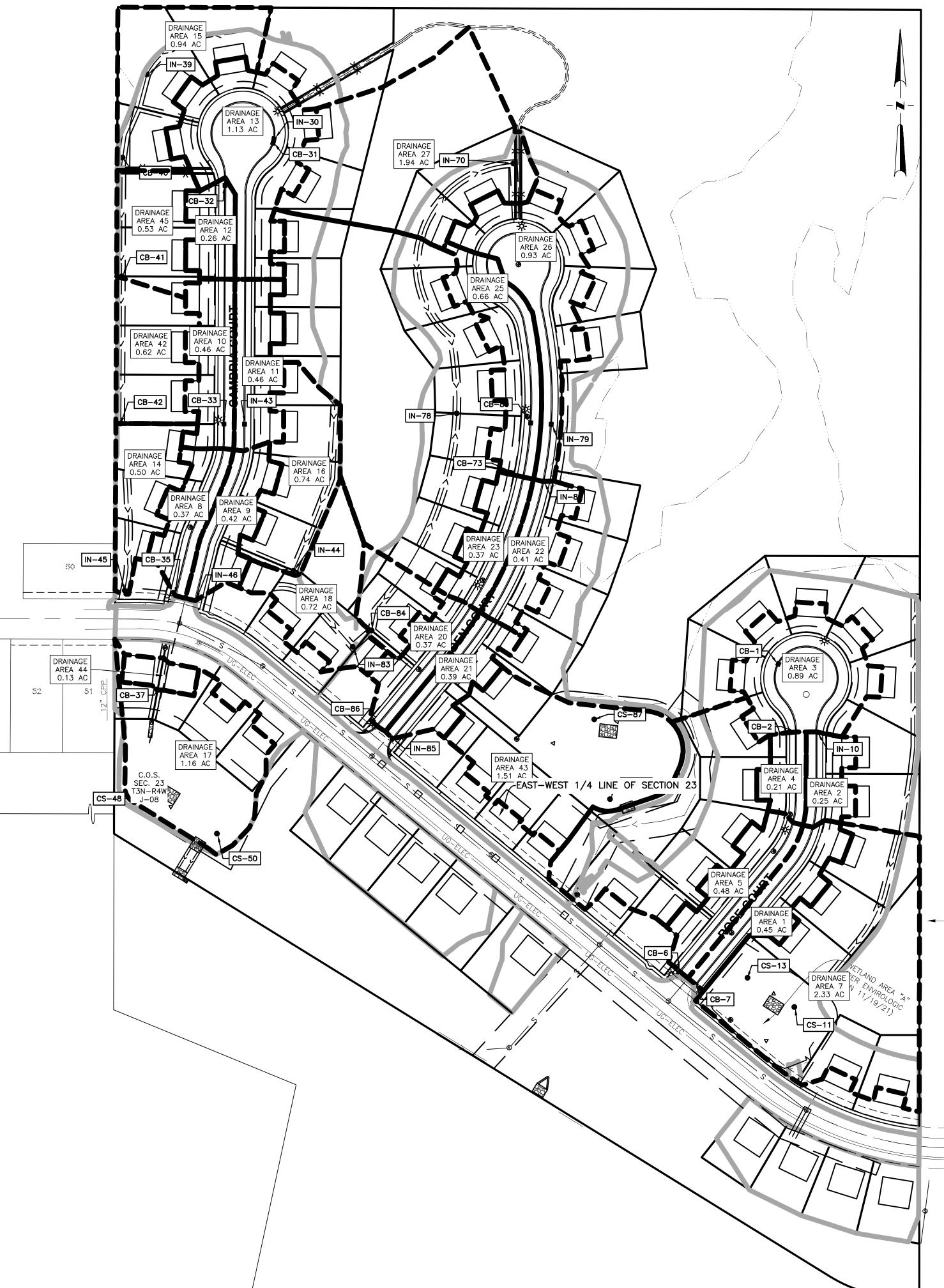
ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329SCALE: 1" = 20' 0 = 1/2" = 1"

FIELD: DF, JH
DRAWN BY: DC, MN
DESIGN BY: KM
CHECK BY: AP

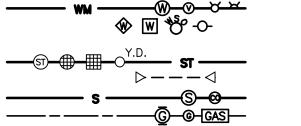
C-7.5

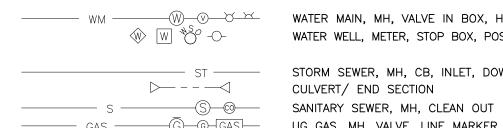
FILE:P:\Projects\2021\21-329 Cambria Ridge\Dwg\Engineering\21-329_C-7.5_Cul-de-Sac_Details.dwg PLOT DATE:8/3/2022 8:45 PM



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COMPOUND RUNOFF COEFFICIENT FOR AREA 1 (CB-7)

	ARFA (SF)	AREA (AC)			
OVERALL	19775	0.45			
CONTRIBUTING	19775	0.45			
FLOWING OFF	15,75	0.00			
TEO VIIIVO OTT	J	0.00	С	AXC	
EX BUILDING	0		0.95	0	
EX PAVEMENT	0		0.95	0	
PR BUILDING	3375		0.95	3206.25	
PR PAVEMENT	9145		0.95	8687.75	
LAWN AREAS - SLOPED	0		0.40	0	
LAWN AREAS - FLAT	0		0.35	0	
NATURAL AREAS	7255		0.10	725.5	
TOTALS	19775			12619.5	
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	12619.5	0.64	
$COMFOUND C = \frac{COM}{COM}$	NTRIBUTING	$\overline{GAREA} = -$	19775		

COMPOUND RUNOFF COEFFICIENT FOR AREA 2 (IN-10)

	AREA (SF)	AREA (AC)		
OVERALL	10796	0.25		
CONTRIBUTING	10796	0.25		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	2250		0.95	2137.5
PR PAVEMENT	4674		0.95	4440.3
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	3872		0.10	387.2
TOTALS	10796			6965
COMPOUND C =	$TOTAL\ A \times$: <i>C</i> =	6965	0.65
$\frac{COM OOND C}{COR}$	NTRIBUTING	G AREA	10796	

COMPOUND RUNOFF COEFFICIENT FOR AREA 3 (CB-1)

		AREA (SF)	AREA (AC)		
	OVERALL	38555	0.89		
	CONTRIBUTING	38555	0.89		
	FLOWING OFF	0	0.00		
				С	AXC
	EX BUILDING	0		0.95	0
	EX PAVEMENT	0		0.95	0
	PR BUILDING	6750		0.95	6412.5
	PR PAVEMENT	16658		0.95	15825.1
'N	LAWN AREAS - SLOPED	0		0.40	0
, 1 4	LAWN AREAS - FLAT	15147		0.35	5301.45
	NATURAL AREAS	0		0.10	0
	TOTALS	38555			27539.1

 $TOTAL\ A \times C$

COMPOUND RUNOFF COEFFICIENT FOR AREA 4 (CB-2)

 $COMPOUND C = \frac{1}{CONTRIBUTING AREA} - \frac{1$

AREA (SF)	AREA (AC)		
9176	0.21		
9176	0.21		
0	0.00		
		С	AXC
0		0.95	0
0		0.95	0
2250		0.95	2137.5
4558		0.95	4330.1
0		0.40	0
2368		0.35	828.8
0		0.10	0
9176			7296.4
$TOTAL\ A \times$	<i>C</i> = -	7296.4	0.80
CONTRIBUTING	G AREA	9176	
	9176 0 0 2250 4558 0 2368 0 9176	9176 0.21 9176 0.21 0 0.00 0 0 2250 4558 0 2368 0	9176 0.21 9176 0.21 0 0.00

COMPOUND RUNOFF COEFFICIENT FOR AREA 8 (CB-35)

AREA (SF)	AREA (AC)		
16310	0.37		
16310	0.37		
0	0.00		
		С	AXC
0		0.95	0
0		0.95	0
2812		0.95	2671.4
7665		0.95	7281.75
5833		0.40	2333.2
0		0.35	0
0		0.10	0
16310			12286.4
$TOTAL\ A \times$	<i>C</i>	12286.4	0.75
NTRIBUTING	G AREA	16310	
	16310 16310 0 0 0 2812 7665 5833 0 0 16310	16310 0.37 16310 0.37 0 0.00 0 0 2812 7665 5833 0 0	16310 0.37 16310 0.37 0 0.00

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ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329 SCALE: 1" = 100'

DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

C-9.0

COMPOUND RUNOFF COEFFICIENT FOR AREA 13 (IN-30)

	AREA (SF)	AREA (AC)		
OVERALL	49201	1.13		
CONTRIBUTING	49201	1.13		
LOWING OFF	0	0.00		
			С	AXC
X BUILDING	0		0.95	0
X PAVEMENT	0		0.95	0
R BUILDING	0		0.95	0
R PAVEMENT	20841		0.95	19799
AWN AREAS - SLOPED	0		0.40	0
AWN AREAS - FLAT	28360		0.35	9926
NATURAL AREAS	0		0.10	0
TOTALS	49201			29725

TOTALS	49201			29725	
COMPOUND C =	$TOTAL\ A \times C$	29	725	0.60	
	NTRIBUTING AREA	- <u></u> 49	201		

COMPOUND RUNOFF COEFFICIENT FOR AREA 14 (IN-45)

	AREA (SF)	AREA (AC)		
OVERALL	21850	0.50		
CONTRIBUTING	21850	0.50		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	3375		0.95	3206.25
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	6433		0.40	2573.2
LAWN AREAS - FLAT	12042		0.35	4214.7
NATURAL AREAS	0		0.10	0
TOTALS	21850			9994.15

COMPOUND C =	$TOTAL\ A \times C$	9994.15	0.46
COMPOUND C =	CONTRIBUTING AREA	21850	

COMPOUND RUNOFF COEFFICIENT FOR AREA 15 (IN-39)

	AREA (SF)	AREA (AC)		
OVERALL	40785	0.94		
CONTRIBUTING	40785	0.94		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	3375		0.95	3206.25
PR PAVEMENT	300		0.95	285
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	37110		0.35	12988.5
NATURAL AREAS	0		0.10	0
TOTALS	40785			16479.8
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	16479.8	0.40
	NTRIBUTING	G AREA	40785	

COMPOUND RUNOFF COEFFICIENT FOR AREA 16 (IN-44)

	AREA (SF)	AREA (AC)		
OVERALL	32205	0.74		
CONTRIBUTING	32205	0.74		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	4500		0.95	4275
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	7289		0.40	2915.6
LAWN AREAS - FLAT	20416		0.35	7145.6
NATURAL AREAS	0		0.10	0
TOTALS	32205			14336.2
COMPOUND C = -	$TOTAL\ A \times$	<i>C</i>	14336.2	0.45
$COMFOOND C = \frac{COMFOOND C}{COMFOOND C}$	ONTRIBUTING	$\frac{1}{GAREA}$	32205	

COMPOUND RUNOFF COEFFICIENT FOR AREA 17 (DIRECTLY TO POND 2)

	AREA (SF)	AREA (AC)		
OVERALL	50598	1.16		
CONTRIBUTING	50598	1.16		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	2250		0.95	2137.5
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	21898		0.40	8759.2
LAWN AREAS - FLAT	4467		0.35	1563.45
POND	21983		1.00	21983
NATURAL AREAS	0		0.10	0
TOTALS	50598			34443.2
$COMPOUND C = \frac{1}{100}$	$TOTAL\ A \times$: <i>C</i>	34443.2	0.68
$\frac{COMIOONDC}{COM}$	NTRIBUTING	$\frac{1}{GAREA}$	50598	

COMPOUND RUNOFF COEFFICIENT FOR AREA 42 (CB-42)

	AREA (SF)	AREA (AC)		
OVERALL	26814	0.62		
CONTRIBUTING	26814	0.62		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	2812.5		0.95	2671.88
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	24001.5		0.35	8400.53
NATURAL AREAS	0		0.10	0
TOTALS	26814			11072.4
COMPOUND C = -	$TOTAL\ A \times$	_	11072.4	0.41
COMIOONDC = CO	NTRIBUTING	G AREA	26814	

COMPOUND RUNOFF COEFFICIENT FOR AREA 44 (CB-39)

	AREA (SF)	AREA (AC)		
OVERALL	5575	0.13		
CONTRIBUTING	5575	0.13		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	4500		0.95	4275
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	1075		0.40	430
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	0		0.10	0
TOTALS	5575			4705
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	4705	0.84
	NTRIBUTING	G AREA	5575	

COMPOUND RUNOFF COEFFICIENT FOR AREA 45 (CB-41)

	AREA (SF)	AREA (AC)		
OVERALL	23004	0.53		
CONTRIBUTING	23004	0.53		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	C
EX PAVEMENT	0		0.95	C
PR BUILDING	2812.5		0.95	2671.88
PR PAVEMENT	303		0.95	287.85
LAWN AREAS - SLOPED	0		0.40	C
LAWN AREAS - FLAT	19888.5		0.35	6960.98
NATURAL AREAS	0		0.10	C
TOTALS	23004			9920.7
golfbollyb g	$TOTAL\ A \times$: <i>C</i>	9920.7	0.43
$COMPOUND C = \frac{1}{CO}$	ONTRIBUTING	$\frac{1}{GAREA} = -\frac{1}{AREA}$	23004	

COMPOUND RUNOFF COEFFICIENT FOR AREA 18 (IN-83)

	AREA (SF)	AREA (AC)		
OVERALL	31331	0.72		
CONTRIBUTING	31331	0.72		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	4500		0.95	4275
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	26831		0.10	2683.1
TOTA	LS 31331			6958.1
COMPOUND C =	$TOTAL A \times$	<i>C</i> = -	6958.1	0.22
COMI COND C =	CONTRIBUTING	GAREA	31331	

COMPOUND RUNOFF COEFFICIENT FOR AREA 19 (CB-84)

	AREA (SF)	AREA (AC)		
OVERALL	14119	0.32		
CONTRIBUTING	14119	0.32		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	9000		0.95	8550
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	5119		0.10	511.9
TOTALS	14119			9061.9
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	9061.9	0.64
$\frac{COMFOOND C - CO}{CO}$	NTRIBUTING	GAREA	14119	

COMPOUND RUNOFF COEFFICIENT FOR AREA 20 (CB-86)

	AREA (SF)	AREA (AC)		
OVERALL	16091	0.37		
CONTRIBUTING	16091	0.37		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	2561		0.95	2432.95
PR PAVEMENT	6918		0.95	6572.1
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	6612		0.10	661.2
TOTALS	16091			9666.25
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	9666.25	0.60
$COMIOOND C = \frac{CO}{CO}$	NTRIBUTING	\overline{GAREA} –	16091	

COMPOUND RUNOFF COEFFICIENT FOR AREA 21 (IN-85)

AREA (SF)	AREA (AC)		
16961	0.39		
16961	0.39		
0	0.00		
		C	AXC
0		0.95	0
0		0.95	0
3064		0.95	2910.8
7590		0.95	7210.5
0		0.40	0
0		0.35	0
6307		0.10	630.7
16961			10752
$TOTAL\ A \times$: <i>C</i>	10752	0.63
NTRIBUTING	G AREA	16961	
	16961 16961 0 0 0 3064 7590 0 0 6307 16961	16961 0.39 16961 0.39 0 0.00 0 0 3064 7590 0 0 6307	16961 0.39 16961 0.39 0 0.00

COMPOUND RUNOFF COEFFICIENT FOR AREA 22 (IN-81)

	AREA (SF)	AREA (AC)			
OVERALL	18005	0.41			
CONTRIBUTING	18005	0.41			
FLOWING OFF	0	0.00			
			С	AXC	
EX BUILDING	0		0.95	0	
EX PAVEMENT	0		0.95	0	
PR BUILDING	3686		0.95	3501.7	
PR PAVEMENT	7424		0.95	7052.8	
LAWN AREAS - SLOPED	0		0.40	0	
LAWN AREAS - FLAT	0		0.35	0	
NATURAL AREAS	6895		0.10	689.5	
TOTALS	18005			11244	
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	11244	0.62	
$COMFOOND C - \frac{COI}{COI}$	VTRIBUTING	$\frac{1}{GAREA}$	18005		

COMPOUND RUNOFF COEFFICIENT FOR AREA 23 (CB-73)

	AREA (SF)	AREA (AC)		
OVERALL	16225	0.37		
CONTRIBUTING	16225	0.37		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	3064		0.95	2910.8
PR PAVEMENT	7183		0.95	6823.85
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	5978		0.10	597.8
TOTALS	16225			10332.5
COMPOUND C =	$TOTAL\ A \times$	<i>C</i>	10332.5	0.64
$\frac{COMFOOND C - \overline{CO}}{CO}$	NTRIBUTING	$G A \overline{REA}$	16225	

COMPOUND RUNOFF COEFFICIENT FOR AREA 24 (IN-78)

	AREA (SF)	AREA (AC)		
OVERALL	145981	3.35		
CONTRIBUTING	145981	3.35		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	10939		0.95	10392.1
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	135042		0.10	13504.2
TOTA	LS 145981			23896.3
COMPOUND C =	TOTAL A >	<u> </u>	23896.3	0.16
COMI COND C —	CONTRIBUTIN	G AREA	145981	

COMPOUND RUNOFF COEFFICIENT FOR AREA 25 (CB-80)

	AREA (SF)	AREA (AC)		
OVERALL	28935	0.66		
CONTRIBUTING	28935	0.66		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	4811		0.95	4570.45
PR PAVEMENT	12131		0.95	11524.5
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	11993		0.10	1199.3
TOTALS	28935			17294.2
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	17294.2	0.60
$COMI OOND C = \frac{1}{CO}$	NTRIBUTING	$GAREA^-$	28935	

COMPOUND RUNOFF COEFFICIENT FOR AREA 26 (IN-79)

	AREA (SF)	AREA (AC)		
OVERALL	40686	0.93		
CONTRIBUTING	40686	0.93		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	6439		0.95	6117.05
PR PAVEMENT	19978		0.95	18979.1
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	14269		0.10	1426.9
TOTAL	s 40686			26523.1
COMPOUND C = -	$TOTAL\ A \times$: <i>C</i>	26523.1	0.65
$COMFOOND C = \frac{1}{C}$	CONTRIBUTING	GAREA	40686	

COMPOUND RUNOFF COEFFICIENT FOR AREA 27 (IN-70)

	AREA (SF)	AREA (AC)		
OVERALL	84489	1.94		
CONTRIBUTING	84489	1.94		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	2250		0.95	2137.5
PR PAVEMENT	580		0.95	551
LAWN AREAS - SLOPED	0		0.40	0
LAWN AREAS - FLAT	0		0.35	0
NATURAL AREAS	81659		0.10	8165.9
TOTALS	84489			10854.4

COMPOUND RUNOFF COEFFICIENT FOR AREA 43 (DIRECTLY TO POND 3)

 $COMPOUND C = \frac{TOTAL \ A \times C}{CONTRIBUTING \ AREA} = \frac{10854.4}{84489}$ 0.13

	AREA (SF)	AREA (AC)		
OVERALL	65596	1.51		
CONTRIBUTING	65596	1.51		
FLOWING OFF	0	0.00		
			С	AXC
EX BUILDING	0		0.95	0
EX PAVEMENT	0		0.95	0
PR BUILDING	5625		0.95	5343.75
PR PAVEMENT	0		0.95	0
LAWN AREAS - SLOPED	0		0.40	0
SURFACE WATER	26500		1.00	26500
LAWN AREAS - FLAT	59971		0.35	20989.9
NATURAL AREAS	0		0.10	0
TOTALS	92096			52833.6
COMPOUND C =	$TOTAL\ A \times$: <i>C</i>	52833.6	0.81
$\frac{COMI COND C}{COI}$	NTRIBUTING	G AREA	65596	

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THE LOCATIONS AND ELEVATIONS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THIS DRAWING ARE ONLY APPROXIMAT NO GUARANTEE IS EITHER EXPRESSED OF ACCURACY THEREOF. THE CONTRACTE SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT UTILITY LOCATION AND ELEVATIONS PRIOR TO THE START OF ONLY OF THE START OF

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE. PORTAGE, MI 49002 (616) 878-1748

ORIGINAL ISSUE DATE:

12/29/2021 PROJECT NO: 21-329

SCALE: 1" = 100'

DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP



PHASE 1 STORM SEWER CALCULATIONS (ROSE COURT)

	FROM STR	AREA	COEFF.		AREA	TOTAL	ПМЕ	INT.	FLOW	PIPE	PIPE	PIPE	PIPE	PIPE	MIN PIPE	H.G.	VEL	VEL	ПМЕ	RIM ELEV. UP	RIM EL DOW
	TO STR	A	C	AxC	TOTAL At	CXA	t	1	Q	CAP.	AREA	LENGTH	DIA.	SLOPE		SLOPE	FULL	SURCH	FLOW	STREAM	STRE
		ac.			ac.		min.	in/hr	cfs.	c.f.s.	sq. ft.	ft.	in.	%		%	ft/sec		min.		
MAIN RUN	CB1 TO CB2	0.89	0.71	0.632	0.890	0.632	20.00	3.89	2.46	2.42	0.79	115	12	0.33	0.22	0.34	3.08	3.13	0.61	887.12	888
	CB2 TO MH3	0.21	0.80	0.168	1.350	0.962	20.61	3.84	3.69	3.79	0.79	135	12	0.81	0.22	0.81	4.82	n/a	0.47	888.33	892
	MH3 TO MH4	0.00	0.00	0.000	1.350	0.962	21.08	3.80	3.66	3.69	0.79	66	12	0.77	0.22	0.77	4.70	n/a	0.23	892.31	891
	MH4 TO MH5	0.00	0.00	0.000	1.350	0.962	21.31	3.78	3.64	5.40	0.79	248	12	1.65	0.22	1.65	6.88	n/a	0.60	891.17	880
	MH5 TO CB6	0.48	0.70	0.336	1.830	1.298	21.91	3.73	4.84	3.69	0.79	7	12	0.77	0.22	1.33	4.70	6.17	0.02	880.08	879
	CB6 TO CB7	0.48	0.70	0.336	2.310	1.634	21.93	3.73	6.09	4.80	1.77	33	18	0.15	0.13	0.24	2.72	3.45	0.16	879.71	879
	CB7 TO MH8	0.45	0.64	0.288	2.760	1.922	22.09	3.72	7.14	5.95	1.77	81	18	0.23	0.13	0.33	3.37	4.04	0.33	879.71	880
	MH8 TO ES9	0.00	0.00	0.000	2.760	1.922	22.43	3.69	7.09	5.95	1.77	69	18	0.23	0.13	0.33	3.37	4.02	0.29	880.09 876.35	876
ATERAL	IN10 TO CB2	0.25	0.65	0.163	0.250	0.163	20.00	3.89	0.63	4.21	0.79	33	12	1.00	0.22	1.00	5.36	n/a	0.10	888.33	0.
ATERAL	CS11 TO ES12	2.33	0.47	1.095	5.090	3.018	20.00	3.89	11.73	9.25	3.14	42	24	0.12	0.09	0.19	2.95	3.74	0.19	888.33 879.00	876
ATERAL	CS13 TO MH14	0.00	0.00	0.000	5.090	3.018	20.00	3.89	11.73	9.25	3.14	66	24	0.12	0.09	0.19	2.95	3.74	0.29	879.00	884
	MH14 TO ES15	0.00	0.00	0.000	5.090	3.018	20.29	3.86	11.66	9.25	3.14	223	24	0.12	0.09	0.19	2.95	3.71	1.00	884.64	870

POND 1 DETENTION CALCULATIONS

COMPOUND RUNOFF COEFFICIENT VOLUME SUMMARY	
AREA (SF) AREA (AC) C 100-YEAR VOLUME	
OVERALL 310,601 7.13 $V_{100} = 25,242$	
CONTRIBUTING 310,601 7.13	
FLOWING OFF 0 0.00 BANKFULL FLOOD VOLUME	
$A \times C$ $V_{bf} = 8785 \times A \times C = 22,729$	
EX BUILDING 0 0.95 0	
EX PAVEMENT 0 0.95 0 FIRST FLUSH VOLUME	
PR BUILDING 34,000 0.95 32,300 $V_{ff} = 3630 \times A \times C = 9,392$	
PR PAVEMENT 47,116 0.95 44,760	
DETENTION BASIN 14,109 1.00 14,109	
LAWN AREAS - LO SLOPE 0.35 0 ACTUAL STORAGE ELEVATIONS	
LAWN AREAS - HI SLOPE 0.40 0	
NATURAL AREAS 215,376 0.10 21,538 FIRST FLUSH	
	DLUME 1 7,340
	DLUME 2 13,654
$COMPOUND C = \frac{TOTAL A \times C}{112,707}$ 112,707 0.36	9,392
$COMT OSND C = CONTRIBUTING AREA \qquad 310,601 \qquad FF ELEVATION (Zff) = 878.33$	
SITE INFO BANKFULL	
	DLUME 1 15,955
7.13 / (6)	DLUME 2 28,860
7.23 7.6	,
ALLOWABLE BISCHMICE INTERQUE	22,723
COMPOUND RUNOFF COEFFICIENT (C) = 0.36 BF ELEVATION (Zbt) = 878.52	
PROPOSED SEDIMENTATION BASIN VOLUME	
100-YEAR	
	DLUME 1 15,955
	28,860 28,860
V1C	00 25,242
876.5 4,099 100 ELEVATION (Z100) = 878.72	

2,178 2,178

5,162 7,340

6,314 13,654

7,567 21,220

(CF)

2,743 2,743

5,437 8,180

6,592 14,771

7,847 22,618

5,356 5,356

10,599 15,955

12,906 28,860

11,304 40,164

INC VOLUME VOLUME

5,162

6,314

7,567

4,572

5,437

6,592

7,847

AVG AREA

8,927

10,599

12,906

11,304

AVG AREA INC VOLUME VOLUME

878

879

880

ELEVATION AREA (FT)

877

878

879

COMBINED POND VOLUME

ELEVATION AREA (FT)

876.4

877

878

879

5,713

6,915

8,218

4,885

7,194

8,357

9,496

11,702

PROPOSED DETENTION BASIN VOLUME

DETENTION POND DESIGN CALCULATION

Cont. Drainage Area (Acres):	7.13
Proposed Runoff Coefficient "C" Value:	0.36
Allowable Release Rate per Acre (CFS/ Acre)	0.15
Maximum Allowable Release Rate (CFS)	1.07

Α	В	С	D	E	F	G	Н	I	J	К
		100-Year	100-Year	Proposed	Proposed	Maximum	Required	Bankfull	First Flush	Total
		24-Hour	24-Hour	100yr-24hr	100yr-24hr	Allowable	100yr-24hr	2yr-24hr	(1 Inch)	Required
		Total	Rainfall Avg.	Avg. Runoff	Runoff	Release	Storage	(2.42 Inches)	Storage	Storage
Duration	Duration	Rainfall	Intensity	Flowrate	Volume	Rate	Volume	Volume	Volume	Volume
(Minutes)	(Hours)	(Inches)	(Inch/Hr)	(CFS)	(CFT)	(CFS)	(CFT)	(CFT)	(CFT)	(CFT)
5	0.08	0.62	7.44	19.25	5,775	1.07	5,615	22,729	9,392	22,729
10	0.17	1.09	6.54	16.92	10,153	1.07	9,832	22,729	9,392	22,729
15	0.25	1.40	5.60	14.49	13,040	1.07	12,559	22,729	9,392	22,729
20	0.33	1.57	4.72	12.21	14,655	1.07	14,013	22,729	9,392	22,729
30	0.50	1.92	3.84	9.94	17,884	1.07	16,921	22,729	9,392	22,729
40	0.67	2.09	3.14	8.12	19,499	1.07	18,215	22,729	9,392	22,729
50	0.83	2.27	2.72	7.04	21,113	1.07	19,509	22,729	9,392	22,729
60	1.00	2.44	2.44	6.31	22,728	1.07	20,802	22,729	9,392	22,729
90	1.50	2.73	1.82	4.71	25,429	1.07	22,541	22,729	9,392	22,729
120	2.00	3.02	1.51	3.91	28,130	1.07	24,280	22,729	9,392	24,280
180	3.00	3.33	1.11	2.87	31,018	1.07	25,242	22,729	9,392	25,242
240	4.00	3.52	0.88	2.28	32,787	1.07	25,087	22,729	9,392	25,087
300	5.00	3.71	0.74	1.92	34,557	1.07	24,931	22,729	9,392	24,931
360	6.00	3.90	0.65	1.68	36,327	1.07	24,776	22,729	9,392	24,776
540	9.00	4.21	0.47	1.21	39,215	1.07	21,888	22,729	9,392	22,729
720	12.00	4.52	0.38	0.97	42,102	1.07	18,999	22,729	9,392	22,729
900	15.00	4.71	0.31	0.81	43,825	1.07	14,947	22,729	9,392	22,729
1080	18.00	4.89	0.27	0.70	45,548	1.07	10,895	22,729	9,392	22,729
1260	21.00	4.97	0.24	0.61	46,303	1.07	5,873	22,729	9,392	22,729
1440	24.00	5.20	0.22	0.56	48,436	1.07	2,231	22,729	9,392	22,729
2880	48.00	5.70	0.12	0.31	53,093	1.07	-39,317	22,729	9,392	22,729

Required 100yr-24hr Detention Storage (CFT) 25,242 Required Storage (CFT) 25,242

- A) Duration of the storm event in minutes.
- B) Duration of the storm event in hours.
- C) Total amount of rainfall during a 100-year recurrence storm event for the given duration in
- Column A & B (ref.: midwestern climatological center rainfall Atlas-Bulletin 71).
- D) Average rainfall intensity during the 100-year recurrence storm event. Calculated by dividing Column C by Column B
- E) The unrestricted 100-year recurrence average discharge flowrate from the proposed site under fully developed
- conditions. Calculated by multiplying Intensity (D), Runoff Coefficient (M) and Drainage Area (L).
- F) The unrestricted 100-year recurrence discharge volume from the proposed site for the given duration. Calculated by multiplying the Proposed Runoff Flowrate (E) by the Storm Duration (A) and by 60 seconds/minute.
- G) The maximum allowable discharge from the site is determined by multiplying the drainage area by the allowed per acre release rate (N).
- H) The required detention storage is determined by multiplying the flowrate differential (Inflow (E) 0.5*Outflow (G), by the
- corresponding duration (A) and by 60 seconds/minute. The calculated maximum release rate only occurs when the pond is full
- As the pond dewaters the actual release rate from the pond will decrease from the maximum allowed release rate to 0.
- Therefore, an average release rate equal to 50% of the maximum rate is used in calculating the required storage volume.
- Calculated storage volumes will vary based on rainfall intensity, the size of the drainage area, and the allowable discharge. The maximum volume of storage for the various storm durations will be the required detention storage volume.
- 1) The bank full volume is based on storing the runoff from 2 year 24 hour storm event (2.42 Inches).
- J) The first flush volume is based on storing the runoff from the first inch of rain.
- K) Total required storage volume is the maximum required storage between the 100-year 24-hour at the allowable discharge rate or the total volume of the bank full storm
- L) Area contributing to the proposed detention/ retention facility M) Weighted Runoff Coefficient based on proposed development conditions
- N) Allowable Release Rate from the site per Acre. Based on capacity of downstream conveyence system.

Calculation By: Kevin McDevitt, P.E. Date: 4/14/2022

FIRST FLUSH OUTLET CONTROL STRUCTURE ORIFICE CALCULATIONS

AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER THE SITE IN 24 HOURS

0.109 CFS

OPENINGS IN BOTTOM OF BASIN

876.50

1.217 FT

0.020 SF

1" DIA HOLE HAS AN AREA OF

1 0.083 = 0.0055 SF

Use 3 - 1" Diameter Holes = 0.0164 SF

DETENTION TIME FOR THREE (3) - 1" DIA HOLES

 $Q_{ff} = A_{ACTUALff} \times 0.62 \sqrt{2 \times g \times h}$ = 0.0898 CFS

BANKFULL OUTLET CALCULATIONS

ALLOWABLE RELEASE TIME FOR BANKFULL IS 36 TO 48 HOURS

BANKFULL DETENTION TIME OF 48 HOURS 48 HRS 0.132 CFS

1.35 FT

0.023 SF

1" DIA HOLE HAS AN AREA OF 1 0.083 = 0.0055 SF

> Use 5 - 1" Diameter Holes = 0.0273 SF

DETENTION TIME FOR FIVE (5) - 1" DIAMETER HOLES

0.1576 $Q_{bf} = A_{ACTUAL\ bf} \ X \ 0.62 \sqrt{2 \times g \times h}$

40.05 HOURS

100 YEAR OUTLET CALCULATIONS

24 TO 48 HRS DETENTION TIME $V_{rem} = V_{100} - V_{bf} \qquad = \qquad$ 2513 CF

CALCULATE TIME TO RELEASE 100 YEAR VOLUME THROUGH BANKFULL OUTLET

 $H_{avg} = \frac{2}{3} \times (Z_{100} - Z_{bttm})$ 2.32 FT

 $Q_{bf(100)} = A_{ACTUAL\ bf}\ X\ 0.62\sqrt{2 \times g \times h}$ 0.2067 33.93 HOURS

MEETS REQUIREMENTS FOR RELEASE RATE. NO ADDITIONAL HOLES NECESSARY.

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KEVIN C. MCDEVITT ENGINEER 6201043260

Kevin CM Tevis Call MISS DIG 3 full working days before you dig: Michigan's One-Call Utility Notificatio Organizatio

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CLIENT:

ALLEN EDWIN HOMES DAN LARABEL

LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

STORM

ORIGINAL ISSUE DATE: 12/29/2021

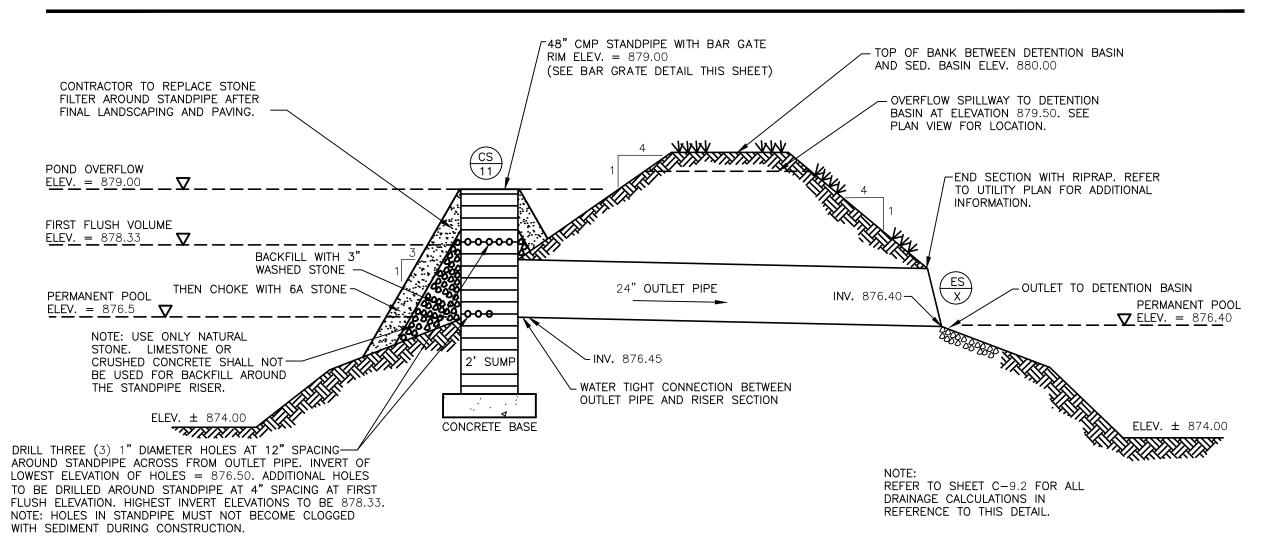
PROJECT NO: 21-329

SCALE: 1" = 100' 1/2" FIELD: DF, JH DRAWN BY: DC, MN

DESIGN BY: KM CHECK BY: AP

C-9.2

SEDIMENTATION BASIN DETAIL - POND 1



FOREBAY OVERFLOW SPILLWAY

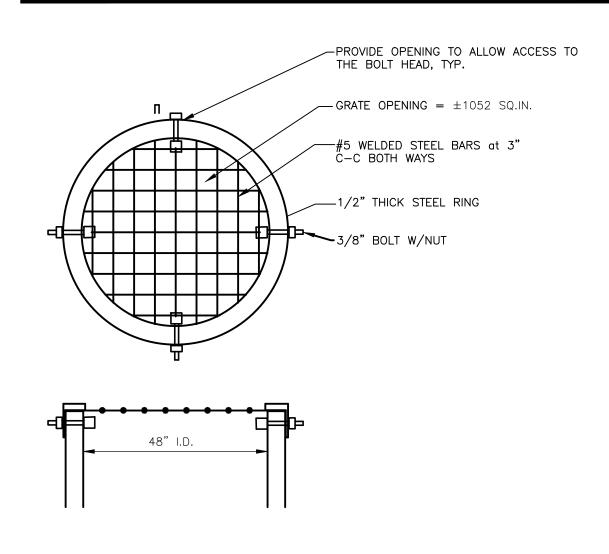
NOTE:

(GENERIC DETAIL, MUST BE UPDATED FOR PROJECT). THIS IS FOR USE ON WAYNE COUNTY PROJECTS WITH INDIVIDUAL SEDIMENTATION AND DETENTION BASINS.

SPILLWAY DETAIL - OVERFLOW - RIP RAP

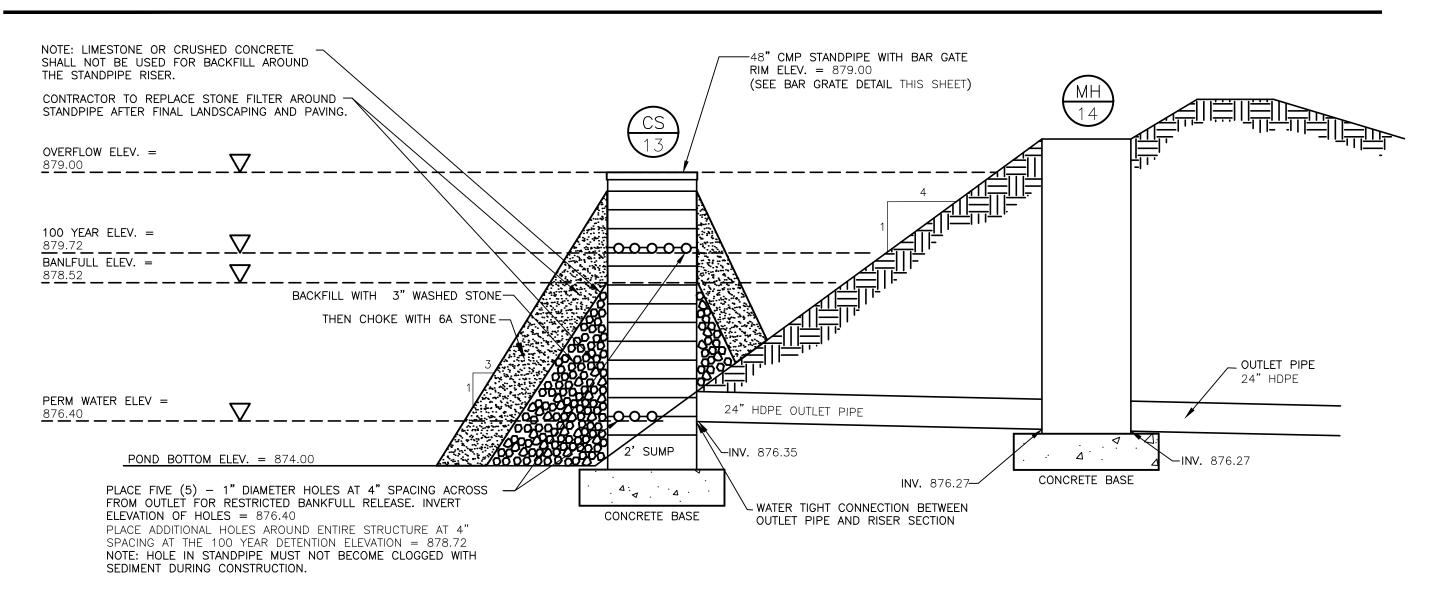
Weir Coefficient (C) 3.4 62 S.Y. OF 8" – 12" NATURAL STONE RIP-RAP OVER APPROVED GEOTEXTILE 880 -T/BANK = 880.00= 879.50 $H = Z_{bank} - Z_{weir}$ = 0.5 FT WELL COMPACTED — EARTH Q(from 10 - Year table)= 11.73 CFS $L_{T/BANK} = 879.50$ Q(from Direct drainage Area 7) = 4.26 CFS Q(Total)= 15.99 CFS = 13.30 FT 14 Ft

BAR GRATE DETAIL - FOR OUTLET CONTROL STRUCTURE



NOTE: BAR GRATE TO BE BOLTED TO STANDPIPE AS SHOWN

DETENTION BASIN OUTLET CONTROL STRUCTURE DETAIL - POND 1



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Call MISS DIG

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE. PORTAGE, MI 49002 (616) 878-1748

> 3RIA RIDGE -023-400-051-05 :, SEC. 23, T3N-R4W

CAMBE TAX ID: 700—C PART OF E 1/2,

S PER PLANNING COMMISSION 2/17/20
TE PLAN SUBMITTAL 4/27/20
FOR CITY/COUNTY REVIEW 07/08/20
SESC SUBMITTAL 07/12/20
IBMITTAL/UTILITY REVISIONS 07/19/20
R YARD GRADES/TAPPING SLEEVES 08/03/20

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 100'
0 1/2" 1"

FIELD: DF, JH
DRAWN BY: DC, MN
DESIGN BY: KM
CHECK BY: AP

C-9.3



																				H.G. ELE	V.	INVERT EL	LEV.	RIM ELEV.	RIM ELEV.
	FROM STR	AREA	COEFF.		AREA	TOTAL	TIME	INT.	FLOW	PIPE	PIPE	PIPE	PIPE	PIPE	MIN PIPE	H.G.	VEL	VEL	TIME	UP	DOWN	UP	DOWN	UP	DOWN
	TO STR	Α	С	AxC	TOTAL	CXA	t	1	Q	CAP.	AREA	LENGTH	DIA.	SLOPE	SLOPE	SLOPE	FULL	SURCH.	FLOW	STREAM	STREAM	STREAM	STREAM	STREAM	STREAM
					At																				
		ac.			ac.		min.	in/hr	c.f.s.	c.f.s.	sq. ft.	t.	in.	%		%	f/sec		min.						
MAIN RUN	IN30 TO CB31	1.13	0.60	0.678	1.130	0.678	20.00	3.89	2.64	2.66	0.79	7	12	0.40	0.22	0.40	3.39	N/A	0.03	922.64	922.61	921.84	921.81	916.84	917.10
WAIN KON	CB31 TO CB32	0.00	0.00	0.000	1.130	0.678	20.00	3.89	2.63	2.66	0.79	104	12	0.40	0.22	0.40	3.39	N/A	0.55	913.61	913.19	912.81	912.39	917.10	918.39
	CB31 TO CB32	0.00	0.73	0.190	1.390	0.868	20.55	3.84	3.33	5.78	0.79	389	12	1.89	0.22	1.89	7.37	N/A	0.88	913.09	905.74	912.01	904.94	918.39	908.94
	CB32 TO CB33 CB33 TO MH34	0.46	0.73	0.190	4.400	2.393	24.28	3.55	8.50	17.54	1.77	177	18	2.00	0.22	2.00	9.93	N/A	0.30	896.74	893.20	895.54	892.00	908.94	898.83
	MH34 TO CB35	0.00	0.00	0.000	5.140	2.726	24.57	3.53	9.62	9.92	1.77	114	18	0.64	0.13	0.64	5.62	N/A	0.34	889.62	888.89	888.19	887.46	898.83	892.40
	CB35 TO MH36	0.37	0.75	0.278	6.430	3.532	24.91	3.51	12.38	10.60	1.77	87	18	0.73	0.13	1.00	6.00	7.01	0.04	888.89	888.03	887.46	886.83	892.40	892.96
	MH36 TO CB37	0.00	0.00	0.000	6.430	3.532	25.12	3.49	12.33	17.54	1.77	70	18	2.00	0.13	2.00	9.93	N/A	0.12	881.15	879.75	879.95	878.55	892.96	883.07
	CB37 TO ES38	0.13	0.84	0.109	6.560	3.641	25.23	3.48	12.68	17.54	1.77	57	18	2.00	0.13	2.00	9.93	N/A	0.10	873.34	872.20	872.14	871.00	883.07	871.00
	0001 10 2000	0.00	0.00	0.000	6.560	3.641	25.33	3.48	12.66	#DIV/0!	0.00			2.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0, 1.00	000.01	0.00
		0.00	0.00	0.000	6.560	3.641	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00				0.00	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	0.00	0.00			0.00
		0.00,	0.00	0.000	0.000										0.00						0.00	0.00			
LATERAL	IN39 TO CB40	0.94	0.40	0.376	0.940	0.376	20.00	3.89	1.46	1.97	0.79	141	12	0.22	0.22	0.22	2.51	N/A	0.93	905.52	905.21	904.72	904.41	909.78	908.94
	CB40 TO CB41	0.00	0.00	0.000	0.940	0.376	20.93	3.81	1.43	1.97	0.79	194	12	0.22	0.22	0.22	2.51	N/A	1.29	2.40	1.97	1.30	0.88	908.94	0.00
	CB41 TO CB42	0.53	0.43	0.228	1.470	0.604	22.22	3.71	2.24	2.30	0.79	240	12	0.30	0.22	0.30	2.94	N/A	1.36	1.97	1.25	0.88	0.16	0.0000000000000000000000000000000000000	0.00
	CB42 TO CB33	0.62	0.41	0.254	2.090	0.858	23.58	3.60	3.09	3.18	0.79	168	12	0.57	0.22	0.57	4.05	N/A	0.69	1.25	0.30	0.16	-0.80		0.00
LATERAL	IN43 TO CB33	0.46	0.72	0.331	0.460	0.331	20.00	3.89	1.29	4.21	0.79	34	12	1.00	0.22	1.00	5.36	N/A	0.11	902.85	902.51	902.05	901.71	908.94	908.94
LATERAL	IN 44 TO MH34	0.74	0.45	0.333	0.740	0.333	20.00	3.89	1.30	1.99	0.79	183	12	0.22	0.22	0.22	2.53	N/A	1.21	889.80	889.39	889.00	888.59	892.00	898.83
LATERAL	IN45 TO CB35	0.50	0.46	0.230	0.500	0.230	20.00	3.89	0.89	7.48	0.79	82	12	3.16	0.22	3.16	9.53	N/A	0.14	891.80	889.20	891.00	888.40	895.00	892.40
					A				- VE						4 4 4	W Market		1 24601	21 2 2						
LATERAL	IN46 TO CB35	0.42	0.71	0.298	0.420	0.298	20.00	3.89	1.16	4.21	0.79	34	12	1.00	0.22	1.00	5.36	N/A	0.11	889.16	888.82	888.36	888.02	892.36	892.40
LATERAL	CS48 TO ES49	1.16	0.68	0.789	#N/A	#N/A	20.00	3.89	#N/A	14.39	3.14	35	24	0.29	0.09	#N/A	4.58	#N/A	#N/A	#N/A	868.60	867.10	867.00	870.00	867.00
ENTERNE	5540 TO E349	1.10	0.00	0.103	TIVIA	TIMA	20.00	0.03	THINA	14.03	0.14	- 55	24	0.23	0.03	TINE	4.00	TIME	mwz	mun	000.00	007.10	007.00	070.00	00.100
LATERAL	CS50 TO ES51	0.00	0.00	0.000	#N/A	#N/A	20.00	3.89	#N/A	14.14	3.14	88	24	0.28	0.09	#N/A	4.50	#N/A	#N/A	#N/A	866.60	865.25	865.00	870.00	865.00

POND 2 DETENTION CALCULATIONS

METALISM AFEA AF	COMPOUND R	UNOFF COEF	FICIENT				COMBINED P	OND VOLUM	ΛE			
Proper		_	457,327	10.50	С		ELEVATION	AREA (FT)				
PR BUILDING 0		3	·				065.5	0.646				
PATEURIDING 0	FLOWING OFF		0	0.00			865.5	9,646	40.450			
PART PART									10,153			
PR BUIDINION S,000 0.95 53,200 80,70 13,101 14,315 14,905							866.0	10,659		5,076	5,076	
PARTICINA DESTINATION DE PROPRIE DESTINATION DE PROPRIÉ DE PROPRI	EX PAVEMENT		0		0.95	0			11,880			
NATURAL AR LANGE 12,037 1,00 12,037 686.0 15,774 17,225 17,225 46,618 17,725 17,225 46,618 17,225 17,225 46,618 17,225 17,225 46,618 17,225 17,225 46,618 17,225 17,225 46,618 17,225 17,	PR BUILDING		56,000		0.95	53,200	867.0	13,101		11,880	16,956	
Matural Arriange Matural Ar	PR PAVEMENT		66,783		0.95	63,444			14,438			
TOTALS	DETENTION BA	SIN	12,037		1.00	12,037	868.0	15,774		14,438	31,394	
TOTAL N	NATURAL AREA	AS	322,507		0.20	64,501			17,225			
193,182		TOTALS	457,327			193,182	869.0	18,675		17,225	48,618	
SITE INFO OVERALL AREA			,			•			20,240			
SITE INFO OVERALL AREA			$TOTALA \times$: <i>C</i>	193.182	0.42	870.0	21,805		20,240	68,858	
SITE INFO SITE INFO SITE INFO CUERALL ARE	COMP	$OUND C = \overline{CO}$	NTRIBUTIN	G AREA –		52		,		,		
STITE NOP					137,327		VOLUME SUR	ЛМАКУ				
CONTRIBUTING ARE A	CITE INICO						TOLONIE SON	• • • • • • • • • • • • • • • • • • • •				
CONTRIBUTING				_ 10) FO AC		100-VEAR VO	LLINAE				
ALLOWABLE DISCHARGE RATE (QO = 0.15 CFS/AC COMPOUND RUNCH CUTTER (C) = 0.42										45 257		
PROPOSED SUPPRIVED PROPOSED PROPOSED SUPPRIVED PROPOSED PROP			TF (O-)				V100	_		45,257		
PROPOSED SUPPRIVE							DANIZELILI EL		ır			
PROPOSED SUPPRIOR PROPOSED SUPPRIOR PROPOSED	COMPOUND R	UNOFF CUEFF	ICIENT (C)	= ().42				lE	00.050		
RELEVATION AREA FT AVG AREA INC VOLUME VOLUME VOLUME VIF 3630 × A × C = 16,099 1							$V_{bf} = 8785$	$\times A \times C =$		38,958		
RELEVATION AREA FIFT CFT C	PROPOSED SEI	DIMENTATIO	N BASIN VOL	.UME								
RELEVATION AREA (FT) (CF) (CF												
ACTUAL STORAGE ELEVATIONS	FI FVATION	ΔREΔ (FT)	AVG AREA I	NC VOLUME	VOLUME		$V_{ff} = 3630$	$\times A \times C =$		16,099		
Residual Control Con	LLLVATION	ANEA (I I)	(FT)	(CF)	(CF)							
FIRST FLUSH							ACTUAL STO	RAGE ELEVA	TIONS			
Recommendation Reco	865.7	3,261										
RELEVATION 2			3,445				FIRST FLUSH					
RELEVATION 2	866	3,629		1,033	1,033		ELEVATION 1	=		868.00	VOLUME 1	10,476
Ref			4,161				ELEVATION 2	=		869.00		
FF ELEVATION (Zff) S 868.86 S 7,870 S 10,476 S S 10,476 S S S S S S S S S	867	4.693	,	4.161	5.194							
868 5,870 5,282 10,476 BANKFULL 100-YEAR ELEVATION 1 1 868.00 VOLUME 1 31,394 100-YEAR ELEVATION 1 2 868.00 VOLUME 1 31,394 100-YEAR ELEVATION 2 2 869.00 VOLUME 2 48,618 100-YEAR 100-YEAR ELEVATION 2 2 869.00 VOLUME 2 48,618 100-YEAR 1		.,	5.282	.,	_,		FF	FI EVATION (7ff)	= 8		20,000
BANKFULL	868	5 870	3,232	5 282	10 476		••					
Record R	000	3,0,0	6 515	3,232	20, 1, 0		RANKELILI					
Relevation 2 Substitution Subs	860	7 150	0,313	6 5 1 5	16 990			_		969 AA	VOLUME 1	21 20/
870 8,560 7,860 24,850 BF ELEVATION (Zbf) = 868.44 PROPOSED JETITION BASIN VOLUME (FT) (CF) (CF) (CF) 865.50 6,385 (FT) 6,708 5 1,005	609	7,139	7 960	0,313	10,550							
PROPOSED DETENTION BASIN VOLUME PROPOSED DETENTION PROPOSED DETENT	070	0.500	7,860	7.000	24.050		ELEVATION 2	=		869.00		
PROPOSED DETENTION BASIN VOLUME ELEVATION AREA (FT) AVG AREA INC VOLUME VOLUME (CF) (CF) (CF) (CF) ELEVATION 1 = 868.00 VOLUME 1 31,394 ELEVATION 2 = 869.00 VOLUME 2 48,618 V100 45,257 6,708	870	8,500		7,860	24,850		D.E.	ELEVATION!	(3). (1)			38,958
ELEVATION AREA (FT)	DDODOSED DE	TENTION DAG					BF	ELEVATION (ZDT)	= 8	308.4 4	
ELEVATION AREA (FT) (FT) (CF) (CF) ELEVATION 1 = 868.00 VOLUME 1 31,394 ELEVATION 2 = 869.00 VOLUME 2 48,618 865.50 6,385 V100 45,257 6,708 100 ELEVATION (Z100) = 868.80 866 7,030 3,354 3,354	PROPOSED DE	TENTION BAS	SIN VOLUME									
ELEVATION AREA (FT) (FT) (CF) (CF) ELEVATION 1 = 868.00 VOLUME 1 31,394 ELEVATION 2 = 869.00 VOLUME 2 48,618 865.50 6,385 V100 45,257 6,708 100 ELEVATION (Z100) = 868.80 866 7,030 3,354 3,354		_		IC VOLUE :	.O.L.1.5.45		100 VE 4 P					
(FT) (CF) (CF) (CF) ELEVATION 1 = 868.00 VOLUME 1 31,394 ELEVATION 2 = 869.00 VOLUME 2 48,618 V100 45,257 6,708 100 ELEVATION (Z100) = 868.80 866 7,030 3,354 3,354	ELEVATION A	AREA (FT)								000.00	VOLUME 4	24 204
865.50 6,385 V100 45,257 6,708 100 ELEVATION (Z100) = 868.80 866 7,030 3,354 3,354		, ,	(FT)	(CF)	(CF)							
6,708 100 ELEVATION (Z100) = 868.80 866 7,030 3,354 3,354							ELEVATION 2	=		869.00		
866 7,030 3,354 3,354	865.50	6,385										45,257
			6,708				100	ELEVATION (Z100)	= 8	868.80	
7,719	866	7,030		3,354	3,354							
			7,719									

DETENTION POND DESIGN CALCULATION

Cont. Drainage Area (Acres):	10.50
Proposed Runoff Coefficient "C" Value:	0.42
Allowable Release Rate per Acre (CFS/ Acre)	0.15
Maximum Allowable Release Rate (CFS)	1.57
,	

А	В	С	D	Е	F	G	Н	I	J	К
		100-Year	100-Year	Proposed	Proposed	Maximum	Required	Bankfull	First Flush	Total
		24-Hour	24-Hour	100yr-24hr	100yr-24hr	Allowable	100yr-24hr	2yr-24hr	(1 Inch)	Required
		Total	Rainfall Avg.	Avg. Runoff	Runoff	Release	Storage	(2.42 Inches)	Storage	Storage
Duration	Duration	Rainfall	Intensity	Flowrate	Volume	Rate	Volume	Volume	Volume	Volume
(Minutes)	(Hours)	(Inches)	(Inch/Hr)	(CFS)	(CFT)	(CFS)	(CFT)	(CFT)	(CFT)	(CFT)
5	0.08	0.62	7.44	33.00	9,899	1.57	9,662	38,958	16,099	38,958
10	0.17	1.09	6.54	29.00	17,402	1.57	16,930	38,958	16,099	38,958
15	0.25	1.40	5.60	24.84	22,352	1.57	21,643	38,958	16,099	38,958
20	0.33	1.57	4.72	20.93	25,119	1.57	24,174	38,958	16,099	38,958
30	0.50	1.92	3.84	17.03	30,654	1.57	29,236	38,958	16,099	38,958
40	0.67	2.09	3.14	13.93	33,421	1.57	31,531	38,958	16,099	38,958
50	0.83	2.27	2.72	12.06	36,188	1.57	33,826	38,958	16,099	38,958
60	1.00	2.44	2.44	10.82	38,956	1.57	36,121	38,958	16,099	38,958
90	1.50	2.73	1.82	8.07	43,586	1.57	39,334	38,958	16,099	39,334
120	2.00	3.02	1.51	6.70	48,216	1.57	42,546	38,958	16,099	42,546
180	3.00	3.33	1.11	4.92	53,165	1.57	44,661	38,958	16,099	44,661
240	4.00	3.52	0.88	3.90	56,198	1.57	44,860	38,958	16,099	44,860
300	5.00	3.71	0.74	3.29	59,232	1.57	45,059	38,958	16,099	45,059
360	6.00	3.90	0.65	2.88	62,265	1.57	45,257	38,958	16,099	45,257
540	9.00	4.21	0.47	2.07	67,215	1.57	41,703	38,958	16,099	41,703
720	12.00	4.52	0.38	1.67	72,164	1.57	38,148	38,958	16,099	38,958
900	15.00	4.71	0.31	1.39	75,118	1.57	32,597	38,958	16,099	38,958
1080	18.00	4.89	0.27	1.20	78,071	1.57	27,047	38,958	16,099	38,958
1260	21.00	4.97	0.24	1.05	79,364	1.57	19,836	38,958	16,099	38,958
1440	24.00	5.20	0.22	0.96	83,020	1.57	14,988	38,958	16,099	38,958
2880	48.00	5.70	0.12	0.53	91,003	1.57	-45,061	38,958	16,099	38,958

A) Duration of the storm event in minutes.

B) Duration of the storm event in hours.

C) Total amount of rainfall during a 100-year recurrence storm event for the given duration in

Column A & B (ref.: midwestern climatological center rainfall Atlas-Bulletin 71). D) Average rainfall intensity during the 100-year recurrence storm event. Calculated by dividing Column C by Column B

E) The unrestricted 100-year recurrence average discharge flowrate from the proposed site under fully developed

conditions. Calculated by multiplying Intensity (D), Runoff Coefficient (M) and Drainage Area (L).

F) The unrestricted 100-year recurrence discharge volume from the proposed site for the given duration.

Calculated by multiplying the Proposed Runoff Flowrate (E) by the Storm Duration (A) and by 60 seconds/minute.

G) The maximum allowable discharge from the site is determined by multiplying the drainage area by the allowed per acre release rate (N).

Required 100yr-24hr Detention Storage (CFT) 45,257

H) The required detention storage is determined by multiplying the flowrate differential (Inflow (E) - 0.5*Outflow (G), by the

corresponding duration (A) and by 60 seconds/minute. The calculated maximum release rate only occurs when the pond is full

As the pond dewaters the actual release rate from the pond will decrease from the maximum allowed release rate to 0. Therefore, an average release rate equal to 50% of the maximum rate is used in calculating the required storage volume.

Calculated storage volumes will vary based on rainfall intensity, the size of the drainage area, and the allowable discharge. The maximum volume

of storage for the various storm durations will be the required detention storage volume. The bank full volume is based on storing the runoff from 2 year - 24 hour storm event (2.42 Inches).

J) The first flush volume is based on storing the runoff from the first inch of rain.

K) Total required storage volume is the maximum required storage between the 100-year 24-hour at the allowable discharge rate or the total volume of the bank full storm.

Required Storage (CFT) 45,257

L) Area contributing to the proposed detention/ retention facility M) Weighted Runoff Coefficient based on proposed development conditions

N) Allowable Release Rate from the site per Acre. Based on capacity of downstream conveyence system.

Calculation By: Kevin McDevitt, P.E. Date: 4/14/2022

AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER THE SITE IN 24 HOURS

FIRST FLUSH OUTLET CONTROL STRUCTURE ORIFICE CALCULATIONS

0.186 CFS

OPENINGS IN BOTTOM OF BASIN

865.70

1" DIA HOLE HAS AN AREA OF

1 0.083 = 0.0055 SF

Use 4 - 1" Diameter Holes = 0.0218 SF

DETENTION TIME FOR FOUR (4) - 1" DIA HOLES

 $Q_{ff} = A_{ACTUALff} X \ 0.62 \sqrt{2 \times g \times h} \quad = \quad$ 0.1576 CFS

28.37 HRS

BANKFULL OUTLET CALCULATIONS

ALLOWABLE RELEASE TIME FOR BANKFULL IS 36 TO 48 HOURS

BANKFULL DETENTION TIME OF 48 HOURS 48 HRS 0.225 CFS 1.83 FT

0.034 SF

1" DIA HOLE HAS AN AREA OF

0.0055 SF 1 0.083 =

0.0382 SF

6299 CF

DETENTION TIME FOR 7 - 1" DIAMETER HOLES

0.2567 $Q_{bf} = A_{ACTUAL\ bf} \ X \ 0.62 \sqrt{2 \times g \times h}$

Use 7 - 1" Diameter Holes =

42.16 HOURS

100 YEAR OUTLET CALCULATIONS

DETENTION TIME 36 TO 48 HRS

 $V_{rem} = V_{100} - V_{bf} \qquad = \qquad$ CALCULATE TIME TO RELEASE 100 YEAR VOLUME THROUGH BANKFULL OUTLET

> $H_{avg} = \frac{2}{3} \times (Z_{100} - Z_{bttm})$ 3.30 FT $Q_{bf(100)} = A_{ACTUAL\,bf} X 0.62 \sqrt{2 \times g \times h}$

36.40 HOURS

MEETS REQUIREMENTS FOR RELEASE RATE. NO ADDITIONAL HOLES NECESSARY.

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MPLIED AS TO THE COMPLETENESS
ACCURACY THEREOF. THE CONTRACT
SHALL BE EXCLUSIVELY RESPONSIBLE F
DETERMINING THE EXACT UTILITY LOCATIO
AND ELEVATIONS PRIOR TO THE START
C O N S T R U C T I O N

CLIENT:

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

S

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329 SCALE: 1" = 100'

FIELD: DF, JH DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

867

8,408

870 13,245

9,156

10,710

12,381

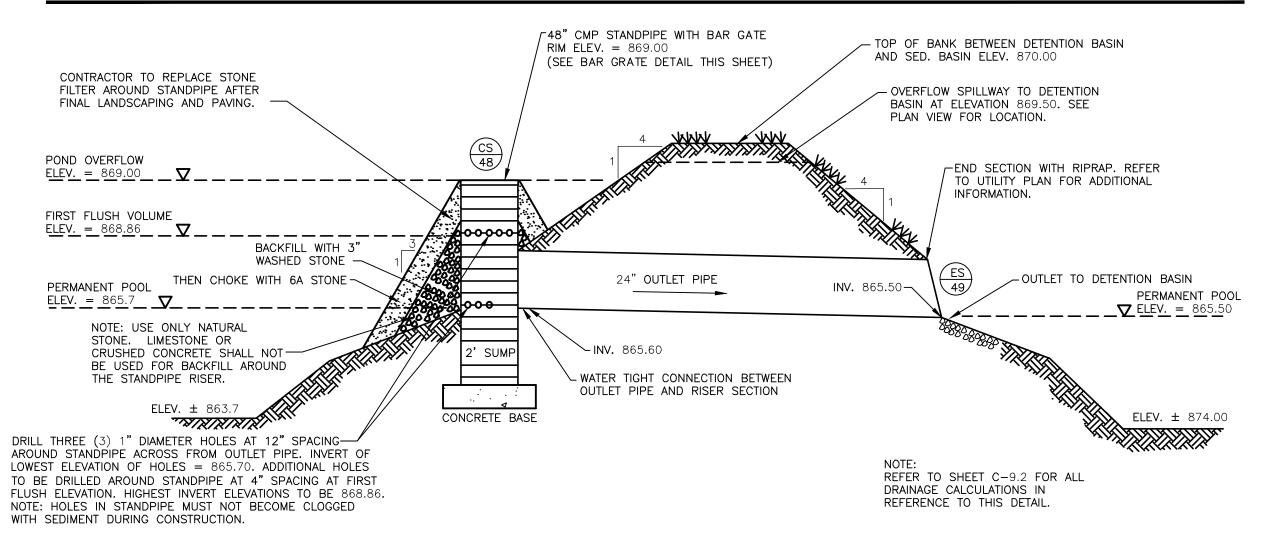
7,719 11,073

9,156 20,229

10,710 **30,939**

12,381 43,319

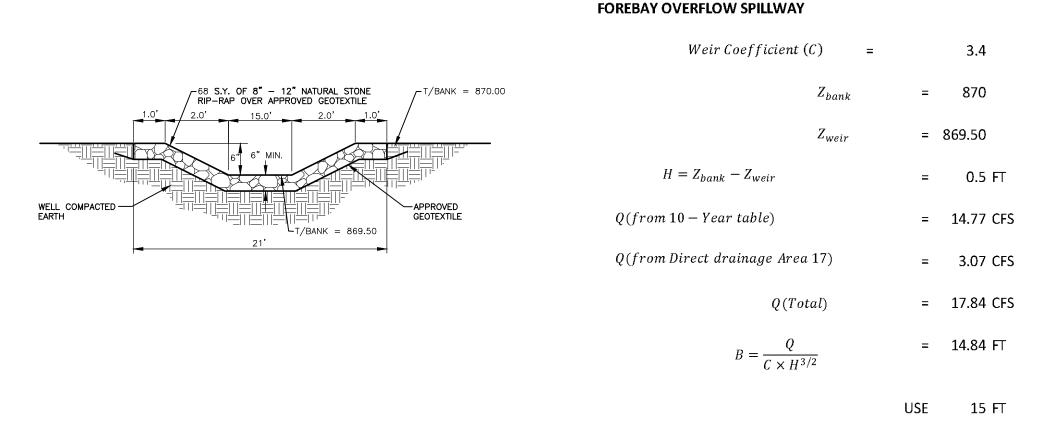
SEDIMENTATION BASIN DETAIL - POND 2



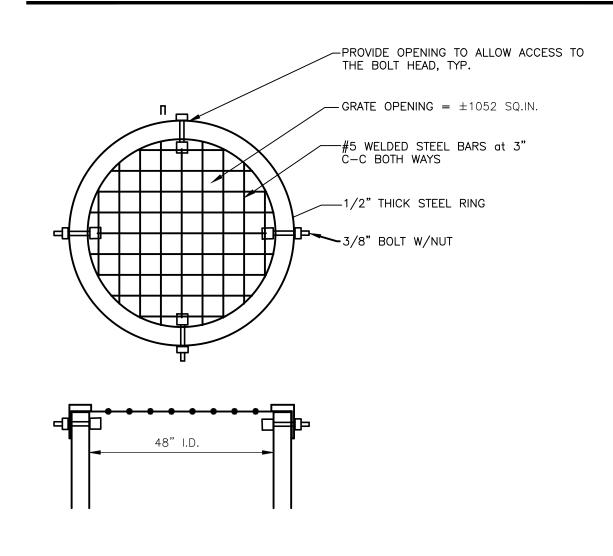
NOTE:

(GENERIC DETAIL, MUST BE UPDATED FOR PROJECT). THIS IS FOR USE ON WAYNE COUNTY PROJECTS WITH INDIVIDUAL SEDIMENTATION AND DETENTION BASINS.

SPILLWAY DETAIL - OVERFLOW - RIP RAP

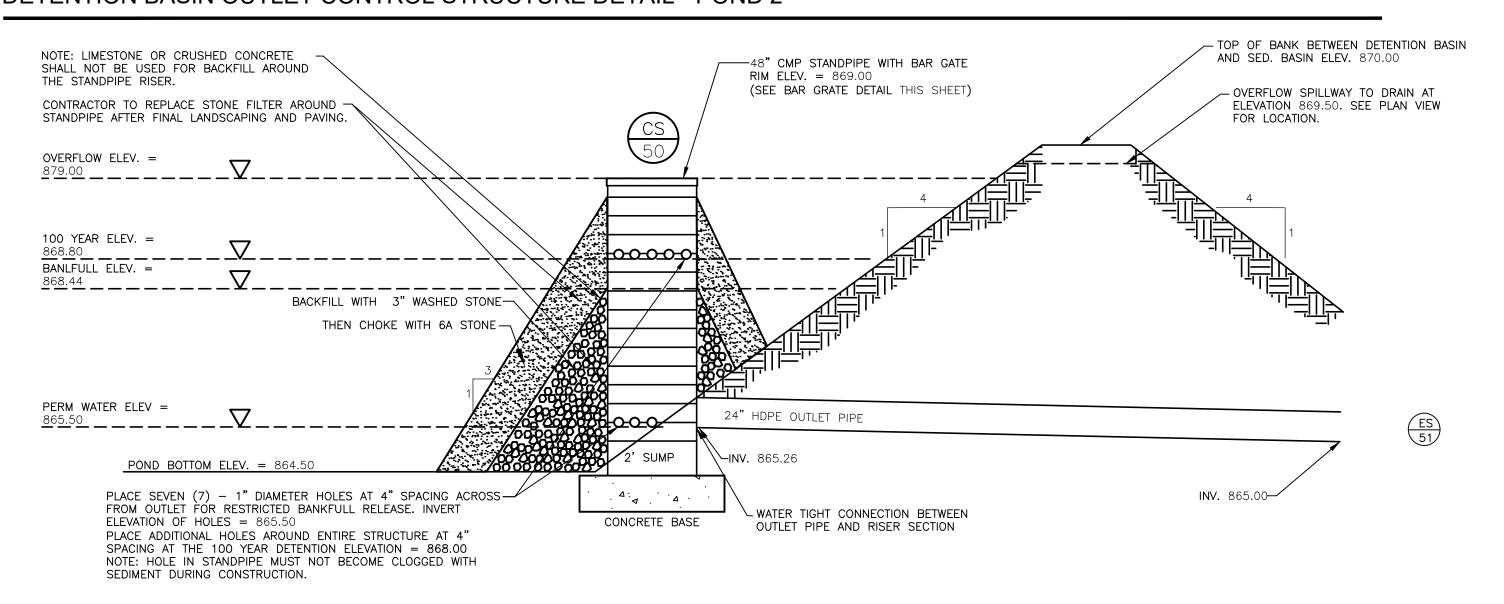


BAR GRATE DETAIL - FOR OUTLET CONTROL STRUCTURE



NOTE: BAR GRATE TO BE BOLTED TO STANDPIPE AS SHOWN

DETENTION BASIN OUTLET CONTROL STRUCTURE DETAIL - POND 2



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CLIENT :

ALLEN EDWIN HOMES

DAN LARABEL LAND MANAGER 2186 E CENTRE AVE. PORTAGE, MI 49002 (616) 878-1748

> SIA RIDGE 123-400-051-05 SEC. 23, T3N-R4W FATON COUNTY, MICHIGA

CAMBRIA

TAX ID: 700-02;
PART OF E 1/2, SITY OF POTTFRVILE FA

 VING COMMISSION
 2/17/2022

 MITTAL
 4/27/2022

 UUNTY REVIEW
 07/08/2022

 TTAL
 07/12/2022

 ITY REVISIONS
 07/19/2022

 DES/TAPPING SLEEVES
 08/03/2022

REVISIONS PER PLANNING COM FINAL SITE PLAN SUBMITTAL REVISED FOR CITY/COUNTY RE ECDC — SESC SUBMITTAL SESC SUBMITTAL/UTILITY REVIS REV REAR YARD GRADES/TAPP

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 100'

O 1/2" 1"

FIELD: DF, JH

DRAWN BY: DC, MN

DESIGN BY: KM

CHECK BY: AP

C-9.5

PHASE 3 STORM SEWER CALCULATIONS (GARDEN COURT)

	FROM STR	AREA	COEFF.		AREA	TOTAL	TIME	INT.	FLOW	PIPE	PIPE	PIPE	PIPE	PIPE	MIN PIPE	H.G.	VEL.	VEL.	TIME	UP	DOWN
	TO STR	Α	С	AxC	TOTAL	CxA	t	I	Q	CAP.	AREA	LENGTH	DIA.	SLOPE	SLOPE	SLOPE	FULL	SURCH.	FLOW	STREAM	STREAM
					At								82.								-
		ac.			ac.		min.	in/hr	c.f.s.	c.f.s.	sq. ft.	ft.	in.	%		%	ft/sec		min.		-
MAIN RUN	IN70 TO MH71	1.94	0.13	0.252	1.940	0.252	20.00	3.89	0.98	3.99	0.79	165	12	0.90	0.22	0.90	5.08	N/A	0.54	890.00	890.05
	MH71 TO MH72	0.00	0.00	0.000	1.940	0.252	20.54	3.84	0.97	4.21	0.79	248	12	1.00	0.22	1.00	5.36	N/A	0.77	890.05	886.20
	MH72 TO CB73	0.00	0.00	0.000	5.290	0.788	21.31	3.78	2.98	2.88	0.79	99	12	0.47	0.22	0.50	3.67	3.79	0.45	886.20	886.51
	CB73 TO MH74	0.37	0.64	0.237	6.070	1.279	21.76	3.74	4.79	6.20	1.77	181	18	0.25	0.13	0.25	3.51	N/A	0.86	886.51	890.28
	MH74 TO MH75	0.00	0.00	0.000	6.070	1.279	22.62	3.67	4.70	8.77	1.77	179	18	0.50	0.13	0.50	4.97	N/A	0.60	890.28	888.18
	MH75 TO MH76	0.00	0.00	0.000	7.110	1.642	23.22	3.63	5.96	11.95	3.14	196	24	0.20	0.09	0.20	3.80	N/A	0.86	888.18	885.14
	MH76 TO ES 77	0.00	0.00	0.000	7.110	1.642	24.08	3.57	5.86	16.03	3.14	71	24	0.36	0.09	0.36	5.10	N/A	0.23	885.14	878.00
LATERAL	IN78 TO MH72	3.35	0.16	0.536	3.350	0.536	20.00	3.89	2.08	2.42	0.79	115	12	0.33	0.22	0.33	3.08	N/A	0.62	885.10	0.00
LATERAL	IN79 TO CB80	0.93	0.65	0.605	0.930	0.605	20.00	3.89	2.35	2.97	0.79	33	12	0.50	0.22	0.50	3.79	N/A	0.15	885.83	885.83
	CB80 TO MH72	0.66	0.60	0.396	1.590	1.001	20.15	3.88	3.88	4.21	0.79	12	12	1.00	0.22	1.00	5.36	N/A	0.04	885.83	886.20
LATERAL	IN81 TO CB73	0.41	0.62	0.254	0.410	0.254	20.00	3.89	0.99	2.97	0.79	33	12	0.50	0.22	0.50	3.79	N/A	0.15	886.52	886.51
LATERAL	IN83 TO CB84	0.72	0.22	0.158	0.720	0.158	20.00	3.89	0.62	3.23	0.79	41	12	0.59	0.22	0.59	4.12	N/A	0.17	885.50	887.50
	CB84 TO MH75	0.32	0.64	0.205	1.040	0.363	20.17	3.87	1.41	3.26	0.79	99	12	0.60	0.22	0.60	4.15	N/A	0.40	887.50	888.18
LATERAL	IN85 TO CB86	0.39	0.63	0.246	0.390	0.246	20.00	3.89	0.96	2.97	0.79	33	12	0.50	0.22	0.50	3.79	N/A	0.15	885.25	885.25
	CB86 TO MH75	0.37	0.60	0.222	0.760	0.468	20.15	3.88	1.81	4.21	0.79	115	12	1.00	0.22	1.00	5.36	N/A	0.36	885.25	888.18

POND 3 DETENTION CALCULATIONS

PROPOSED DETENTION BASIN VOLUME

7,677

9,187

10830

12601

878

ELEVATION	AREA (FT)	AVG AREA (FT)	INC VOLUME (CF)	VOLUME (CF)
876.50	9,223			
		9,612		
877	10,001		4,806	4,806
	•	10,823	•	•
878	11,644	,	10,823	15,629
	,	12,523	,	,
879	13,402	12,323	12,523	28,152
0,5	13,402	14,338	12,323	20,132
000	15 272	14,338	14 220	43.400
880	15,273		14,338	42,489
		16,264		
881	17,255		16,264	58,753

8,432

11,716

6,988 12,966

8,432 21,398

10,009 31,406

11,716 43,122

DETENTION POND DESIGN CALCULATION

Cont. Drainage Area (Acres):	12.83
Proposed Runoff Coefficient "C" Value:	0.39
Allowable Release Rate per Acre (CFS/ Acre)	0.15
Maximum Allowable Release Rate (CFS)	1.93

А	В	С	D	E	F	G	Н		J	К
		100-Year	100-Year	Proposed	Proposed	Maximum	Required	Bankfull	First Flush	Total
		24-Hour	24-Hour	100yr-24hr	100yr-24hr	Allowable	100yr-24hr	2yr-24hr	(1 Inch)	Required
		Total	Rainfall Avg.	Avg. Runoff	Runoff	Release	Storage	(2.42 Inches)	Storage	Storage
Duration	Duration	Rainfall	Intensity	Flowrate	Volume	Rate	Volume	Volume	Volume	Volume
(Minutes)	(Hours)	(Inches)	(Inch/Hr)	(CFS)	(CFT)	(CFS)	(CFT)	(CFT)	(CFT)	(CFT)
5	0.08	0.62	7.44	37.71	11,312	1.93	11,023	44,521	18,397	44,521
10	0.17	1.09	6.54	33.15	19,887	1.93	19,310	44,521	18,397	44,521
15	0.25	1.40	5.60	28.38	25,543	1.93	24,677	44,521	18,397	44,521
20	0.33	1.57	4.72	23.92	28,706	1.93	27,550	44,521	18,397	44,521
30	0.50	1.92	3.84	19.46	35,031	1.93	33,298	44,521	18,397	44,521
40	0.67	2.09	3.14	15.91	38,193	1.93	35,883	44,521	18,397	44,521
50	0.83	2.27	2.72	13.79	41,356	1.93	38,468	44,521	18,397	44,521
60	1.00	2.44	2.44	12.37	44,518	1.93	41,053	44,521	18,397	44,521
90	1.50	2.73	1.82	9.22	49,809	1.93	44,611	44,521	18,397	44,611
120	2.00	3.02	1.51	7.65	55,100	1.93	48,169	44,521	18,397	48,169
180	3.00	3.33	1.11	5.63	60,756	1.93	50,360	44,521	18,397	50,360
240	4.00	3.52	0.88	4.46	64,223	1.93	50,361	44,521	18,397	50,361
300	5.00	3.71	0.74	3.76	67,689	1.93	50,363	44,521	18,397	50,363
360	6.00	3.90	0.65	3.29	71,156	1.93	50,364	44,521	18,397	50,364
540	9.00	4.21	0.47	2.37	76,812	1.93	45,624	44,521	18,397	45,624
720	12.00	4.52	0.38	1.91	82,468	1.93	40,884	44,521	18,397	44,521
900	15.00	4.71	0.31	1.59	85,843	1.93	33,863	44,521	18,397	44,521
1080	18.00	4.89	0.27	1.38	89,218	1.93	26,842	44,521	18,397	44,521
1260	21.00	4.97	0.24	1.20	90,696	1.93	17,924	44,521	18,397	44,521
1440	24.00	5.20	0.22	1.10	94,874	1.93	11,706	44,521	18,397	44,521
2880	48.00	5.70	0.12	0.60	103,997	1.93	-62,339	44,521	18,397	44,521

Required 100yr-24hr Detention Storage (CFT) 50,364 Required Storage (CFT) 50,364

- A) Duration of the storm event in minutes.
- B) Duration of the storm event in hours.
- C) Total amount of rainfall during a 100-year recurrence storm event for the given duration in
- Column A & B (ref.: midwestern climatological center rainfall Atlas-Bulletin 71).
- D) Average rainfall intensity during the 100-year recurrence storm event. Calculated by dividing Column C by Column B
- E) The unrestricted 100-year recurrence average discharge flowrate from the proposed site under fully developed
- conditions. Calculated by multiplying Intensity (D), Runoff Coefficient (M) and Drainage Area (L).
- F) The unrestricted 100-year recurrence discharge volume from the proposed site for the given duration.
- Calculated by multiplying the Proposed Runoff Flowrate (E) by the Storm Duration (A) and by 60 seconds/minute.
- G) The maximum allowable discharge from the site is determined by multiplying the drainage area by the allowed per acre release rate (N).
- H) The required detention storage is determined by multiplying the flowrate differential (Inflow (E) 0.5*Outflow (G), by the corresponding duration (A) and by 60 seconds/minute. The calculated maximum release rate only occurs when the pond is full
- As the pond dewaters the actual release rate from the pond will decrease from the maximum allowed release rate to 0. Therefore, an average release rate equal to 50% of the maximum rate is used in calculating the required storage volume.
- Calculated storage volumes will vary based on rainfall intensity, the size of the drainage area, and the allowable discharge. The maximum volume
- of storage for the various storm durations will be the required detention storage volume.
- 1) The bank full volume is based on storing the runoff from 2 year 24 hour storm event (2.42 Inches). J) The first flush volume is based on storing the runoff from the first inch of rain.
- K) Total required storage volume is the maximum required storage between the 100-year 24-hour at the allowable discharge rate or the total volume of the bank full storm
- L) Area contributing to the proposed detention/ retention facility M) Weighted Runoff Coefficient based on proposed development conditions
- N) Allowable Release Rate from the site per Acre. Based on capacity of downstream conveyence system.

Calculation By: Kevin McDevitt, P.E. Date: 4/14/2022

FIRST FLUSH OUTLET CONTROL STRUCTURE ORIFICE CALCULATIONS

AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER THE SITE IN 24 HOURS

0.213 CFS

OPENINGS IN BOTTOM OF BASIN

876.50

$$H_{avg} = \frac{2}{3} \times (Z_{ff} - Z_{bttm})$$
 = 1.429 FT
$$A_{ff} = \frac{Q_{ff}}{2} = 0.036 \text{ SF}$$

1" DIA HOLE HAS AN AREA OF

0.0327 SF Use 6 - 1" Diameter Holes =

DETENTION TIME FOR SIX (6) - 1" DIA HOLES

$$Q_{ff} = A_{ACTUALff} \times 0.62\sqrt{2 \times g \times h} = 0.1947 \text{ CFS}$$

$$T_{ff} = \frac{V_{ff}}{Q_{obs}} = \frac{V_{ff}}{Q_{obs} \times 3600}$$
 = 26.25 HRS

BANKFULL OUTLET CALCULATIONS

ALLOWABLE RELEASE TIME FOR BANKFULL IS 36 TO 48 HOURS

BANKFULL DETENTION TIME OF 48 HOURS = 48 HRS
$$Q_{b,c} = \frac{V_{bf}}{V_{bf}} = \frac{V_{bf}}{V_{bf}} = 0.258 \text{ CFS}$$

$$H_{avg} = \frac{2}{3} \times (Z_{bf} - Z_{bttm})$$
 = 1.82 FT

$$A_{bf} = \frac{Q_{bf}}{0.62\sqrt{2 \times 32.2 \times H_{avg}}} = 0.038 \text{ SF}$$

1" DIA HOLE HAS AN AREA OF

DETENTION TIME FOR EIGHT (8) - 1" DIAMETER HOLES

$$Q_{bf} = A_{ACTUAL\ bf} X \ 0.62\sqrt{2 \times g \times h} \qquad = \qquad 0.2932$$

$$T_{bf} = \frac{V_{bf}}{Q_{col}} = \frac{V_{bf}}{Q_{col} \times 3600}$$
 = 42.18 HOURS

100 YEAR OUTLET CALCULATIONS

$$V_{rem} = V_{100} - V_{bf} = 5843 \text{ CF}$$

CALCULATE TIME TO RELEASE 100 YEAR VOLUME THROUGH BANKFULL OUTLET

$$H_{avg} = \frac{2}{3} \times (Z_{100} - Z_{bttm})$$
 = 2.98 FT $Q_{bf(100)} = A_{ACTUAL\ bf} \ X \ 0.62 \sqrt{2 \times g \times h}$ = 0.3745

$$Q_{bf(100)} = A_{ACTUAL\ bf} \ X \ 0.62\sqrt{2 \times g \times h} \qquad = \qquad 0.3745$$

$$T_{bf} = \frac{V_{bf}}{Q_{bf}} = \frac{V_{bf}}{Q_{bf} \times 3600}$$
 = 37.35 HOURS

MEETS REQUIREMENTS FOR RELEASE RATE. NO ADDITIONAL HOLES NECESSARY.

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ACCURACY THEREOF. THE CONTRACT
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DETERMINING THE EXACT UTILITY LOCATIO
AND ELEVATIONS PRIOR TO THE START
CONSTRUCTOR

CLIENT:

ALLEN EDWIN HOMES DAN LARABEL

LAND MANAGER 2186 E CENTRE AVE PORTAGE, MI 49002 (616) 878-1748

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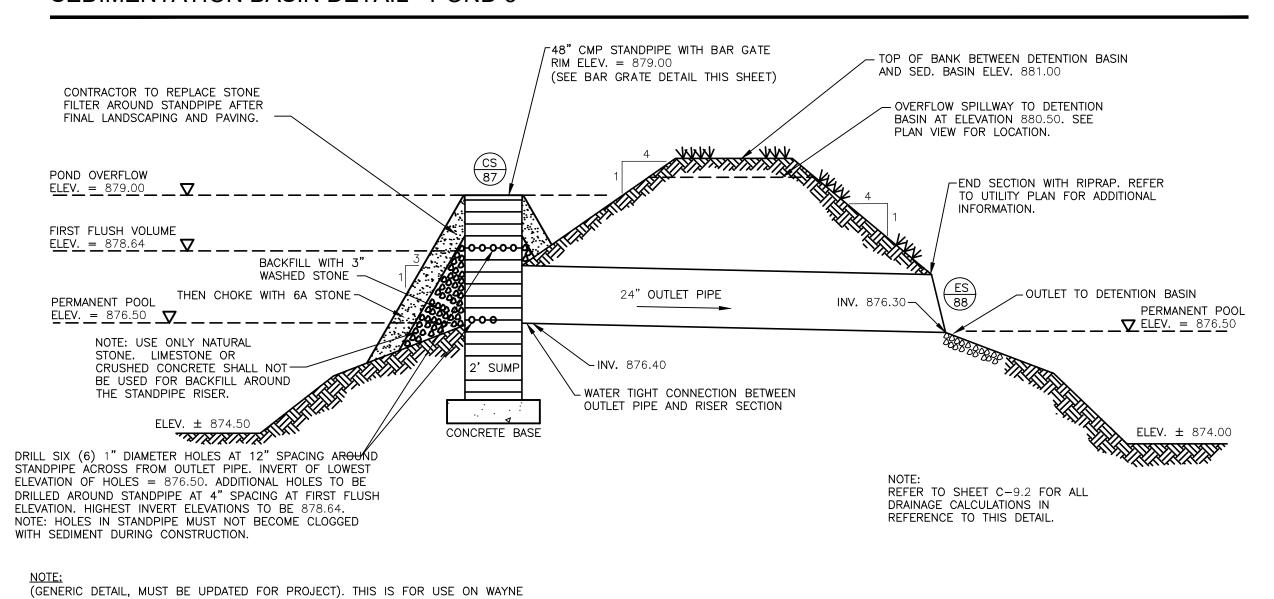
ORIGINAL ISSUE DATE:

12/29/2021 PROJECT NO: 21-329

> SCALE: 1" = 100' FIELD: DF, JH

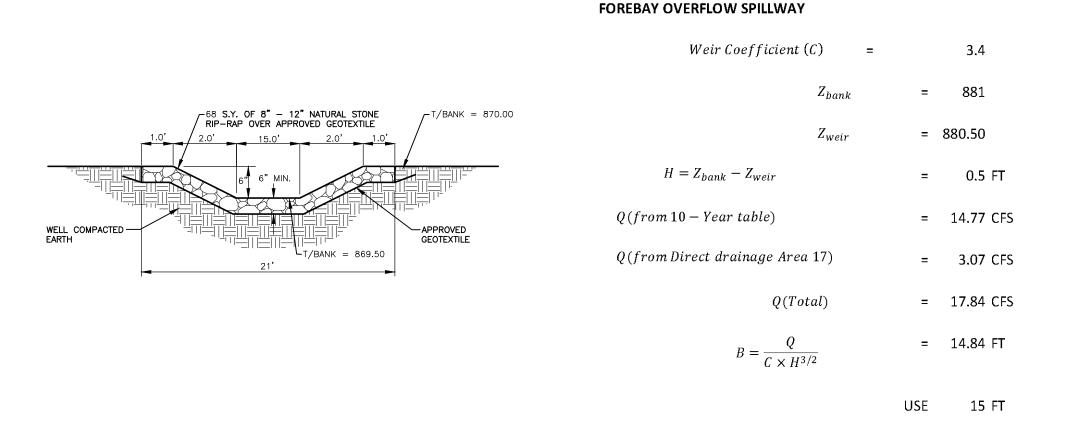
DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

SEDIMENTATION BASIN DETAIL - POND 3

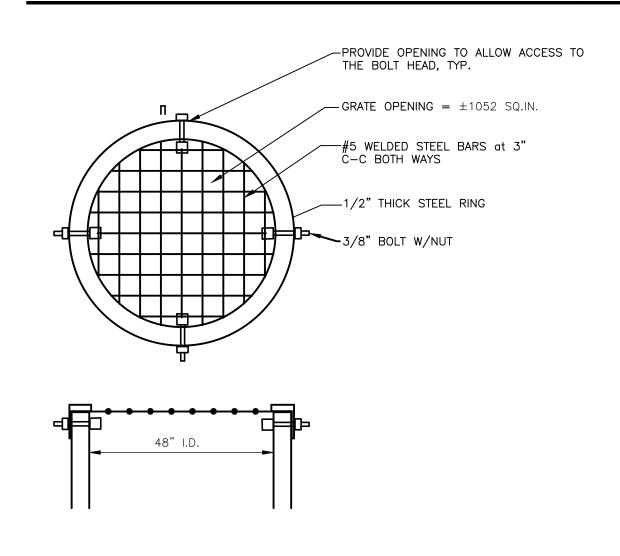


SPILLWAY DETAIL - OVERFLOW - RIP RAP

COUNTY PROJECTS WITH INDIVIDUAL SEDIMENTATION AND DETENTION BASINS.

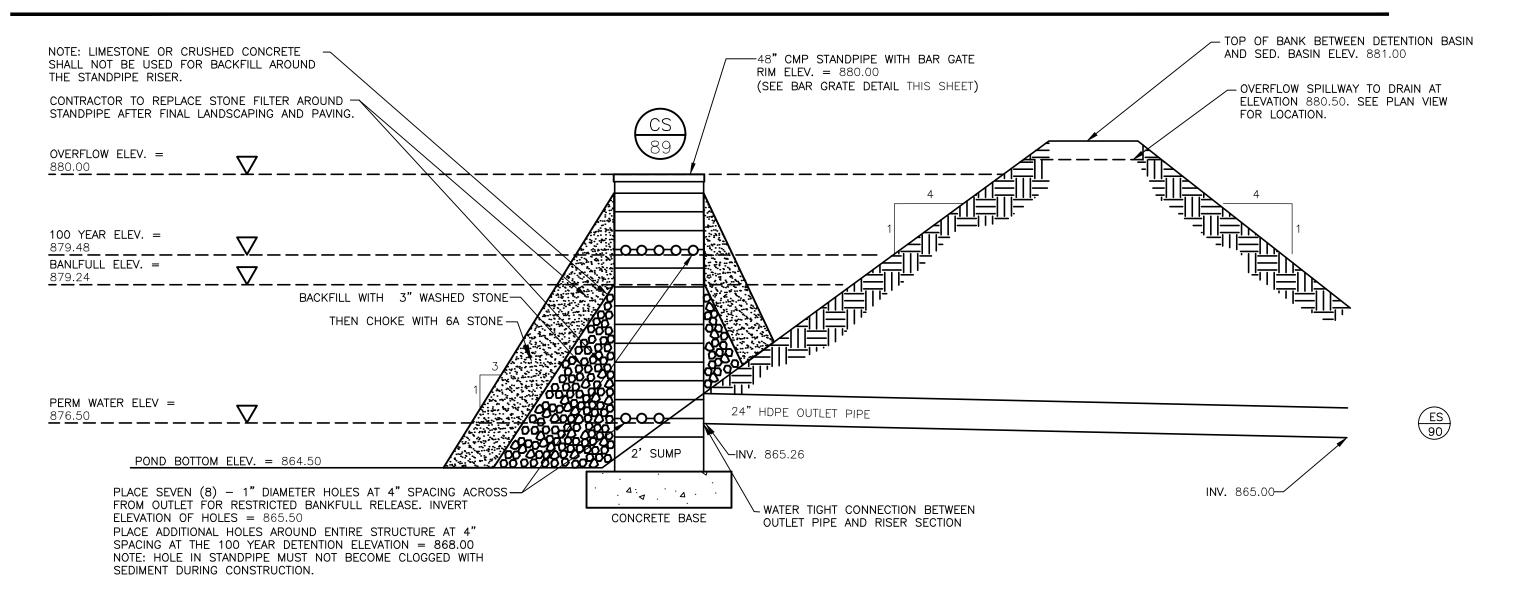


BAR GRATE DETAIL - FOR OUTLET CONTROL STRUCTURE



NOTE: BAR GRATE TO BE BOLTED TO STANDPIPE AS SHOWN

DETENTION BASIN OUTLET CONTROL STRUCTURE DETAIL - POND 3



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KEVIN C. MCDEVITT

ENGINEER

NO.
6201043260

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CLIENT :

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DAN LARABEL LAND MANAGER 2186 E CENTRE AVE. PORTAGE, MI 49002 (616) 878-1748

> RIA RIDGE 023-400-051-05 , SEC. 23, T3N-R4W FATON COLINTY MICHIGAL

HASE 3 DETENTION

CAMBRIA R

TAX ID: 700-023PART OF E 1/2, SEC

MMISSION 2/17/2022

EVIEW 07/08/2022

SIONS 07/19/2022

PING SLEEVES 08/03/2022

PLAN SUBMITTALS/REVISIONS
REVISIONS PER PLANNING COMMISSION
FINAL SITE PLAN SUBMITTAL
REVISED FOR CITY/COUNTY REVIEW
ECDC - SESC SUBMITTAL
SESC SUBMITTAL/UTILITY REVISIONS
REV REAR YARD GRADES/TAPPING SLEEVE

ORIGINAL ISSUE DATE: 12/29/2021

PROJECT NO: 21-329

SCALE: 1" = 100'

O 1/2" 1"

FIELD: DF, JH

DRAWN BY: DC, MN

DESIGN BY: KM

C-9.7

PROVIDE 6" MIN. MDOT 21AA

RESILIENT CONNECTOR-

WITH S.S. STRAP

MANHOLE CONE-OPENING ABOVE

MANHOLE STEPS

1/2" PLASTER-

COATING INSIDE

ASTM C443 PREMIUM-

AND OUT

JOINT (TYP.)

GROUT FLOW -CHANNELS ON

MANHOLE BOTTOM

PRECAST CONCRETE -

TO DIRECT FLOW

INTEGRAL BASE

UNDISTURBED SOIL

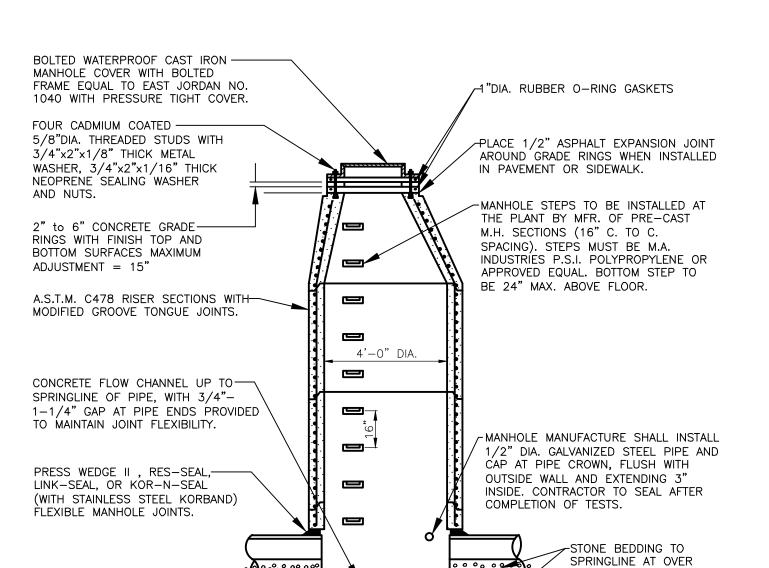
SECTION

CASTING AS SPECIFIED-

AGGREGATE COMPACTED TO

95% MAX. DRY DENSITY

(ASTM D-1557)



SANITARY MANHOLE DETAIL - EXTERNAL DROP CONNECTION

-FLOW CHANNELS

FINISHED GRADE

- SET CASTING IN MORTAR

-2 TO 6 CONCRETE GRADE

COAT INSIDE & OUT

RINGS WITH 1/2" PLASTER

- PRECAST ECCENTRIC M.H. CONE

- RESILIENT CONNECTOR WITH

STAINLESS STEEL STRAP (TYP.)

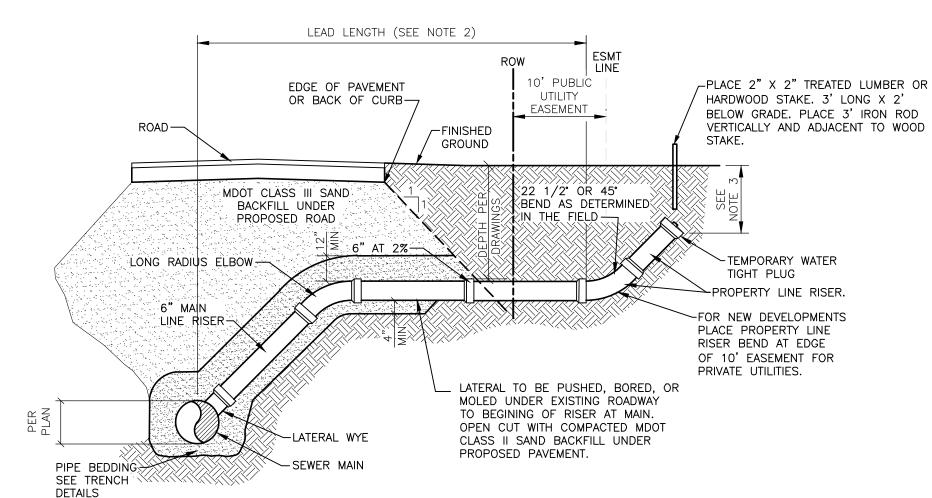
`−2500 P.S.I.

CONCRETE

-1 1/2" MIN.

EXCAVATED AREA.

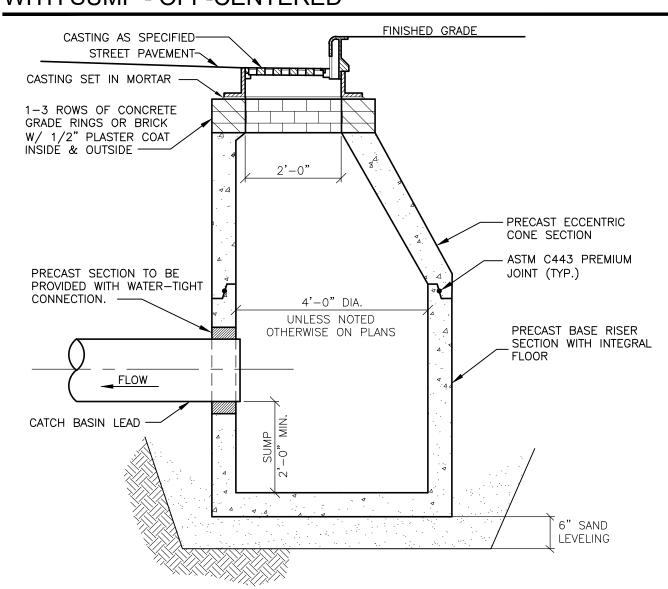
SANITARY LEAD CONNECTION DETAIL - RESIDENTIAL



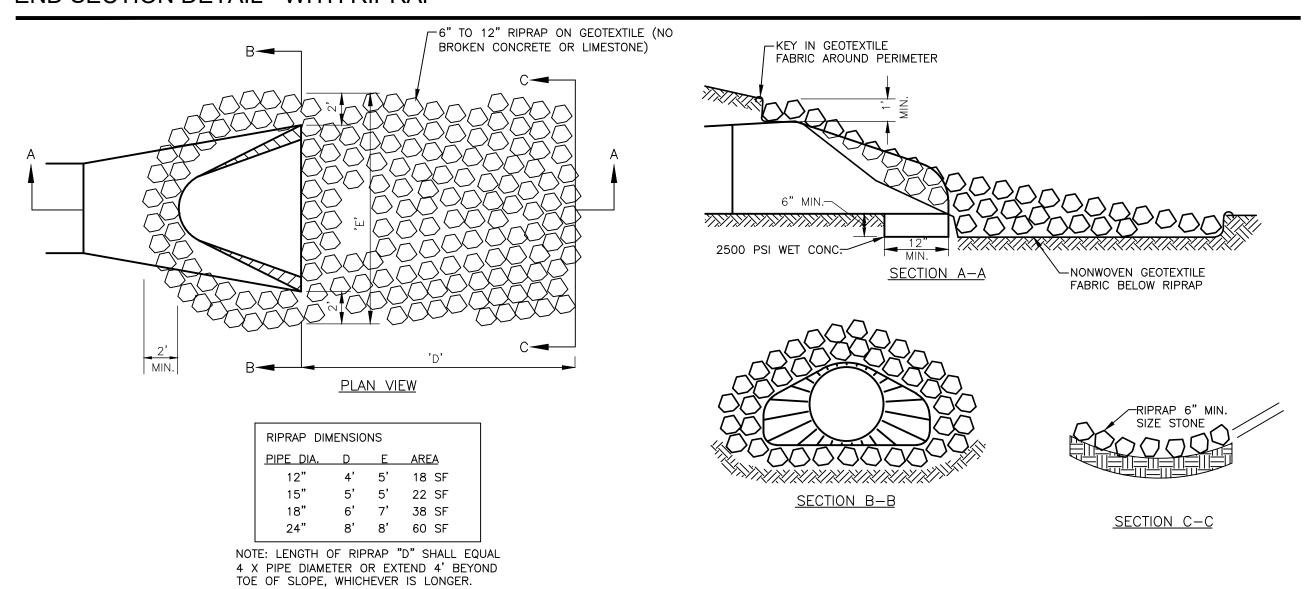
NOTES:

- 1. ADJUST MAIN LINE AND AT ROW LINE RISERS AS NEEDED TO AVOID CONFLICT WITH OTHER UTILITIES IN ROW.
- 2. UNIT MEASUREMENT FOR LEAD LENGTH IS MEASURED HORIZONTALLY DIRECTLY ABOVE THE LATERAL TO INCLUDE PIPE AND ALL FITTINGS AND APPURTENANCES EXCEPT PROPERTY LINE RISER.
- 3. PROPERTY LINE RISER TO EXTEND TO 4' BELOW EXISTING GRADE OR 1' ABOVE GROUND WATER. WHICHEVER IS CLOSER TO FINISH GRADE. MAINTAIN 2'

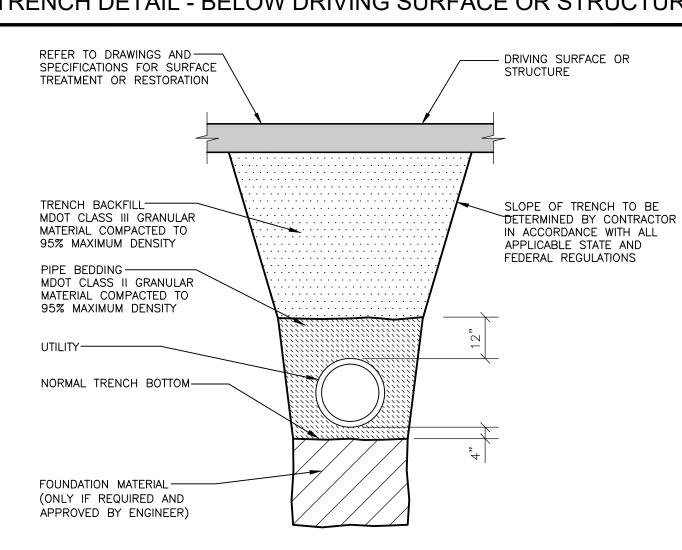
CATCH BASIN CURB DETAIL 4' DIA. -WITH SUMP - OFF-CENTERED



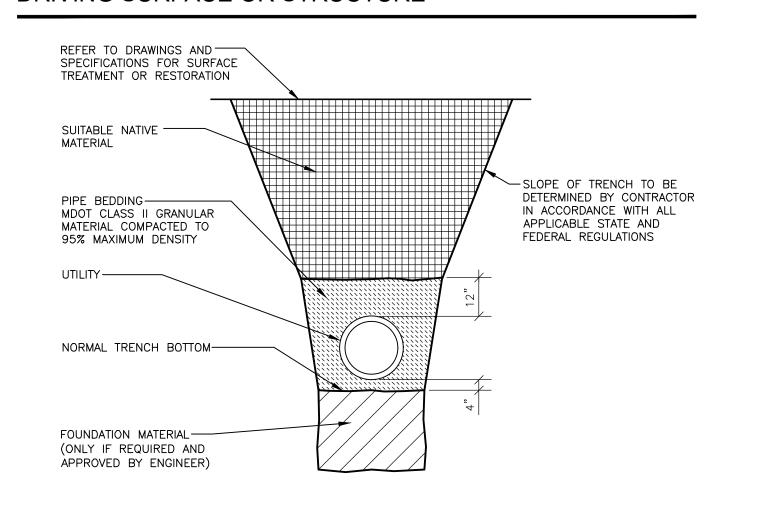
END SECTION DETAIL - WITH RIPRAP



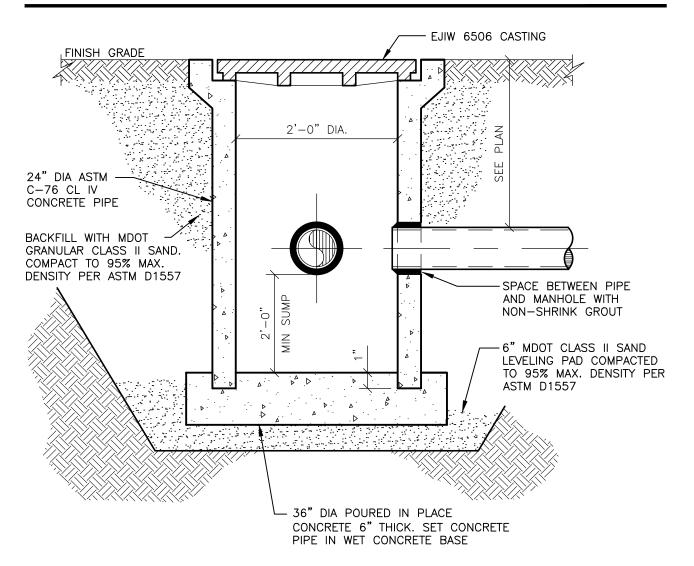
TRENCH DETAIL - BELOW DRIVING SURFACE OR STRUCTURE



TRENCH DETAIL - NOT ADJACENT TO DRIVING SURFACE OR STRUCTURE



YARD BASIN DETAIL (2' DIA.)



PROJECT NO: 21-329

C-11.0

FILE:P:\Projects\2021\21-329 Cambria Ridge\Dwg\Engineering\21-329_C-11.0_Details.dwg PLOT DATE:8/15/2022 12:45 PM

UNLESS OTHERWISE NOTED ON PLANS

CHANNEL WALL

4.4.4.4.4

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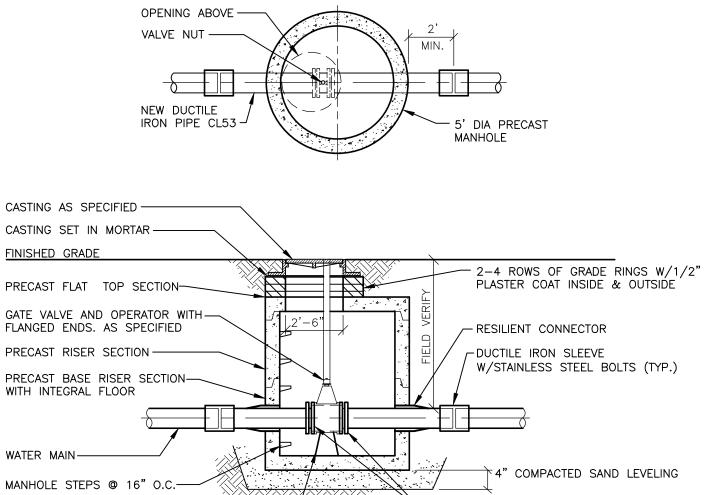
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ORIGINAL ISSUE DATE: 12/29/2021

SCALE: N/A 1/2" FIELD: DF, JH

DRAWN BY: DC, MN DESIGN BY: KM CHECK BY: AP

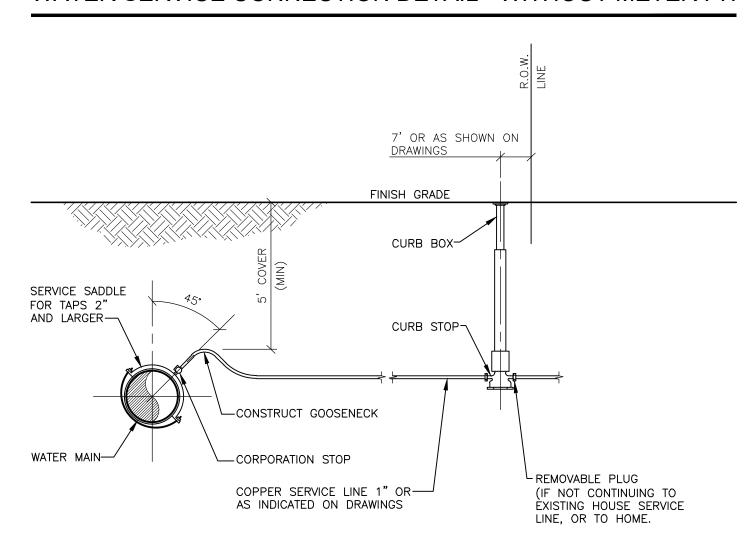
GATE VALVE & STRUCTURE DETAIL

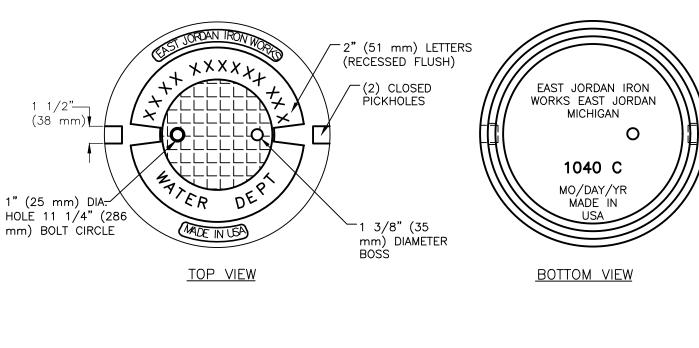


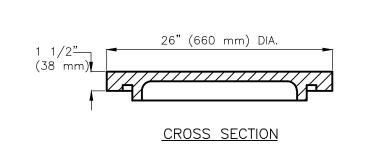
GROOVED FLANGE ADAPTER (TYP.)

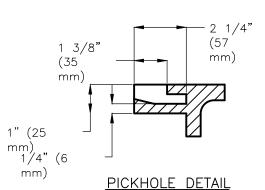
VICTALIC, STYLE 741, OR EQUAL

WATER SERVICE CONNECTION DETAIL - WITHOUT METER PIT STRUCTURE COVER DETAIL



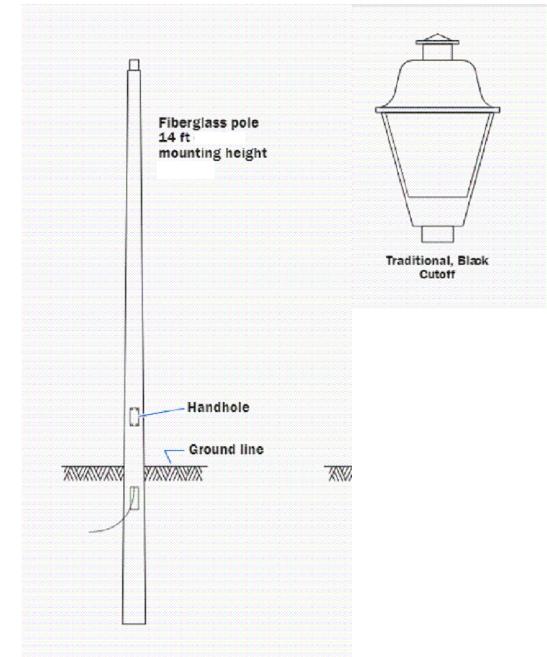






LIGHTING ELECTRICAL CONCEPT DETAILS

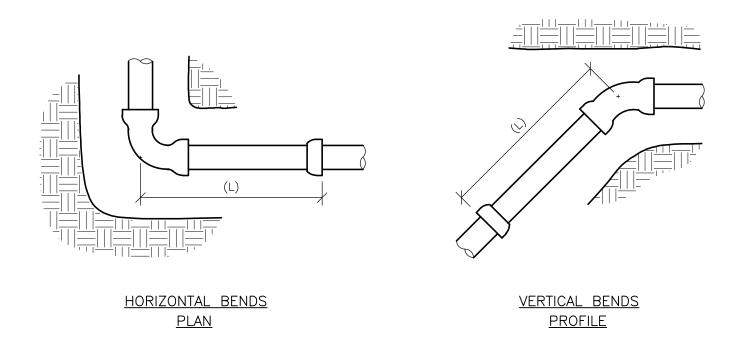
NOTE: PROPOSED LIGHTING WILL LOCATIONS ARE PRELIMINARY AND WILL BE INSTALLED BY CONSUMERS ENERGY CORPORATION AT A RATE OF MINIMUM INDUSTRY STANDARD AS REQUIRED BY CONSUMERS ENERGY. DETAILS BELOW ARE



JOINT RESTRAINT DETAIL - STABLE SOILS

3500 PSI POURED CONCRETE VALVE SUPPORT.-

KEEP BOLTS & JOINTS CLEAR OF CONCRETE

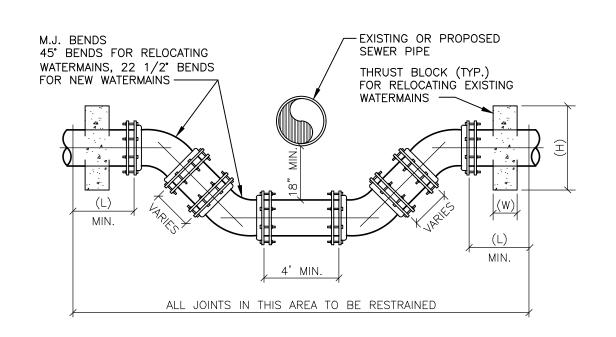


1. ALL LENGTHS SHOWN IN THE TABLE ARE IN FEET AND ARE FOR PRIMARILY SANDY CONDITIONS.

- FOR SOFT CLAY AND SILTY CONDITIONS, MULTIPLY THE TABLE VALUES BY 1.4. FOR HARD CLAY CONDITIONS MULTIPLY THE TABLE VALUES BY 0.70. . FOR MUCK AND OTHER UNSTABLE SOIL CONDITIONS, RESTRAIN ALL JOINTS.
- 5. A MINIMUM OF ONE PIPE LENGTH EACH SIDE OF A BEND SHALL BE RESTRAINED. THIS METHOD OF RESTRAINT SHALL NOT BE USED WITH PVC.
- MECHANICAL JOINT RETAINER GLANDS ARE NOT ACCEPTABLE AS A RESTRAINED JOINT SYSTEM. 8. TYPE OF JOINT RESTRAINT REQUIRES APPROVAL BY ENGINEER.

LENGTH OF PIPE (L) TO BE RESTRAINED								
FITTING		HORIZON	ITAL BENDS	5	VERTICAL BENDS			
SIZE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4" & 6"	12'	8'	4'	2'	24'	18'	12'	8'
8"	16'	10'	6'	4'	31'	23'	15'	9'
10"	18'	12'	6'	4'	37'	27'	19'	11'
12"	22'	14'	8'	4'	44'	32'	21'	13'
16"	37'	21'	12'	6'	57'	41'	27'	16'
24"	53'	30'	16'	9'	83'	59'	38'	23'

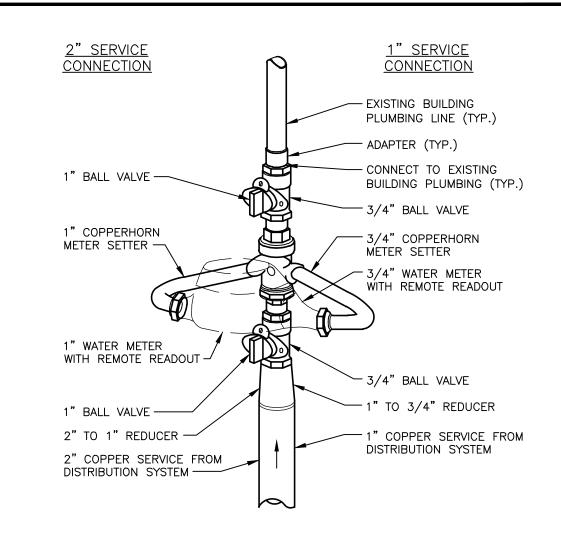
LOWERING DETAIL



NEW WA INSTALLATION	EXISTIN	
PIPE DIA.	(L)	PIPE D
6	5'	6
8	6'	8
10	7'	10
12	9'	12

EXISTING WATERMAIN RELOCATION SCHEDULE						
PIPE DIA.	(W)	(D)	(H)			
6	2'	3'	3'			
8	2'	3'	3'			
10	3'	3'	3'			
12	۸,	4,	٦,			

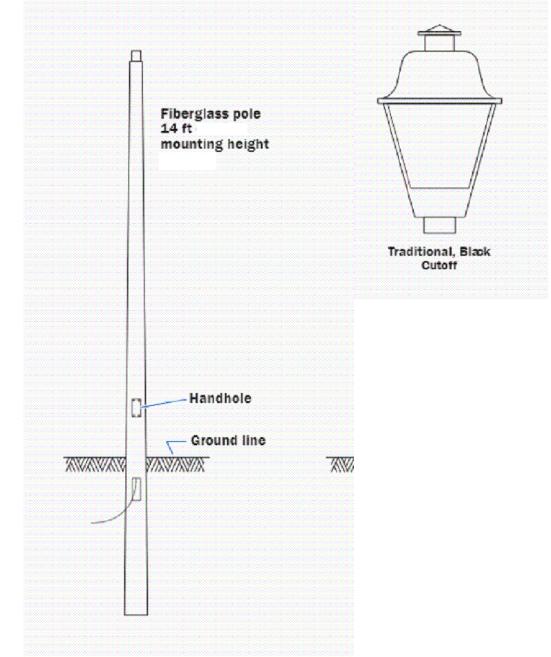
WATER SERVICE CONNECTION DETAIL - RESIDENTIAL



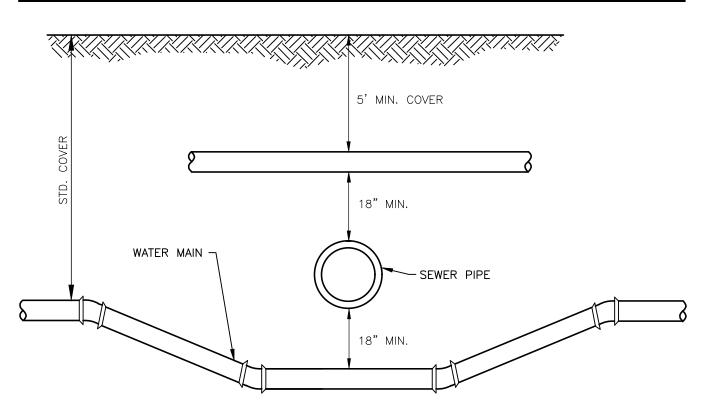
- A. HYDRANTS TO MEET AWWA C502, MECHANICAL JOINT WITH DRAIN OUTLET. HYDRANT SHALL BE EAST JORDAN MODEL 5-BR WITH BREAKAWAY FLANGE, BRASS MAIN VALVE SEAT AND THREADED BRASS INSERT.
- B. HYDRANTS SHALL HAVE 6 INCH FLANGED INLET, TWO 2-1/2 INCH HOSE NOZZLES WITH CAPS AND CHAINS, AND ONE - 4 INCH PUMPER NOZZLE (TO FACE STREET), WITH
- INCLUDING BLIND CAP AND STORZ SPANNER WENCH. THE CAP SHALL BE CONNECTED TO THE ADAPTER OR HYDRANT WITH A 0.125" VINYL COATED AIRCRAFT CABLE. THE FITTINGS

- F. HYDRANT BARREL LENGTH SHALL BE ORDERED TO ACCOMMODATE CONDITIONS PRESENT

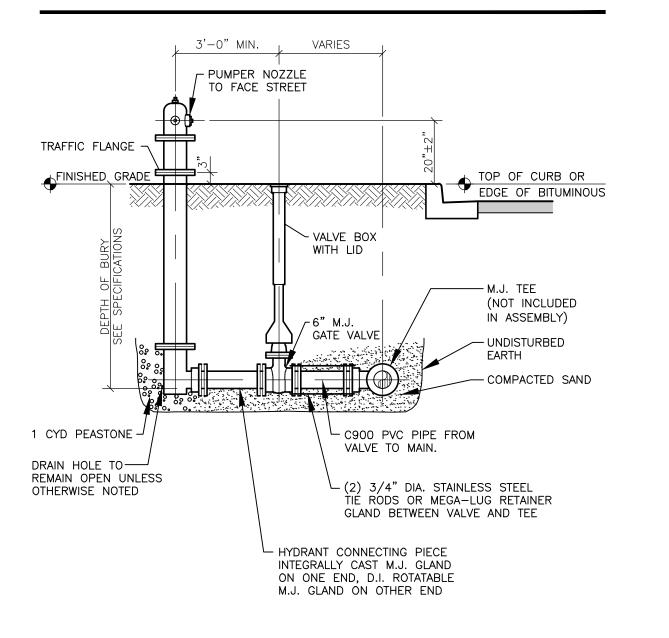
AS PROVIDED BY CONSUMERS ENERGY.



SEWER OR CULVERT CROSSING DETAIL



HYDRANT ASSEMBLY DETAIL - STANDARD



HYDRANT NOTES

- C. INCLUDE A 5" INTEGRAL HYDRANT STORZ 55903D FITTING ON THE MAIN PUMPER NOZZLE, SHALL BE INSTALLED ON THE HYDRANT DURING ASSEMBLY, NOT AT THE JOB SITE.
- D. HYDRANT SHALL HAVE A 1-1/2 INCH PENTA OPERATING NUT, OPEN LEFT, PAINT COLOR YELLOW.
- E. TOUCH UP PAINT SHALL BE RUSTOLEUM SAFETY YELLOW
- WITH THE PUMPER NOZZLE BEING CENTERED ABOVE GRADE BETWEEN 18 AND 36 INCHES.
- G. PROVIDE NATIONAL STANDARD FIRE HOSE THREAD.

ORIGINAL ISSUE DATE: 12/29/2021 PROJECT NO: 21-329 SCALE: N/A 1/2" DF, JH DRAWN BY: DC, MN

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AND ELEVATIONS PRIOR TO THE START
CONSTRUCTOR

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HOMES

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LAND MANAGER

2186 E CENTRE AVE

PORTAGE, MI 49002

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Kevin C/

Michigan's

One-Call

CLIENT:

C-11.1

FIELD:

DESIGN BY: KM

CHECK BY: AP

2. RULES, REGULATIONS OR LAWS OF ANY CONTROLLING GOVERNMENTAL AGENCY SHALL GOVERN, WHEN THEY ARE MORE STRINGENT THAN THE REQUIREMENTS OF THESE SPECIFICATIONS.

MICHIGAN, AND THE COUNTY ROAD COMMISSION WHERE APPLICABLE.

- 3. SHOULD THE CONTRACTOR ENCOUNTER A CONFLICT BETWEEN THESE PLANS AND SPECIFICATIONS, EITHER AMONG THEMSELVES OR WITH THE REQUIREMENTS OF ANY AND ALL REVIEWING AND PERMIT—ISSUING AGENCIES, CONTRACTOR SHALL SEEK CLARIFICATION IN WRITING FROM THE ENGINEER BEFORE COMMENCEMENT OF CONSTRUCTION. FAILURE TO DO SO SHALL BE AT SOLE EXPENSE TO THE
- 4. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT TO COMPLETE THE TYPE OF WORK WHICH IS BID, IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS, DETAILS AND TO THE SATISFACTION OF THE OWNER AND OWNER'S REPRESENTATIVE.
- 5. CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.
- 6. ANY WORK WITHIN STREET OR HIGHWAY RIGHT-OF-WAYS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE GOVERNMENTAL AGENCIES HAVING JURISDICTION AND SHALL NOT BEGIN UNTIL PERMITS HAVE BEEN ISSUED BY THESE GOVERNING AUTHORITIES.
- 7. ALL NECESSARY PERMITS, BONDS, INSURANCES, ETC., SHALL BE PAID FOR BY THE CONTRACTOR.
- 8. ALL ELEVATIONS SHOWN ARE BASED ON BENCHMARKS PROVIDED BY THE LOCAL MUNICIPALITY UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- 9. ALL ITEMS OF WORK NOT SPECIFICALLY INDICATED AS PAY ITEMS ON THE
- DRAWINGS OR IN THE BID PACKAGE SHALL BE CONSIDERED INCIDENTAL ITEMS.

 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DUST CONTROL DURING THE
- PERIODS OF CONSTRUCTION.

 11. AT LEAST THREE (3) WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CONTACT MISS DIG (1–800–482–7171) TO VERIFY THE LOCATION OF ANY EXISTING UNDERGROUND UTILITIES AND SHALL NOTIFY REPRESENTATIVES OF OTHER
- UTILITIES IN THE VICINITY OF THE WORK.

 12. ALL PROPERTIES OR FACILITIES IN THE SURROUNDING AREAS, PUBLIC OR PRIVATE, DESTROYED OR OTHERWISE DISTURBED DUE TO CONSTRUCTION, SHALL BE REPLACED AND/OR RESTORED TO THE ORIGINAL CONDITION BY THE CONTRACTOR, AT NO ADDITIONAL COST TO THE OWNER.
- 13. MANHOLE, CATCH BASIN, GATE WELL RIMS AND HYDRANT FINISH GRADE ELEVATIONS MUST BE AS-BUILT AND APPROVED BY THE ENGINEER BEFORE THE CONTRACTOR'S WORK IS CONSIDERED COMPLETE. AGENCY REQUIREMENTS FOR RECORD DRAWINGS
- 14. CONTRACTOR SHALL REMOVE AND DISPOSE OF OFF-SITE ANY TREES, BRUSH, STUMPS, TRASH OR OTHER UNWANTED DEBRIS, AT THE OWNER'S DIRECTION, INCLUDING OLD BUILDING FOUNDATIONS AND FLOORS. THE BURNING OR BURYING
- 15. ALL REFERENCES TO M.D.O.T. SPECIFICATIONS REFER TO THE MOST CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

OF TRASH, STUMPS OR OTHER DEBRIS WILL NOT BE ALLOWED.

- 16. ALL CONTRACTORS BIDDING THIS PROJECT SHALL HAVE VISITED THE SITE TO BECOME THOROUGHLY FAMILIAR WITH THE SITE AND THE CONDITIONS IN WHICH THEY WILL BE CONDUCTING THEIR OPERATIONS. ANY VARIANCE FOUND BETWEEN THE PLANS AND EXISTING CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE DESIGN ENGINEER.
- 17. THE LOCATIONS AND DIMENSIONS SHOWN ON THE PLANS FOR EXISTING UNDERGROUND FACILITIES ARE IN ACCORDANCE WITH AVAILABLE INFORMATION PROVIDED BY THE UTILITY COMPANIES AND GOVERNMENTAL AGENCIES WITHOUT UNCOVERING AND MEASURING. THE DESIGN ENGINEER DOES NOT GUARANTEE THE ACCURACY OF THIS INFORMATION OR THAT ALL EXISTING UNDERGROUND FACILITIES ARE SHOWN
- 18. THE OWNER MAY EMPLOY AND PAY FOR THE SERVICES OF AN ENGINEER TO PROVIDE ON—SITE INSPECTION AND VERIFY IN THE FIELD THAT ALL BACKFILL, PAVEMENTS AND CONCRETE CURB AND GUTTER HAVE BEEN PLACED AND COMPACTED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. IF, IN THE OPINION OF THE ENGINEER, THE WORK DOES NOT MEET THE TECHNICAL OR DESIGN REQUIREMENTS STIPULATED FOR THE WORK, THE CONTRACTOR SHALL MAKE ALL NECESSARY ADJUSTMENTS AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL MAKE NO DEVIATIONS FROM THE CONTRACT DOCUMENTS WITHOUT SPECIFIC WRITTEN APPROVAL OF THE OWNER.
- 19. ALL EXCAVATED MATERIAL REMOVED FROM THE SANITARY SEWER, STORM SEWER AND WATER MAIN TRENCHES UNDER, THROUGH AND WITHIN 3 FEET OF THE 45° ZONE OF INFLUENCE LINE OF EXISTING OR PROPOSED PAVING, SIDEWALK AREAS AND PER PLANS, NOT SUITABLE FOR BACKFILL, SHALL BE REMOVED FROM THESE AREAS AND DISPOSED OF.
- 20. THE CONTRACTOR SHALL RESTORE TO THEIR PRESENT CONDITIONS ANY PAVEMENT OR PUBLIC RIGHTS-OF-WAY THAT IS DISTURBED BY THE OPERATIONS OF THE CONTRACTOR. ALL RESTORATION WORK IN PUBLIC RIGHTS-OF-WAY SHALL BE PERFORMED TO THE SATISFACTION OF THE GOVERNMENT AGENCIES HAVING JURISDICTION.
- 21. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BARRICADES, SIGNAGE AND LIGHTS TO PROTECT THE WORK AND SAFELY MAINTAIN TRAFFIC, IN ACCORDANCE WITH LOCAL REQUIREMENTS AND THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST EDITION).
- 22. O.S.H.A. SAFETY REQUIREMENTS ALL WORK, WORK PRACTICE, AND MATERIALS SHALL COMPLY WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL SAFETY, OCCUPATIONAL, HEALTH AND ENVIRONMENTAL REGULATIONS AND ALSO NFPA AND ANSI CODES AS APPLICABLE. ALL WORK INSIDE A CONFINED SPACE SUCH AS MANHOLES OR UNDERGROUND STRUCTURES SHALL BE COORDINATED WITH UTILITY OWNER AND ALL WORKER SAFETY REQUIREMENTS STRICTLY ENFORCED. LAND SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- 23. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ARRANGE FOR OR SUPPLY TEMPORARY WATER SERVICE, SANITARY FACILITIES AND ELECTRICITY.
- 24. CONTRACTOR SHALL PROVIDE FOR THE CONTINUOUS OPERATION OF EXISTING FACILITIES WITHOUT INTERRUPTION DURING CONSTRUCTION UNLESS SPECIFICALLY AUTHORIZED OTHERWISE BY THE RESPECTIVE AUTHORITY.
- 25. THE CONTRACTOR SHALL NOTE EXISTING UNDERGROUND UTILITIES IN THE PROJECT PLANS. TRENCH BACKFILL FOR EXISTING UTILITIES SHALL BE EXAMINED CRITICALLY. ANY TRENCH WHICH, IN THE OPINION OF THE SOILS ENGINEER ARE FOUND TO BE SOFT, UNSTABLE, OR UNSUITABLE MATERIAL SHALL BE COMPLETELY EXCAVATED AND BACKFILLED WITH SUITABLE MATERIAL. SAND BACKFILL SHALL BE USED UNDER PAVEMENT OR WITHIN 3 FEET OF THE 45° INFLUENCE LINE OF PAVEMENT OR STRUCTURES.

EROSION CONTROL STANDARDS

- 1. ALL EROSION AND SEDIMENT CONTROL WORK SHALL CONFORM TO STANDARDS AND SPECIFICATIONS OF THE JURISDICTIONAL AGENCY UNDER PART 91 OF ACT 451 OF 1994. AS AMENDED.
- 2. UNDER "MICHIGAN'S PERMIT-BY-RULE FOR CONSTRUCTION ACTIVITIES",
 PROMULGATED UNDER ACT 245, PUBLIC ACTS OF 1929 AS AMENDED, AN NPDES
 STORM WATER DISCHARGE COVERAGE PERMIT IS REQUIRED FOR ANY CONSTRUCTION
 ACTIVITY THAT DISTURBS 1 ACRES OR MORE OF LAND. A CERTIFIED STORM
 WATER OPERATOR IS REQUIRED FOR THE SUPERVISION AND INSPECTION OF THE
 SOIL EROSION CONTROL MEASURES AT THE CONSTRUCTION SITE IN ACCORDANCE
 WITH THE PROVISIONS OF THESE RULES.
- 3. DAILY INSPECTIONS SHALL BE MADE BY CONTRACTOR WHILE WORKING TO DETERMINE THE EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES. ANY NECESSARY REPAIRS SHALL BE PERFORMED WITHOUT DELAY. ALL SOIL EROSION CONTROL PROVISIONS SHALL BE PROPERLY MAINTAINED DURING CONSTRUCTION
- 4. EROSION AND ANY SEDIMENTATION FROM WORK ON THIS SITE SHALL BE CONTAINED ON THE SITE AND NOT ALLOWED TO COLLECT ON ANY OFF-SITE AREAS OR IN WATERWAYS. WATERWAYS INCLUDE BOTH NATURAL AND MAN-MADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES, AND PONDS.
- 5. CONTRACTOR SHALL APPLY TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES WHEN REQUIRED AND AS DIRECTED ON THESE PLANS. CONTRACTOR SHALL REMOVE TEMPORARY MEASURES AS SOON AS PERMANENT STABILIZATION OF SLOPES, DITCHES, AND OTHER EARTH CHANGE AREAS HAVE BEEN COMPLETED.

EROSION CONTROL STANDARDS CONTINUED

- 6. STAGING THE WORK WILL BE DONE BY THE CONTRACTOR AS DIRECTED IN THESE PLANS AND AS REQUIRED TO ENSURE PROGRESSIVE STABILIZATION OF DISTURBED
- 7. SOIL EROSION CONTROL PRACTICES WILL BE ESTABLISHED IN EARLY STAGES OF CONSTRUCTION BY THE CONTRACTOR. SEDIMENT CONTROL PRACTICES WILL BE APPLIED AS A PERIMETER DEFENSE AGAINST ANY TRANSPORTING OF SILT OFF THE
- 8. DUST SHALL BE CONTROLLED BY WATERING OR BY OTHER APPROVED MEANS THROUGHOUT ALL CONSTRUCTION OPERATIONS.
- 9. ALL WATER FROM DEWATERING OR SURFACE DRAINAGE FROM THE CONSTRUCTION SITE SHALL BE CONTROLLED TO ELIMINATE SEDIMENT CONTAMINATION OF OFF-SITE WATERWAYS OR STORM SEWERS. SUCH MEASURES SHALL BE APPROVED BY THE ENGINEER PRIOR TO ANY DEWATERING OR LAND DISTURBANCE.
- 10. PERMANENT SOIL EROSION CONTROL MEASURES FOR SLOPES, CHANNELS, DITCHES OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 5 CALENDAR DAYS AFTER FINAL GRADING OR THE FINAL EARTH CHANGE HAS BEEN COMPLETED. WHEN IT IS NOT POSSIBLE TO PERMANENTLY STABILIZE A DISTURBED AREA AFTER AN EARTH CHANGE HAS BEEN COMPLETED OR WHERE SIGNIFICANT EARTH CHANGE HAS BEEN COMPLETED OR WHERE SIGNIFICANT EARTH CHANGE ACTIVITY CEASES, TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED WITHIN 5 CALENDAR DAYS. ALL TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND ESTABLISHED BEFORE A CERTIFICATE OF COMPLIANCE IS

STORM SEWER SPECIFICATIONS

- THESE SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH THE GENERAL SPECIFICATIONS AND THE SPECIFICATIONS AND DETAIL SHEETS OF THE GOVERNING AGENCIES. IF ANY CONFLICT IS FOUND BETWEEN THE SPECIFICATIONS, THE STRICTER SPECIFICATIONS SHALL BE FOLLOWED.
- 2. CONTRACTOR SHALL FURNISH CERTIFIED EVIDENCE THAT ALL MATERIAL TESTS AND INSPECTIONS HAVE BEEN PERFORMED AND THAT THE PRODUCT HAS BEEN MANUFACTURED IN COMPLIANCE WITH THE APPLICABLE SPECIFICATIONS.
- 3. PROPER IMPLEMENTS, TOOLS AND FACILITIES SHALL BE PROVIDED AND USED FOR UNLOADING AND DISTRIBUTING MATERIALS ALONG THE LINE OF WORK. ANY PIPE OR FITTING DAMAGED IN TRANSPORTATION OR HANDLING SHALL BE REJECTED AND IMMEDIATELY REMOVED FROM THE JOB SITE.
- 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE STORAGE OF ALL MATERIAL INTENDED FOR THE WORK. HE SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO MATERIALS, EQUIPMENT AND WORK.
- 5. PIPE BEDDING, UNLESS OTHERWISE INDICATED, SHALL BE CL. II SAND, CRUSHED STONE OR ROUNDED GRAVEL. BEDDING MATERIAL SHALL HAVE 95% PASSING A 3/4" SIEVE AND AT LEAST 50% RETAINED ON A NO. 4 SIEVE.
- 6. POROUS FILTER MATERIAL FOR PERFORATED SUBSURFACE DRAINS SHALL BE CRUSHED ROCK OR GRAVEL GRADED BETWEEN 1-1/2" AND 3/4" OR PER PLANS
- 7. BACKFILL, UNLESS OTHERWISE NOTED, SHALL BE COARSE SAND, FINE GRAVEL OR EARTH HAVING A LOW PLASTICITY INDEX, FREE OF ROCKS, DEBRIS AND OTHER FOREIGN MATERIALS AND DEFINED AS ALL PASSING THROUGH A 3/8" SIEVE AND NOT MORE THAN 10% BY VOLUME PASSING THROUGH A 200—MESH SIEVE.
- STORM SEWER PIPING AND FITTINGS SHALL BE OF THE SIZE AND TYPE INDICATED ON THE DRAWINGS AND SHALL CONFORM TO THE FOLLOWING:
 - A. POLYVINYL CHLORIDE (PVC) AND ACRYLONITRILE BUTADIENE STYRENE (ABS) FOR PIPE UP TO AND INCLUDING 10" IN DIAMETER, SHALL CONFORM TO ASTM D3034, SDR 23.5 FOR PVC PIPE AND ASTM D2751 FOR ABS PIPE WITH ELASTOMETRIC GASKET JOINTS CONFORMING TO ASTM D3212 OR CHEMICALLY WELDED PIPE JOINTS CONFORMING TO ASTM F545.
- B. REINFORCED CONCRETE PIPE, FOR PIPE 12" IN DIAMETER AND UP, SHALL CONFORM TO ASTM C-76, CLASS IV UNLESS MODIFIED BY THE DRAWINGS. JOINTS SHALL BE MODIFIED GROOVED TONGUE WITH RUBBER GASKET CONFORMING TO ASTM C-443.
- C. PERFORATED SUBSURFACE DRAIN PIPE SHALL BE PVC CONFORMING TO ASTM D-2729 OR PERFORATED, CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONFORMING TO AASHTO M-294. JOINTS FOR PVC AND POLYETHYLENE PIPE SHALL BE PREFABRICATED COUPLING WITH SOLVENT
- MANHOLES, CATCH BASINS, AND INLETS SHALL BE OF THE SIZE AND TYPE INDICATED ON THE DRAWINGS AND SHALL BE CONSTRUCTED OF THE FOLLOWING:
- A. REINFORCED PRE-CAST CONCRETE MANHOLE SECTIONS INCLUDING CONCENTRIC OR ECCENTRIC CONES AND GRADE RINGS SHALL BE 4000 PSI CONCRETE AND CONFORM TO ASTM C-478-64T.
- B. BRICK SHALL BE SOUND, HARD-BURNED THROUGHOUT AND OF UNIFORM SIZE AND QUALITY AND SHALL BE IN ACCORDANCE WITH AASHTO M 91, GRADE MS
- C. CONCRETE MASONRY SHALL BE SOLID PRE-CAST SEGMENTAL UNITS CONFORMING TO ASTM C-139.
- 10. IRON CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 30. BEARING SURFACES BETWEEN CAST IRON FRAMES, COVERS AND GRATES SHALL BE MACHINED, FITTED TOGETHER AND MATCHED-MARKED TO PREVENT ROCKING. SYSTEM IDENTIFYING LETTERS 2" HIGH SHALL BE STAMPED OR CAST INTO ALL COVERS SO THAT THEY ARE PLAINLY VISIBLE. SEE MUNICIPALITY STANDARDS FOR ACTUAL WORDING.
- 11. CASTINGS SHALL BE MANUFACTURED BY EAST JORDAN IRON WORKS, INC., NEENAH FOUNDRY COMPANY OR EQUAL.
- 12. CONCRETE AND MASONRY MATERIALS FOR CONSTRUCTION OF STORM DRAINAGE STRUCTURES SHALL CONSIST OF THE FOLLOWING:
 - A. PORTLAND CEMENT SHALL BE STANDARD BRAND OF PORTLAND CEMENT CONFORMING TO ASTM C-150, TYPE I OR IA.
 - B. FINE AND COARSE AGGREGATES FOR CONCRETE SHALL BE PER ASTM C-33.C. AGGREGATE FOR CEMENT MORTAR SHALL BE CLEAN, SHARP SAND
 - CONFORMING TO ASTM C-144.

 D. HYDRATED LIME SHALL COMPLY WITH ASTM C-207, TYPE S.
 - E. WATER SHALL MEET THE REQUIREMENTS OF MDOT SPEC SECTION 911.
- F. REINFORCING STEEL FOR CONCRETE SHALL BE INTERMEDIATE-GRADE NEW BILLET STEEL CONFORMING TO ASTM A-615, GRADE 40.
- 13. CONCRETE, UNLESS OTHERWISE NOTED, SHALL HAVE COMPRESSIVE STRENGTH AFTER 28 DAYS OF 3000 PSI MINIMUM WITH 3" MAXIMUM SLUMP.
- A. CONCRETE FILL BELOW GRADE MAY BE 2500 PSI AT 28 DAYS.
- B. CONCRETE, WHERE EXPOSED TO THE WEATHER, SHALL BE AIR—ENTRAINED. AIR ENTRAINMENT SHALL BE ACCOMPLISHED BY THE USE OF ADDITIVES CONFORMING TO ASTM C-260. AIR CONTENT SHALL BE 6% + 1%. ADDITIVE SHALL BE USED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S PRINTED
- C. READY-MIX CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-94.
- 14. MORTAR SHALL BE SPECIFIED HEREINAFTER. USE METHOD OF MIXING MORTAR AT JOB SO THAT SPECIFIED PROPORTIONS OF MORTAR MATERIALS CAN BE CONTROLLED AND ACCURATELY MAINTAINED DURING WORK PROGRESS. MORTAR SHALL NOT BE MIXED IN GREATER QUANTITIES THAN REQUIRED FOR IMMEDIATE USE, WITH AMOUNT OF WATER CONSISTENT WITH SATISFACTORY WORKABILITY. RE—TAMPERING OF MORTAR IS NOT PERMITTED.
 - A. MORTAR FOR LAYING BRICK OR CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C-270, TYPE M, AVERAGE COMPRESSIVE STRENGTH 2500 PSI MINIMUM AT 28 DAYS. MORTAR MIX SHALL BE PROPORTIONED BY VOLUME.
 - B. MORTAR FOR PLASTERING SHALL CONSIST OF 1 PART PORTLAND CEMENT AND 2-1/2 PARTS SAND.
- C. MORTAR FOR GROUTING OF RIP-RAP SHALL CONSIST OF 1 PART PORTLAND CEMENT AND 3-1/2 PARTS SAND.
- 15. PERFORM ALL EXCAVATING AND TRENCHING TO DIMENSIONS AND ELEVATIONS INDICATED ON DRAWINGS.

STORM SEWER SPECIFICATIONS, CONTINUED

- 16. OPEN NO MORE TRENCH IN ADVANCE OF PIPE LAYING THAN IS NECESSARY TO
- 17. CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED ON DRAWNGS. WHERE EXCESSIVE OR UNAUTHORIZED EXCAVATION TAKES PLACE, THE OVERDEPTH SHALL BE BACKFILLED TO THE PROPER GRADE WITH COMPACTED BEDDING MATERIAL, AT NO EXPENSE TO THE OWNER.
- 18. WHERE UNSTABLE SOIL IS ENCOUNTERED, CONTRACTOR SHALL NOT PLACE PIPE UNTIL A SOLID BED HAS BEEN PROVIDED.
- 19. EXCAVATION FOR DRAINAGE STRUCTURES SHALL EXTEND A SUFFICIENT DISTANCE FROM THE WALLS AND FOOTINGS TO ALLOWS FOR FORMS, CONSTRUCTION OF
- WALLS, CONNECTIONS AND FOR INSPECTION.

 20. PROVIDE REQUIRED TIMBER SHEETING, BRACING AND SHORING TO PROTECT SIDES
- LADDERS FOR SAFE ENTRY TO AND EXIT FROM EXCAVATION.

 21. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE PILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF TRENCHES TO

OF EXCAVATION. DO NOT BRACE SHEETING AGAINST PIPE. PROVIDE SUITABLE

- AVOID OVERLOADING, AND TO PREVENT SLIDES OR CAVE—INS.

 22. WHEN WET EXCAVATION IS ENCOUNTERED, THE TRENCH SHALL BE DE—WATERED UNTIL THE PIPE HAS BEEN LAID AND BACKFILLED TO A POINT AT LEAST 1 FOOT
- 23. MANHOLES AND CATCH BASINS SHALL BE CONSTRUCTED OF BRICK, CONCRETE MASONRY UNITS OR PRE-CAST CONCRETE WITH CAST IRON FRAMES, COVERS AND MANHOLE STEPS.
- 24. THE WALL THICKNESS OF MANHOLES AND CATCH BASINS CONSTRUCTED OF VARIOUS MATERIALS AND SET AT VARIOUS DEPTHS SHALL MEET THESE MINIMUMS. ADHERE TO REQUIREMENTS OF THE GOVERNING AGENCY IF THEY EXCEED THESE THICKNESSES:

•	<u>DEPTH</u>	BRICK	CONCRETE BLOCK	PRE-CAST
•	0' - 10'	8"	6"	6"
•	10' - 16'	12 "	8"	8"
•	16' - 25'	16 "	12 "	12"

ABOVE TOP OF PIPE.

- 25. WHENEVER EXISTING MANHOLES OR SEWER PIPE ARE TO BE TAPPED, DRILL HOLES 4" CENTER, TO CENTER, AROUND THE PERIPHERY OF OPENINGS TO CREATE A PLANE OF WEAKNESS JOINT BEFORE BREAKING SECTION OUT.
- 26. MANHOLE STEPS SHALL BE BUILT INTO AND THOROUGHLY ANCHORED TO WALLS. STEPS SHALL BE FACTORY INSTALLED IN PRE-CAST STRUCTURES.
- 27. ALL PIPING ENTERING OR LEAVING DRAINAGE STRUCTURES SHALL BE ADEQUATELY SUPPORTED BY POURED IN-PLACE CONCRETE FILL FROM PIPE CENTER TO UNDISTURBED GROUND.
- 28. SET FRAMES IN FULL BED OF STIFF MORTAR OR BITUMINOUS MASTIC JOINTING COMPOUND AT FINAL ELEVATION.
- 29. ALL TIMBER SHEETING BELOW A PLANE 12" ABOVE TOP OF PIPE SHALL REMAIN IN PLACE IN ORDER NOT TO DISTURB PIPE GRADING. BEFORE BACKFILLING, REMOVE ALL OTHER SHEETING BRACING AND SHORING.
- 30. BEDDING USED FOR TRENCH BOTTOM SHALL BE EXTENDED UP THE SIDES AND CAREFULLY PLACED AROUND AND OVER PIPE IN 6" MAXIMUM LAYERS. EACH LAYER SHALL BE THOROUGHLY AND CAREFULLY COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS PER ASTM D-1557 (MODIFIED PROCTOR) UNTIL 12" OF COVER EXISTS OVER PIPE.
- 31. REMAINDER OF TRENCH SHALL BE BACKFILLED WITH SPECIFIED BACKFILL MATERIAL TO SPECIFIED SUBGRADE ELEVATION. BACKFILLING SHALL BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY PER ASTM D-1557.
- 32. WITHIN 3' OF THE 45' INFLUENCE LINE OF THE SUBGRADE OF STREETS, DRIVES, PARKING LOTS AND OTHER AREAS TO HAVE OR HAVING IMPROVED HARD SURFACES, BACKFILL SHALL BE MATERIAL SPECIFIED AND SHALL BE DEPOSITED IN 6" LOOSE LAYERS AT OPTIMUM MOISTURE CONTENT (±2%) COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER ASTM D1557. (MODIFIED PROCTOR) SUITABLE MATERIALS FOUND ON SITE MAY BE USED.
- 33. BEFORE BACKFILLING AROUND DRAINAGE STRUCTURES, ALL FORMS, TRASH AND DEBRIS SHALL BE REMOVED AND CLEARED AWAY. SELECTED EXCAVATED MATERIAL SHALL BE PLACED SYMMETRICALLY ON ALL SIDES IN 8" MAXIMUM LAYERS; EACH LAYER SHALL BE MOISTENED AND COMPACTED WITH MECHANICAL OR HAND TAMPERS.
- 34. AFTER INSTALLATION OF PIPES AND DRAINAGE STRUCTURES, CLEAN THEM, AND ADJUST TOPS TO FINISH GRADE. PIPE SHALL BE STRAIGHT BETWEEN STRUCTURES, WITH THE FULL INSIDE DIAMETER VISIBLE WHEN SIGHTING BETWEEN
- 35. ENDS OF HEADWALL AND END SECTIONS FOR PIPES LARGER THAN 6 INCHES, SHALL BE FITTED WITH A #4 ROUND MINIMUM WELDED STEEL ROD GRATING. RODS SHALL BE SPACED 6" O.C. MAXIMUM. WELD ROD AT ALL INTERSECTIONS. GRATE SHALL BE REMOVABLE FOR ACCESS AND CLEANING.
- 36. RIP-RAP SHALL BE LAID FROM THE BOTTOM UPWARD; STONES SHALL BE LAID BY HAND WITH 8" MINIMUM DIMENSION PERPENDICULAR TO GRADE WITH WELL-BROKEN JOINTS, COMPACTED AS IT GOES, TRUE TO LINE. ALL JOINTS SHALL BE FILLED WITH CEMENT MORTAR. SURFACE STONE TO BE EXPOSED. CLEAN JOINTS WITH WIRE BRUSH.
- 37. THE CONTRACTOR SHALL DO ALL REQUIRED EXCAVATION AND TRENCHING WORK AND THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE COMPLETION OF THE WORK HEREIN REGARDLESS OF THE NATURE OF MATERIALS ENCOUNTERED DURING THE COURSE OF THE WORK. THE OWNER WILL NOT BE LIABLE FOR ANY COSTS WHATSOEVER ASSOCIATED WITH, BUT NOT LIMITED TO, THE PRESENCE OF ROCK, PEAT, SUBTERRANEAN STREAMS, EXCESSIVE WATER OR OTHER DIFFICULT OR UNANTICIPATED SUB—SURFACE PHENOMENA.
- 38. ALL CONNECTIONS TO EXISTING SEWERS SHALL BE PER MUNICIPAL REQUREMENTS, AND ALL COSTS INCLUDING TESTING AND/OR VIDEO OF SEWERS SHALL BE

WATER MAIN SPECIFICATIONS

INCIDENTAL TO THE JOB.

- 1. WATER MAIN SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH THE GENERAL SPECIFICATIONS, THE WATER MAIN SPECIFICATIONS, AND THE DETAIL SHEETS OF THE GOVERNING AGENCIES. IF ANY CONFLICT IS FOUND BETWEEN THE SPECIFICATIONS, THE STRICTER SPECIFICATIONS SHALL BE FOLLOWED.
- 2. DUCTILE IRON PIPE, 16" DIAMETER AND SMALLER, SHALL CONFORM TO ANSI/AWWA SPECIFICATION C151/A21.51, CLASS 54. DUCTILE IRON FITTINGS SHALL CONFORM TO ANSI/AWWA SPECIFICATION C110/A21.10 FOR STANDARD FITTINGS OR TO ANSI/AWWA SPECIFICATION C153/A21.53 FOR COMPACT FITTINGS. DUCTILE IRON PIPE AND FITTINGS SHALL HAVE A DOUBLE THICKNESS CEMENT MORTAR LINING CONFORMING TO ANSI SPECIFICATION A21.4.
- 3. JOINTS FOR DUCTILE IRON WATER MAIN SHALL BE U.S. PIPE AND FOUNDRY COMPANY "TYTON JOINT" OR APPROVED EQUAL.
- 4. POLYVINYL CHLORIDE (PVC) WATER MAIN SHALL CONFORM TO AWWA C900 FOR PIPE SIZES 4 TO 12 INCHES, AND SHALL CONFORM TO AWWA C905 FOR PIPE SIZES 14 TO 24 INCHES. ALL PIPES SHALL HAVE A MINIMUM DIMENSION RATIO OF (DR) OF 18 CORRESPONDING TO A WORKING PRESSURE OF 235 PSI FOR PVC TYPE 1120 PIPE.
- 4.1. RESTRAINTS FOR PVC PIPE SHALL BE EBA IRON SERIES 200PV, UNIFLANGE SERIES 1350C, 1390C, 1500 OR APPROVED EQUAL.
 4.2. SERVICES SHALL BE INSTALLED WITH ALL STAINLESS STEEL SADDLES SUCH

AS SMITH-BLAIR 372, FORD FS303, CASCADE CS22, OR APPROVED EQUAL.

MANUFACTURED WITHIN THE LAST 12 MONTHS AS DETERMINED FROM THE DATE STAMP ON THE PIPE, AND FREE FROM DEFECTS.

4.4. ALL PIPES SHALL BE MARKED WITH THE MANUFACTURER'S NAME, DATE, NOMINAL SIZE, TYPE OF PLASTIC AND PRESSURE RATING. PIPE O.D. SHALL

BE EQUIVALENT TO DUCTILE IRON PIPE OF THE SAME NOMINAL SIZE.

4.5. FITTING SHALL CONFORM TO AWWA C907 AND C908, UNLESS OTHERWISE

4.3. ALL PVC PIPE USED FOR POTABLE WATER SHALL BE BLUE IN COLOR.

5. ALL WATER MAIN SHALL BE INSTALLED WITH A MINIMUM COVER OF FIVE FEET, OR AS SPECIFIED BY THE LOCAL GOVERNING MUNICIPALITY, BELOW FINISH GRADE UNLESS OTHERWISE NOTED IN THE PLANS. WHEN WATER MAINS MUST DIP TO PASS UNDER A STORM SEWER OR SANITARY SEWER, THE SECTIONS WHICH ARE DEEPER THAN NORMAL SHALL BE KEPT TO A MINIMUM LENGTH BY THE USE OF

APPROVED BY THE ENGINEER.

VERTICAL 11-1/4 BENDS PROPERLY ANCHORED.

- SEE THE WATER MAIN STANDARD DETAIL SHEETS OF THE GOVERNING AGENCY FOR THE SPECIFIC TYPE OF HYDRANTS AND VALVES TO BE USED FOR THIS PROJECT. THESE DETAIL SHEETS ARE INCLUDED AS PART OF THE PLANS.
- 7. PRIOR TO HYDROSTATIC TESTING AND BEFORE PLACING THE WATER MAIN IN SERVICE, ALL NEW WATER PIPELINES SHALL BE CHLORINATED IN ACCORDANCE WITH AWWA C651. VERIFICATION OF DISINFECTION SHALL BE PERFORMED BY A CERTIFIED TESTING LABORATORY.

WATER MAIN SPECIFICATIONS,

- 8. BEFORE ANY WATER MAIN WILL BE ACCEPTED BY THE GOVERNING AGENCY, IT MUST PASS A HYDROSTATIC PRESSURE TEST IN ACCORDANCE WITH AWWA C605 AND COMPLYING WITH THE CURRENT SPECIFICATIONS AND PROCEDURES OF THE AGENCY.
- 9. PRIOR TO BEING PLACED INTO SERVICE, WATER MAIN SHALL BE FLUSHED OF CHLORINATED WATER AND FILLED WITH WATER FROM THE DISTRIBUTION SYSTEM. CHLORINATED WATER SHALL BE PUMPED INTO THE SANITARY SEWER. NO CHLORINATED WATER SHALL BE ALLOWED IN THE STORM SEWER OR DISCHARGED TO SURFACE WATERS.
- 10. BEFORE ANY WATER MAIN SYSTEM WILL BE ACCEPTED BY THE GOVERNING AGENCY, THE FIRE HYDRANTS MUST BE PAINTED AS INDICATED ON THE WATER
- 11. TWO INCH (2") DIAMETER CORPORATION STOPS SHALL BE PROVIDED IN BOTH THE EXISTING WATER MAIN AND THE NEW WATER MAIN AT ALL NEW CONNECTIONS.
- 12. ALL TEES, BENDS CONNECTIONS, ETC. ARE INCIDENTAL TO THE JOB.

MAIN STANDARD DETAIL SHEETS.

- 13. PHYSICAL CONNECTIONS SHALL NOT BE MADE BETWEEN EXISTING AND NEW WATERMAINS UNTIL TESTING IS SATISFACTORILY COMPLETED.
- 14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE STORAGE OF ALL MATERIAL INTENDED FOR THE WORK. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO MATERIALS EQUIPMENT AND WORK.
- 15. PIPE BEDDING, UNLESS OTHERWISE INDICATED, SHALL BE CRUSHED STONE OR ROUNDED GRAVEL. BEDDING MATERIAL SHALL HAVE 95% PASSING A 3/4" SIEVE AND 50% RETAINED ON A NO. 4 SIEVE; LOAD FACTOR SHALL BE 1.9.
- 16. BACKFILL, UNLESS OTHERWISE NOTED, SHALL BE COARSE SAND, FINE GRAVEL OR EARTH HAVING A LOW PLASTICITY INDEX, FREE OF ROCKS, DEBRIS AND OTHER FOREIGN MATERIALS AND DEFINED AS ALL PASSING THROUGH A 3/8" SIEVE AND NOT MORE THAN TEN PERCENT (10%) BY VOLUME PASSING THROUGH A 200 MESH
- 17. GATE WELLS SHALL BE REINFORCED PRE—CAST CONCRETE SECTIONS INCLUDING CONCENTRIC OR ECCENTRIC CONES AND GRADE RINGS SHALL BE 4000 PSI CONCRETE AND CONFORM TO ASTM C—478.
- 18. THRUST BLOCKS, IF REQUIRED BY THE MUNICIPALITY, SHALL BE MADE OF 3000
- PSI CONCRETE WET MIX

 19. THE MAXIMUM WIDTH OF TRENCH TO TOP OF PIPE SHALL BE AS FOLLOWS:

•	PIPE DIAMETER	TRENCH WIDTH
•	THROUGH 12"	36"
•	15" THROUGH 36"	O.D. PLUS 24"
•	42" THROUGH 60"	O.D. PLUS 30"
•	66" AND LARGER	O.D. PLUS 36"

- 20. OPEN NO MORE TRENCH IN ADVANCE OF PIPE LAYING THAN IS NECESSARY TO
- 21. CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED ON DRAWINGS. WHERE EXCESSIVE OR UNAUTHORIZED EXCAVATION TAKES PLACE, THE OVERDEPTH SHALL BE BACKFILLED AT THE PROPER GRADE WITH COMPACTED BEDDING MATERIAL, AT NO EXPENSE TO THE OWNER.
- 22. WHERE UNSTABLE SOIL IS ENCOUNTERED, CONTRACTOR SHALL NOT PLACE PIPE UNTIL A SOLID BED HAS BEEN PROVIDED.
- 23. EXCAVATION FOR STRUCTURES SHALL EXTEND A SUFFICIENT DISTANCE FROM THE WALLS AND FOOTINGS TO ALLOW FOR FORMS, CONSTRUCTION OF WALLS, CONNECTIONS AND FOR INSPECTION.
- 24. GATE WELLS SHALL BE CONSTRUCTED OF BRICK, CONCRETE MASONRY UNITS OR PRE-CAST CONCRETE WITH CAST IRON FRAMES, COVERS AND MANHOLE STEPS, AS INDICATED ON DRAWINGS AND SPECIFIED HEREIN.

A. COMPLETELY FILL JOINTS ON PRE-CAST CONCRETE SECTIONS WITH

- BITUMINOUS MASTIC JOINTING COMPOUND OR JOINTS SHALL BE MADE WITH CEMENT MORTAR WITH INSIDE POINTING AND OUTSIDE RUBBER WRAP.

 B. BRICK SHALL BE WET WHEN LAID. LAY BRICK OR CONCRETE MASONRY UNITS IN MORTAR SO AS TO FORM FULL BED, WITH END AND SIDE JOINTS IN ONE OPERATION, WITH JOINTS NOT MORE THAN 3/8" WIDE EXCEPT WHEN BRICKS OR CONCRETE MASONRY UNITS ARE LAID RADIALLY, IN WHICH CASE THE NARROWEST PART OF JOINT SHALL NOT EXCEED 1/4". LAY IN TRUE
- LINE AND, WHENEVER PRACTICAL, JOINTS SHALL BE CAREFULLY STRUCK AND POINTED ON INSIDE.

 C. PROTECT FRESH BRICK WORK FROM FREEZING, FROM DRYING EFFECTS OF SUN AND WIND, AND FOR SUCH TIME AS DIRECTED BY THE GEOTECHNICAL ENGINEER. IN FREEZING WEATHER, HEAT SUFFICIENTLY TO REMOVE ICE AND
- FROST FROM BRICK WORK.
- 25. GATE WELL STEPS SHALL BE BUILT INTO AND THOROUGHLY ANCHORED TO WALLS.
 26. ALL PIPING ENTERING OR LEAVING GATE WELLS SHALL BE ADEQUATELY SUPPORTED BY POURED—IN—PLACE CONCRETE FILL FROM PIPE CENTER TO UNDISTURBED GROUND.
- 27. THE OUTSIDE SURFACES OF BRICK OR CONCRETE MASONRY PORTION OF GATE WELLS SHALL BE PLASTERED AND TROWELED SMOOTH WITH 1/2" LAYERS OF
- 28. SET FRAMES IN FULL BED OF STIFF MORTAR OR BITUMINOUS MASTIC JOINTING COMPOUND AT FINAL ELEVATION.
- 29. IF REQUIRED BY THE MUNICIPALITY, PLACE HORIZONTAL AND/OR VERTICAL THRUST BLOCKS AT ALL PLUGS, CAPS, TEES AND FITTINGS. THE COST OF THRUST BLOCKS SHALL BE INCLUDED IN THE PRICE BID PER FOOT FOR WATER MAIN. THRUST BLOCKS SHALL NOT BE BACKFILLED PRIOR TO OBSERVATION BY THE CONTROLLING GOVERNMENTAL AGENCY. IF THRUST BLOCKS ARE NOT
- 30. IN UNSTABLE SOIL CONDITIONS, THRUST BLOCKS SHALL BE SUPPORTED BY PILING DRIVEN TO SOLID FOUNDATIONS OR BY REMOVAL OF THE UNSTABLE SOILS AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THE THRUSTS. THE COST OF PILING OR BALLAST AT THRUST BLOCKS SHALL BE INCLUDED IN THE PRICE BID FOR WATER MAIN.

UTILIZED, ALL FITTINGS SHALL HAVE RESTRAINED JOINTS PER THE MANUFACTURER.

- 31. PLACE ALL CONCRETE ANCHORAGES AND ENCASEMENTS, AS CALLED FOR ON THE DRAWINGS. THE COST OF RESTRAINED JOINTS OR ANCHORAGE AND ENCASEMENTS SHALL BE INCLUDED IN THE PRICE BID FOR WATER MAIN.
- 32. BEDDING USED FOR TRENCH BOTTOM SHALL BE EXTENDED UP THE SIDES AND CAREFULLY PLACED AROUND AND OVER PIPE IN 6" MAXIMUM LAYERS. EACH LAYER SHALL BE THOROUGHLY AND CAREFULLY COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS PER ASTM D-1557(MODIFIED PROCTOR) UNTIL 12" OF COVER EXISTS OVER PIPE.
- 33. REMAINDER OF TRENCH SHALL BE BACKFILLED WITH SPECIFIED BACKFILL MATERIAL TO SPECIFIED SUBGRADE ELEVATION. BACKFILLING SHALL BE COMPACTED TO 90% OF MAXIMUM DRY DENSITY PER ASTM D-1557.
- 34. WITHIN 3' OF THE 45° INFLUENCE LINE OF THE SUBGRADE OF STREETS, DRIVES, PARKING LOTS AND OTHER AREAS PAVED, OR AREAS PROPOSED TO BE PAVED, PLACE SAND BACKFILL IN 6" LOOSE LAYERS AT OPTIMUM MOISTURE CONTENT (±2%) AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR).
- 35. BEFORE BACKFILLING AROUND STRUCTURES, ALL FORMS, TRASH AND DEBRIS SHALL BE REMOVED AND CLEARED AWAY. SELECTED EXCAVATED MATERIAL SHALL BE PLACED SYMMETRICALLY ON ALL SIDES IN 8" MAXIMUM LAYERS; EACH LAYER SHALL BE MOISTENED AND COMPACTED WITH MECHANICAL OR HAND
- 36. THE CONTRACTOR SHALL DO ALL REQUIRED EXCAVATION AND TRENCHING WORK AND THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE COMPLETION OF THE WORKS HEREIN REGARDLESS OF THE NATURE OF MATERIALS ENCOUNTERED DURING THE COURSE OF THE WORK. THE OWNER WILL NOT BE LIABLE FOR ANY COSTS WHATSOEVER ASSOCIATED WITH, BUT NOT LIMITED TO, THE PRESENCE OF ROCK, PEAT, SUBTERRANEAN STREAMS, EXCESSIVE WATER OR OTHER DIFFICULT OR UNANTICIPATED SUB—SURFACE PHENOMENA.

UNLOADING AND DISTRIBUTING MATERIALS ALONG THE LINE OF WORK. ANY PIPE

OR FITTING DAMAGED IN TRANSPORTATION OR HANDLING SHALL BE REJECTED AND

SANITARY SEWER SPECIFICATIONS

IMMEDIATELY REMOVED FROM THE JOB SITE

- 1. THESE SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH THE GENERAL SPECIFICATIONS AND THE SANITARY SEWER SPECIFICATIONS AND DETAIL SHEETS OF THE GOVERNING AGENCIES. IF ANY CONFLICT IS FOUND BETWEEN THE SPECIFICATIONS, THE STRICTER SPECIFICATIONS WILL BE FOLLOWED.
- THE GOVERNING AGENCY WILL INSPECT THE INSTALLATION OF ALL SANITARY SEWER PIPING.
 PROPER IMPLEMENTS, TOOLS AND FACILITIES SHALL BE PROVIDED AND USED FOR

SANITARY SEWER SPECIFICATION, CONTINUED

- 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE STORAGE OF ALL MATERIAL INTENDED FOR THE WORK. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO MATERIALS, EQUIPMENT AND
- 5. THE CONTRACTOR SHALL DO ALL REQUIRED EXCAVATION AND TRENCHING WORK AND THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE COMPLETION OF THE WORKS HEREIN REGARDLESS OF THE NATURE OF MATERIALS ENCOUNTERED DURING THE COURSE OF THE WORK. THE OWNER WILL NOT BE LIABLE FOR ANY COSTS WHATSOEVER ASSOCIATED WITH, BUT NOT LIMITED TO, THE PRESENCE OF ROCK, PEAT, SUBTERRANEAN STREAMS, EXCESSIVE WATER OR OTHER DIFFICULT OR UNANTICIPATED SUB—SURFACE
- 6. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE AND SCHEDULE THE SANITARY SEWER INSTALLATION WITH THE GRADING, EXCAVATION AND OTHER SITE UTILITY SUBCONTRACTORS AND THE OWNERS REPRESENTATIVE SO AS TO PROVIDE FOR A SMOOTH AND ORDERLY PROGRESSION OF THE WORK.
- SANITARY SEWER PIPING AND FITTINGS SHALL BE OF THE SIZE AND TYPE INDICATED ON THE DRAWINGS AND SHALL CONFORM TO THE REQUIREMENTS OF
- 8. REINFORCED PRE-CAST CONCRETE MANHOLE SECTIONS INCLUDING CONCENTRIC OR ECCENTRIC CONES AND GRADE RINGS SHALL BE 4000 PSI CONCRETE AND

THE GOVERNING AGENCY.

- CONFORM TO ASTM C-478 OR AASHTO M-199.
 OPEN NO MORE TRENCH IN ADVANCE OF PIPE LAYING THAN IS NECESSARY TO EXPEDITE THE WORK.
- 10. CARE SHALL BE TAKEN NOT TO EXCAVATE BELOW THE DEPTHS INDICATED ON DRAWINGS. WHERE EXCESSIVE OR UNAUTHORIZED EXCAVATION TAKES PLACE, THE OVERDEPTH SHALL BE BACKFILLED AT THE PROPER GRADE WITH COMPACTED BEDDING MATERIAL, AT NO EXPENSE TO THE OWNER.
- 11. PROVIDE REQUIRED TIMBER SHEETING, BRACING AND SHORING TO PROTECT SIDES OF EXCAVATION. DO NOT BRACE SHEETING AGAINST PIPE. PROVIDE STAGING AND SUITABLE LADDERS WHERE REQUIRED.
- 12. DURING EXCAVATION, MATERIAL SUITABLE FOR BACKFILLING SHALL BE PILED IN AN ORDERLY MANNER A SUFFICIENT DISTANCE FROM THE BANKS OF TRENCHES TO AVOID OVERLOADING, AND TO PREVENT CAVE—INS.
- 13. WHEN WET EXCAVATION IS ENCOUNTERED, THE TRENCH SHALL BE DE-WATERED UNTIL THE PIPE HAS BEEN LAID AND BACKFILLED TO A POINT AT LEAST 1 FOOT ABOVE TOP OF PIPE.

14. SANITARY SEWER CROSSINGS SHALL BE MADE WITH 18" OF VERTICAL

CLEARANCE FROM ANOTHER UTILITY AND SHALL BE MADE WITHOUT PLACING POINT LOADS ON EITHER PIPE. CONSTRUCT SADDLES, OR PLACE PROTECTIVE CONCRETE CAP TO PREVENT DAMAGE.

15. ALL CONNECTION BRANCHES IN THE SEWER PIPE SHALL BE SECURELY AND COMPLETELY FASTENED TO, OR FORMED IN, THE WALL OF THE PIPE DURING

THE COURSE OF MANUFACTURE. ALL PIPE CONTAINING SUCH CONNECTION

BRANCHES SHALL BE INSTALLED WITH THE MAIN SEWER. THE PROPOSED

- LOCATION OF THE WYE SHALL BE PER PLAN OR AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.

 16. SERVICE LEADS SHALL TERMINATE (WITH AN APPROVED STOPPER) PER PLANS
- OR AS DIRECTED BY OWNER OR OWNER'S REPRESENTATIVE.

 17. EACH RISER AND/OR SERVICE LEAD SHALL BE MARKED WITH A 2 INCH X 2 INCH X 8 FOOT LONG HARDWOOD MARKER, PLACED VERTICALLY AT THE END
- 18. DOWNSPOUTS, WEEP TILE, FOOTING DRAINS, OR ANY CONDUIT, THAT CARRIES STORM OR GROUND WATER SHALL NOT BE ALLOWED TO DISCHARGE INTO A
- 19. ANY CONNECTION TO AN EXISTING SANITARY SEWER MANHOLE SHALL BE MADE IN STRICT CONFORMANCE WITH THE PLANS AND SPECIFICATIONS, WITH ALL WORK BEING DONE IN A WORKMANLIKE MANNER. THIS WORK SHALL INCLUDE THE CONSTRUCTION OF A PROPER CHANNEL IN THE EXISTING MANHOLE AT WHICH THE CONNECTION IS TO BE MADE, TO DIRECT THE FLOW OF INCOMING FLUIDS TO THE EXISTING OUTLET IN A MANNER WHICH WILL TEND TO CREATE THE LEAST AMOUNT OF TURBULENCE. ANY PORTION OF THE EXISTING STRUCTURE WHICH WOULD INTERFERE WITH SUCH CONSTRUCTION SHALL BE REMOVED. THE COST OF ALL CONNECTIONS, INCLUDING ALL TESTING AND/OR TELEVISING REQUIRED BY THE LOCAL MUNICIPALITY, SHALL BE INCLUDED IN THE CONTRACT PRICE FOR THE MAIN SEWER UNLESS OTHERWISE PROVIDED IN THE
- 20. WHEN CONNECTIONS ARE MADE WITH SEWERS OR DRAINS CARRYING FLUIDS, SPECIAL CARE MUST BE TAKEN THAT NO PART OF THE WORK IS BUILT UNDER WATER. A FLUME OR DAM MUST BE INSTALLED AND PUMPING MAINTAINED, IF NECESSARY, AND THE NEW WORK KEPT DRY UNTIL COMPLETED AND ANY
- CONCRETE OR MORTAR HAS SET.

 21. ALL TIMBER SHEETING BELOW A PLANE 12" ABOVE TOP OF PIPE SHALL REMAIN IN PLACE IN ORDER NOT TO DISTURB PIPE GRADING. BEFORE BACKFILLING, REMOVE ALL OTHER SHEETING, BRACING AND SHORING.
- 22. BEDDING USED FOR TRENCH BOTTOM SHALL BE EXTENDED UP THE SIDES AND CAREFULLY PLACED AROUND AND OVER PIPE IN 6" MAXIMUM LAYERS. EACH LAYER SHALL BE THOROUGHLY AND CAREFULLY COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS PER ASTM D-1557 (MODIFIED PROCTOR) UNTIL 12"
- 23. REMAINDER OF TRENCH SHALL BE BACKFILLED WITH SPECIFIED BACKFILL MATERIAL AS APPROVED BY THE GEOTECHNICAL ENGINEER TO SPECIFIED SUBGRADE ELEVATION. BACKFILLING SHALL BE COMPACTED TO 90% OF

OF COVER EXISTS OVER PIPE.

SEAL CO." OR APPROVED EQUAL.

MAXIMUM DRY DENSITY PER ASTM D-1557.

24. WITHIN 3' OF THE 45' INFLUENCE LINE OF THE SUBGRADE OF STREETS, DRIVES, PARKING LOTS AND OTHER AREAS TO HAVE OR HAVING IMPROVED HARD SURFACES, BACKFILL SHALL BE MATERIAL SPECIFIED AND SHALL BE DEPOSITED IN 6" LOOSE LAYERS AT OPTIMUM MOISTURE CONTENT (±2%) AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR). SUITABLE MATERIALS FOUND ON SITE MAY BE USED IF APPROVED BY THE GEOTECHNICAL ENGINEER AND OWNER'S REPRESENTATIVE. WHERE SERVICE OR UTILITY LINES CROSS PAVEMENT OR SIDEWALK, BEDDING SHALL

BE CARRIED TO 3 FEET BEHIND THE CURB LINE OR 3 FEET BEHIND THE SIDE

- OF SIDEWALK FARTHEST AWAY FROM THE PROPOSED PAVEMENT.

 25. BEFORE BACKFILLING AROUND MANHOLES, ALL FORMS, TRASH AND DEBRIS SHALL BE REMOVED AND CLEARED AWAY. SELECTED EXCAVATED MATERIAL SHALL BE PLACED SYMMETRICALLY ON ALL SIDES IN 8" MAXIMUM LAYERS; EACH LAYER SHALL BE MOISTENED AND COMPACTED WITH MECHANICAL AND
- 26. SANITARY SEWER MANHOLES MUST BE WATER—TIGHT AND SHALL BE PRECAST SECTIONS WITH MODIFIED GROOVED TONGUE JOINTS WITH RUBBER GASKETS, CONFORMING TO ASTM DESIGNATION C478. CAST IRON STEPS SHALL BE CAST INTO THE MANHOLE SECTIONS AT 16" O.C. DURING MANUFACTURE AND AT 45° FROM THE CENTERLINE OF THE SEWER. MANHOLE STEPS SHALL BE NEENAH
- R-1980-E, EAST JORDAN IRON WORKS, 8500 OR APPROVED EQUAL.

 27. WHEN EXISTING REINFORCED CONCRETE MANHOLES OR SEWER PIPES ARE TO BE TAPPED, A HOLE OF THE APPROPRIATE DIAMETER, SHALL BE CORE DRILLED, THROUGH THE WALL OF THE MANHOLE OR SEWER PIPE, TO ACCEPT A RESILIENT CONNECTOR CONFORMING TO ASTM DESIGNATION C-923. RESILIENT CONNECTORS SHALL BE "KOR-N-SEAL" AS MANUFACTURED BY "THE CORE AND
- 28. ALL SEWERS SHALL BE SUBJECTED TO INFILTRATION, AIR OR EXFILTRATION TESTS OR A COMBINATION THEREOF IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS, OR PER THE SEWER AUTHORITY'S STANDARDS, PRIOR TO ACCEPTANCE OF THE SYSTEM AND PRIOR TO REMOVAL OF THE BULKHEADS.
- A. ALL SEWERS OVER 24" DIAMETER SHALL BE SUBJECTED TO INFILTRATION TESTS. ALL SEWERS OF 24" DIAMETER OR SMALLER, WHERE GROUND WATER LEVEL ABOVE THE TOP OF SEWER IS OVER SEVEN (7) FEET, SHALL BE SUBJECTED TO AN INFILTRATION TEST.

B. ALL SEWERS OF 24" DIAMETER OF LESS, WHERE THE GROUND WATER

LEVEL ABOVE THE TOP OF THE SEWER IS SEVEN (7) FEET OR LESS,

29. NO SANITARY SEWER INSTALLATION OR PORTION THEREOF SHALL HAVE INFILTRATION EXCEEDING 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOUR PERIOD.

SHALL BE SUBJECT TO AIR TESTS OR EXFILTRATION TESTS.

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FOR CITY/COUNTY REVIEW
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JBMITTAL/UTILITY REVISIONS
IR YARD GRADES/TAPPING SLEEVES
PER CITY/EGLE WATER RESUBMITTAL
HYDRANT DETAIL

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TSNOO GOS TO

GRADING AND EARTHWORK **SPECIFICATIONS**

- ALTHOUGH A SUB-SURFACE INVESTIGATION MAY HAVE BEEN MADE BY THE OWNER. THE BIDDER AND ANY SUB-CONTRACTORS SHALL MAKE A PERSONAL INVESTIGATION OF SITE AND EXISTING SURFACE AND SUR-SURFACE CONDITIONS. THE CONTRACTOR IS RESPONSIBLE TO ACQUAINT HIMSELF WITH CONDITIONS OF THE WORK AREA. THE CONTRACTOR IS ADVISED TO DETERMINE THE SUB-SURFACE SOIL CONDITIONS AND GROUND WATER CONDITIONS TO HIS OWN SATISFACTION PRIOR TO BIDDING. NO MODIFICATIONS TO THE UNIT PRICES BID FOR ANY ITEM WILL BE MADE DUE TO VARIABLE SUB-SURFACE CONDITIONS. DEWATERING, I DETERMINED NECESSARY BY THE CONTRACTOR, BY WELL POINTING OR DEEP WELLS WILL BE INCIDENTAL TO THE INSTALLATION COST OF THE ITEM.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING DETERMINED TO HIS SATISFACTION PRIOR TO THE SUBMISSION OF HIS BID THE CONFIRMATION OF THE GROUND. THE CHARACTER AND QUALITY OF THE SUBSTRATA, THE TYPES AND QUANTITIES OF MATERIALS TO BE ENCOUNTERED. THE NATURE OF THE GROUNDWATER CONDITIONS. THE PROSECUTION OF THE WORK. THE GENERAL AND LOCAL CONDITIONS INCLUDING RECENT CLIMATIC CHANGES, THE TIME OF YEAR IN WHICH CONSTRUCTION WILL TAKE PLACE AND ALL OTHER MATTERS WHICH CAN IN ANY WAY AFFECT THE WORK UNDER THIS CONTRACT.
- PRIOR TO COMMENCING THE EXCAVATION THE CONTRACTOR SHALLSUBMIT A PLAN OF HIS PROPOSED OPERATIONS AND TIME SCHEDULE TO THE OWNER & OWNERS REPRESENTATIVE FOR THEIR APPROVAL.
- THE CONTRACTOR SHALL CONSIDER, AND HIS PLAN FOR EXCAVATION SHALL REFLECT, THE EQUIPMENT AND METHODS TO BE EMPLOYED IN THE EXCAVATION AND WHAT METHODS WILL BE USED WHEN WET CONDITIONS ARE ENCOUNTERED REQUIRING GROUNDWATER CONTROL OR OTHER MOISTURE CONDITIONING. CONTRACTOR SHALL SUBMIT AN OUTLINE OF HIS EARTHWORK METHODS WHICH SHALL TAKE INTO ACCOUNT THE OVERALL CONSTRUCTION SCHEDULE. THE PRICES ESTABLISHED IN THE PROPOSAL FOR THE WORK TO BE DONE SHALL REFLECT ALL COSTS PERTAINING TO THE WORK. NO CLAIMS FOR EXTRAS BASED ON SUBSTRATA OR GROUNDWATER TABLE CONDITIONS OR MOISTURE CONDITIONING
- 5. THE CONTRACTOR SHALL KEEP INFORMED AND THE OWNER'S REPRESENTATIVE INFORMED AT ALL TIMES AS TO A "FILL SURPLUS OR SHORTAGE" SITUATION. SHORTAGE OR SURPLUS OF SUITABLE MATERIAL AT THE CONCLUSION OF TH GRADING AND EARTHWORK OPERATION SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HE WILL BE REQUIRED TO SUPPLY THE DEFICIENCY OR DISPOSE OF THE SURPLUS WITHOUT ADDITIONAL COST TO THE OWNER.
- 6. THE CONTRACTOR SHALL REMOVE VEGETATION, DEBRIS, UNSATISFACTORY SOIL MATERIALS, OBSTRUCTIONS, AND OTHER DELETERIOUS MATERIALS FROM GROUND SURFACE PRIOR TO CUT OR FILL OPERATIONS. SUCH MATERIAL SHALL BECOME PROPERTY OF THE CONTRACTOR TO BE DISPOSED OF IN A LEGAL MANNER OFF
- MATERIALS FOR FILL OR BACKFILL REQUIRED TO GRADE THE SITE AND ACHIEVE DESIGN ELEVATIONS SHALL BE EITHER ON OR OFF-SITE SOILS WHICH ARE FREE OF ORGANIC MATTER AND DEBRIS. NO TOPSOIL SHALL BE USED AS ENGINEERED
- NO FILL MAY BE PLACED UNTIL THE EXPOSED SURFACES HAVE BEEN APPROVED BY THE GEOTECHNICAL ENGINEER. ALL FILL MATERIALS SHALL BE
- 9. IF ANY UNKNOWN SUBSURFACE STRUCTURES ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE AND DESIGN ENGINEER PRIOR TO PROCEEDING.
- 10. ALL FILL MATERIAL SHALL BE PLACED AND COMPACTED AT THE OPTIMUM MOISTURE CONTENT OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- 11. NO FROZEN MATERIAL SHALL BE USED AS FILL NOR WILL ANY FILL BE PLACED ON A FROZEN BASE.
- 12. NO ROCK OR SIMILAR MATERIAL GREATER THAN 6" DIAMETER SHALL BE PLACED N THE FILL UNLESS RECOMMENDATIONS FOR SUCH PLACEMENT HAVE BEEN SUBMITTED BY THE GEOTECHNICAL ENGINEER IN ADVANCE AND APPROVED BY THE OWNER AND OWNER'S REPRESENTATIVE.
- 13. COMPACT FILL MATERIAL TO AT LEAST THE FOLLOWING PERCENTAGE OF MAXIMUM DRY DENSITY, AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR). NO DEVIATION FROM THESE COMPACTION DENSITIES WILL BE ALLOWED UNLESS SPECIFICALLY RECOMMENDED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE OWNER AND OWNER'S REPRESENTATIVE.
 - % OF MAXIMUM DRY DENSITY • FILL AREAS
- FILL UNDER BUILDING (EXTENDING 5' BEYOND FOOTINGS AT A SLOPE OF 1 ON 1)
- FILL UNDER PAVEMENT OR SIDEWALKS FILL PLACED UNDER OR BEHIND
- ALL OTHER FILL
- 14. ALL FILL MATERIAL SHALL BE PLACED AND COMPACTED IN LIFTS, THAT WILL NOT EXCEED THE DEPTH IN WHICH THE COMPACTION EQUIPMENT CAN ACHIEVE THE MAXIMUM DENSITY REQUIRED FOR THE ENTIRE DEPTH OF THE MATERIAL PLACED IN
- 15. ALL AREAS WHERE FILL HAS BEEN PLACED OR THE EXISTING SOILS HAVE BEEN DISTURBED SHALL BE SUBJECT TO COMPACTION TESTING BY THE GEOTECHNICAL ENGINEER AND SHALL BE TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER, OWNER AND OWNER'S REPRESENTATIVE.
- 16. FILL MATERIAL UNDER PAVEMENTS OR STRUCTURES SHALL BE FREE OF ORGANIC OR DELETERIOUS MATERIALS. IT SHALL BE SUITABLE FOR SUPPORTING PAVEMENTS AND STRUCTURES WITHOUT ADVERSE SHRINKING OR SWELLING.
- 17. FILL MATERIAL IN BERMS AND LANDSCAPE AREAS SHALL BE SUITABLE TO SUPPORT GROWTH OF THE LANDSCAPING MATERIALS (TYPICAL FOR THE LOCAL CLIMATE) AND AS PROPOSED BY THE LANDSCAPE ARCHITECT.
- 18. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF, IN A LEGAL MANNER, ANY TREES, BRUSH OR DEBRIS THAT ARE WITHIN THE DESIGNATED CUTTING AND FILLING AREAS TO BRING THE SITE TO PROPOSED
- 19. THE CONTRACTOR SHALL STOCKPILE EXCAVATED MATERIAL ONLY IN DESIGNATED AREAS AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
- 20. DURING THE PERFORMANCE OF SITE GRADING OPERATIONS, THE SUBGRADE SHALL BE EXAMINED CRITICALLY, AND ANY AREAS DISCOVERED WHICH, IN THE OPINION OF THE OWNER'S REPRESENTATIVE OR GEOTECHNICAL ENGINEER. ARE SOFT AND UNSTABLE. SHALL BE EXCAVATED TO SUCH DEPTHS AS MAY BE NECESSARY TO INSURE SATISFACTORY SUPPORTING PROPERTIES AS DETERMINED BY THE GEOTECHNICAL ENGINEER. THESE AREAS OF EXCAVATION SHALL BE BACKFILLED IMMEDIATELY AND SHALL BE BROUGHT BACK TO THE ELEVATION OF THE SURROUNDING AREAS WITH APPROVED FILL MATERIAL AND IN ACCORDANCE WITH THE EARTH FILL CONSTRUCTION PROCEDURE.
- 21. NEWLY GRADED AREAS SHALL BE PROTECTED FROM THE ACTION OF THE ELEMENTS. ANY SETTLEMENT, DISPLACEMENT, PONDING OR WASHING OUT THAT MAY OCCUR PRIOR TO COMMENCING THE NEXT PHASE OF CONSTRUCTION SHALL BE REPAIRED, AND GRADES REESTABLISHED TO THE REQUIRED ELEVATIONS AND
- 22. THE FINISHED SUBGRADE SURFACE SHALL BE SHAPED TO INDICATED PROFILES AND SHALL BE REASONABLY SMOOTH AND FREE FROM IRREGULAR SURFACE CHANGES AND SHALL BE NO MORE THAN 1 INCH ABOVE OR BELOW THE INDICATED SUBGRADE ELEVATIONS.
- 23. THE GRADING CONTRACTOR SHALL BACKFILL ALL PARKING LOT PLANTERS AND LAWN AREAS TO WITHIN 2 INCHES OF THE TOP ADJACENT CURB GRADES. THE TOP 4 INCHES MINIMUM SHALL BE TOPSOIL, FREE FROM DEBRIS AND STONES LARGER THAN 1 INCH IN DIAMETER.
- 24. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY PUMPS, DITCHING, WELL POINT SYSTEMS AND OTHER MEANS FOR REMOVING WATER FROM EXCAVATIONS. TRENCHES, SUBGRADES AND OTHER PARTS OF THE WORK. THE CONTRACTOR SHALL CONTINUE DE-WATERING OPERATIONS UNTIL THE WATER HAS BEEN REMOVED ENTIRELY. UPON COMPLETION OF WATER REMOVAL THE CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO DRY THE SOILS, REGRADE TO PROPOSED ELEVATIONS AND COMPACT SOILS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER AND OWNER'S REPRESENTATIVE
- 25. THE CONTRACTOR SHALL DISPOSE OF WATER IN A SAFE AND SANITARY WAY TO PREVENT FLOODING OR INJURY TO PUBLIC OR PRIVATE PROPERTY AND SHALL OBTAIN APPROVAL OF THE LOCAL GOVERNING AUTHORITY BEFORE DISCHARGING RUN-OFF WATER TO THEIR SYSTEM. SEE EROSION CONTROL NOTES FOR ADDITIONAL REQUIREMENTS.
- 26. THE CONTRACTOR SHALL PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING GRADES AND NEW GRADES.

BITUMINOUS PAVING SPECIFICATIONS

- REFERENCE SPECIFICATIONS WHERE APPLICABLE TO WORK UNDER THIS SECTION ARE REFERRED TO BY ABBREVIATION AS FOLLOWS:
 - A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).
 - B. THE ASPHALT INSTITUTE (TAI)
 - C. MICHIGAN DEPARTMENT OF TRANSPORTATION/ CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION (MDOT)
 - D. AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)
- AGGREGATE BASE COURSE SHALL MEET THE REQUIREMENTS OF SECTION 902 OF THE MDOT STANDARD SPECIFICATION FOR CONSTRUCTION AND SHALL CONSIST OF 21AA CRUSHED AGGREGATE. THE USE OF SLAG IS PROHIBITED.
- TACK COAT SHALL BE EMULSIFIED ASPHALT MEETING REQUIREMENTS OF MOOT SECTION 904, GRADE CSS-1H.
- 4. AGGREGATE SHALL CONSIST OF CRUSHED STONE, CRUSHED GRAVEL, A MIXTURE OF UNCRUSHED GRAVEL WITH EITHER CRUSHED STONE OR CRUSHED GRAVEL. OI OTHER INERT MATERIAL HAVING SIMILAR CHARACTERISTICS. IT SHALL BE COMPOSED OF CLEAN, TOUGH, DURABLE FRAGMENTS FROM AN EXCESS OF FLAT OR ELONGATED PIECES, AND SHALL BE FREE OF ORGANIC MATTER AND DELETERIOUS SUBSTANCES AND MEET THE REQUIREMENTS OF MOOT STANDARD SPECIFICATIONS, SECTION 902, 21AA. CONTRACTOR MAY USE CRUSHED HMA AGGREGATE SCREENED TO MEET THE REQUIREMENTS OF MDOT 21AA MATERIAL.
- 5. FINE AGGREGATE SHALL BE WELL GRADED FROM COARSE TO FINE AND CONSIST OF NATURAL SAND, STONE SCREENINGS, OR A BLEND OF NATURAL SAND AND STONE SCREENINGS. IT SHALL BE COMPOSED OF ROUGH SURFACED AND ANGULAR GRAINS OF QUARTZ OR OTHER HARD DURABLE ROCK AND MEET THE REQUIREMENTS OF MDOT STANDARD SPECIFICATIONS, SECTION 902 FOR CLASS II OR CLASS III GRANULAR MATERIAL. CONTRACTOR MAY USE CRUSHED HMA AGGREGATE SCREENED TO MEET THE REQUIREMENTS OF MDOT CLASS II OR CLASS
- 6. ASPHALT CEMENT SHALL COMPLY WITH THE REQUIREMENTS OF MDOT SECTION
- 7. HOT MIXED ASPHALT (HMA) SHALL COMPLY WITH MDOT SECTION 501 OF STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- 8. BITUMINOUS LEVELING COURSE SHALL BE MDOT HMA, 13A, UNLESS OTHERWISE REQUIRED BY THE MUNICIPALITY OR ROAD AGENCY WITH JURISDICTION.
- 9. BITUMINOUS WEARING COURSE SHALL BE MDOT HMA, 36A UNLESS OTHERWISE REQUIRED BY THE MUNICIPALITY OR ROAD AGENCY WITH JURISDICTION. CONTRACTOR MAY SUBSTITUTE 13A WITH THE APPROVAL OF THE OWNER AND
- 10. THE CONTRACTOR SHALL SUBMIT, TO THE OWNER, TWO COPIES OF MATERIALS CERTIFICATES SIGNED BY MATERIAL PRODUCER AND CONTRACTOR. CERTIFICATES SHALL STATE THAT EACH MATERIAL ITEM MEETS SPECIFIED REQUIREMENTS.
- 11. THE CONTRACTOR SHALL SUBMIT TO THE GEOTECHNICAL ENGINEER, JOB-MIX FORMULAS FOR EACH REQUIRED ASPHALT AGGREGATE MIXTURE. MIX DESIGNS SHALL BE WITHIN ALLOWABLE TOLERANCES AS SPECIFIED BY MDOT FOR THE PARTICULAR APPLICATION.
- 12. SUBGRADE PREPARATIONS SHALL CONSIST OF THE FINAL MACHINING OF THE SUBGRADE IMMEDIATELY PRIOR TO PLACING THE BITUMINOUS BASE COURSE. THE SUBGRADE SHALL BE COMPACTED PER PLANS AND DETAILS. THE SUBGRADE SHALL BE TRUE TO LINE AND GRADE.
- 13. CRUSHED AGGREGATE BASE COURSE SHALL BE COMPACTED TO A DENSITY EQUAL TO AT LEAST 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR).
- 14. BITUMINOUS CONCRETE PAVEMENT CONSTRUCTION METHODS SHALL CONFORM TO APPLICABLE PORTIONS OF SECTION 501 OF THE MDOT STANDARD SPECIFICATIONS
- 15. THE CONTRACTOR SHALL NOT PLACE THE AGGREGATE BASE COURSE OR THE BITUMINOUS BASE COURSE PRIOR TO THE APPROVAL OF THE SUBGRADE BY THE
- 16. EACH LIFT AND COURSE OF BITUMINOUS CONCRETE SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER, PRIOR TO THE PLACEMENT OF A SUCCEEDING COURSE

GEOTECHNICAL ENGINEER.

- 17. APPLY BITUMINOUS TACK COATS ONLY WHEN TEMPERATURE HAS NOT BEEN BELOW 35 DEGREES F. FOR 12 HOURS IMMEDIATELY PRIOR TO APPLICATION. CONSTRUCT BITUMINOUS CONCRETE WEARING COURSE ONLY WHEN ATMOSPHERIC OR LIFT IS CLEAN AND DRY. BASE COURSE MAY BE LAID WHEN TEMPERATURE IS ABOVE 35 DEGREES F. AND RISING AND APPROVED BY THE GEOTECHNICAL
- 18. THE BITUMINOUS CONCRETE SHALL BE TRANSPORTED FROM THE MIXING PLANT TO THE POINT OF USE IN VEHICLES CONFORMING TO THE REQUIREMENTS OF SECTION 501 OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. DELIVERIES SHALL BE SCHEDULED SO THAT SPREADING AND ROLLING OF ALL BITUMINOUS CONCRETE PREPARED FOR ONE DAY'S RUN CAN BE COMPLETED DURING DAYLIGHT, UNLESS ADEQUATE ARTIFICIAL LIGHTING IS PROVIDED. HAULING OVER FRESHLY PLACED BITUMINOUS MAT SHALL NOT BE PERMITTED UNTIL THE BITUMINOUS CONCRETE HAS BEEN COMPACTED, AS SPECIFIED, AND ALLOWED TO COOL TO ATMOSPHERIC TEMPERATURE.
- 19. UPON ARRIVAL, THE BITUMINOUS CONCRETE SHALL BE SPREAD TO A THICKNESS NOT TO EXCEED 3-INCHES AND TO THE FULL WIDTH BY AN APPROVED BITUMINOUS PAVER. IT SHALL BE STRUCK OFF IN A UNIFORM LAYER OF SUCH DEPTH THAT, WHEN THE WORK IS COMPLETED, IT SHALL HAVE THE REQUIRED THICKNESS AND CONFORM TO THE GRADE AND CONTOUR INDICATED. THE SPEED OF THE PAVER SHALL BE REGULATED TO ELIMINATE PULLING AND TEARING OF THE BITUMINOUS MAT. UNLESS OTHERWISE DIRECTED. PLACEMENT OF THE BITUMINOUS CONCRETE SHALL BEGIN ALONG THE CENTERLINE OF A CROWNED SECTION OR ON THE HIGH SIDE OF AREAS WITH A ONE—WAY SLOPE. THE BITUMINOUS CONCRETE SHALL BE PLACED IN CONSECUTIVE ADJACENT STRIPS HAVING A MINIMUM WIDTH OF 10 FEET, EXCEPT WHERE EDGE LANES REQUIRE LESS WIDTH TO COMPLETE THE AREA. TRANSVERSE JOINTS IN ADJACENT LANES SHALL BE OFFSET A MINIMUM OF 10 FEET. WHERE POSSIBLE, JOINTS SHALL BE LOCATED AT THE LANE EDGES.
- 20. ON AREAS WHERE IRREGULARITIES OR UNAVOIDABLE OBSTACLES MAKE THE USE OF MECHANICAL SPREADING AND FINISHING EQUIPMENT IMPRACTICAL, THE BITUMINOUS CONCRETE MAY BE SPREAD AND RAKED BY HAND TOOLS.
- 21. THE BITUMINOUS CONCRETE SHALL BE PLACED AT A TEMPERATURE OF NOT LESS THAN 250 NOR HIGHER THEN THE RECOMMENDED TEMPERATURE OF THE BINDER PRODUCER OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- 22. THE BITUMINOUS CONCRETE MIXTURE SHALL BE THOROUGHLY AND UNIFORMLY COMPACTED BY ROLLING. THE SURFACE SHALL BE ROLLED WHEN THE BITUMINOUS MAT HAS ATTAINED SUFFICIENT STABILITY SO THAT THE ROLLING DOES NOT CAUSE UNDUE DISPLACEMENT, CRACKING AND SHOVING. THE SEQUENCE OF ROLLING OPERATIONS SHALL BE AT THE DISCRETION OF THE
- 23. THE SPEED OF THE ROLLER SHALL, AT ALL TIMES, BE SUFFICIENTLY SLOW TO AVOID DISPLACEMENT OF THE HOT BITUMINOUS CONCRETE. ANY DISPLACEMENT OCCURRING AS A RESULT OF REVERSING THE DIRECTION OF THE ROLLER, OR FROM ANY OTHER CAUSE. SHALL BE CORRECTED AT ONCE.
- 24. SUFFICIENT ROLLERS SHALL BE FURNISHED TO HANDLE THE OUTPUT OF THE PLANT. ROLLING SHALL CONTINUE UNTIL ALL ROLLER MARKS ARE ELIMINATED, THE SURFACE IS OF UNIFORM TEXTURE AND TRUE TO GRADE AND CROSS—SECTION, AND THE REQUIRED FIELD DENSITY IS OBTAINED.
- 25. TACK COAT SHALL BE APPLIED TO THE SURFACE OF PREVIOUS LIFTS AND COURSES OF BITUMINOUS CONCRETE AND TO SURFACES ABUTTING OR PROJECTING INTO THE BITUMINOUS CONCRETE.
- 26. IMMEDIATELY BEFORE PLACING A SUCCEEDING LIFT OR COURSE OF BITUMINOUS CONCRETE THE PRECEDING LIFT OR COURSE SHALL BE CLEARED OF ANY DEBRIS OR STANDING WATER BY APPROPRIATE METHODS.
- 27. TO PREVENT ADHESION OF THE BITUMINOUS CONCRETE TO THE ROLLER, THE WHEELS SHALL BE KEPT PROPERLY MOISTENED, BUT EXCESSIVE WATER WILL NOT
- 28. IN AREAS NOT ACCESSIBLE TO THE ROLLER, THE BITUMINOUS CONCRETE SHALL BE THOROUGHLY COMPACTED WITH HOT HAND TAMPERS.
- 29. ANY BITUMINOUS CONCRETE THAT BECOMES LOOSE AND BROKEN, MIXED WITH DIRT, OR IN ANY WAY DEFECTIVE SHALL BE REMOVED AND REPLACED WITH FRESH HOT BITUMINOUS CONCRETE AND IMMEDIATELY COMPACTED TO CONFORM TO THE SURROUNDING AREA. THIS WORK SHALL BE DONE AT THE CONTRACTOR'S EXPENSE. SKIN PATCHING SHALL NOT BE ALLOWED.
- 30. THE CONTRACTOR SHALL PROVIDE AT LEAST TWO ROLLERS FOR EACH PAVER OPERATING ON THE WORK. THE CONTRACTOR SHALL USE ADDITIONAL ROLLERS AS REQUIRED TO OBTAIN THE SPECIFIED PAVEMENT DENSITY.

BITUMINOUS PAVING SPECIFICATIONS.

- 31. THE CONTRACTOR SHALL CAREFULLY MAKE JOINTS BETWEEN OLD AND NEW PAVEMENTS, OR BETWEEN SUCCESSIVE DAYS' WORK, TO ENSURE A CONTINUOUS BOND BETWEEN ADJOINING WORK. CONSTRUCT JOINTS TO HAVE THE SAME TEXTURE, DENSITY AND SMOOTHNESS AS OTHER SECTIONS OF THE BITUMINOUS CONCRETE COURSE. THE CONTRACTOR SHALL CLEAN CONTACT SURFACES OF SAND, DIRT, OR OTHER OBJECTIONABLE MATERIAL AND APPLY TACK COAT BEFORE
- 32. THE CONTRACTOR SHALL TEST THE FINISHED SURFACE OF EACH BITUMINOUS CONCRETE COURSE FOR SMOOTHNESS, USING A 10 FOOT STRAIGHTEDGE APPLIED PARALIFI WITH AND AT RIGHT ANGLES TO CENTERLINE OF PAVED AREA. SURFACE SHALL NOT BE ACCEPTABLE IF EXCEEDING THE FOLLOWING TOLERANCES FOR SMOOTHNESS.
 - A. LEVELING COURSE SURFACE: 1/4 INCH, PLUS OR MINUS 1/4 INCH.
 - B. SURFACE COURSE: 1/4 INCH
- 33. THE CONTRACTOR SHALL TEST CROWNED SURFACES WITH A CROWN TEMPLATE, CENTERED AND AT RIGHT ANGLES TO THE CROWN. SURFACES WILL NOT BE ACCEPTABLE IF THE FINISHED CROWN SURFACES VARY MORE THAN 1/4 INCH FROM THE CROWN TEMPLATE.
- 34. AFTER FINAL ROLLING, THE CONTRACTOR SHALL NOT PERMIT VEHICULAR TRAFFIC ON THE BITUMINOUS CONCRETE PAVEMENT UNTIL IT HAS COOLED AND HARDENED, AND IN NO CASE SOONER THAN SIX HOURS OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- 35. THE AGGREGATE BASE MUST EXTEND A MINIMUM OF 1' BEHIND THE BACK-OF-CURB OR BEYOND EDGE OF PAVEMENT WHEN NO CURB IS PROPOSED.

CONCRETE CURB, SIDEWALK AND PAVEMENT SPECIFICATIONS

1. THESE SPECIFICATIONS SHALL GOVERN THE CONSTRUCTION OF ALL PAVEMENTS, CURB AND GUTTER, SIDEWALKS, SERVICE WALKS, DRIVEWAY APPROACHES, AND LOADING DOCK AREAS, AS INDICATED ON THE DRAWINGS.

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION

- 2. REFERENCE SPECIFICATIONS WHERE APPLICABLE TO WORK UNDER THIS SECTION ARE REFERRED BY ABBREVIATION AS FOLLOWS:
 - OFFICIALS (AASHTO).

B. AMERICAN CONCRETE INSTITUTE (ACI)

- C. MICHIGAN DEPARTMENT OF TRANSPORTATION / CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION (MDOT)
- D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
- THE FINE AGGREGATE SHALL MEET ALL REQUIREMENTS OF SECTION 902 OF OF MDOT SPECIFICATION FOR NO. 2NS NATURAL SAND.
- THE COARSE AGGREGATE SHALL MEET ALL REQUIREMENTS OF SECTION 902 OF M.D.O.T. SPECIFICATIONS FOR 6AA COARSE AGGREGATE
- THE CONTRACTOR SHALL SUBMIT, TO THE OWNER, TWO COPIES OF MATERIALS
- CERTIFICATES SIGNED BY MATERIAL PRODUCER AND CONTRACTOR. CERTIFICATES SHALL STATE THAT EACH MATERIAL ITEM MEETS SPECIFIED REQUIREMENTS. 6. THE CONTRACTOR SHALL SUBMIT, TO THE GEOTECHNICAL ENGINEER, JOB
- SHALL BE WITHIN ALLOWABLE TOLERANCES AS SPECIFIED FOR THE PARTICULAR CONCRETE MIX SHALL BE AIR-ENTRAINED AND PROPORTIONED TO PROVIDE THE
 - A. COMPRESSIVE STRENGTH AT 28 DAYS: 3500 PSI MIN., OR AS INDICATED

MIX-FORMULAS FOR EACH REQUIRED CEMENT-AGGREGATE MIXTURE. MIX DESIGNS

- B. TOTAL AIR CONTENT BY VOLUME: 5% TO 8%.
- C. SLUMP 3 INCH MAXIMUM, OR AS INDICATED ON PLANS. 8. THE CONTRACTOR SHALL AT HIS EXPENSE FURNISH SAMPLES OF FRESH
- CONCRETE AND PROVIDE SAFE AND SATISFACTORY FACILITIES FOR OBTAINING THE
- 9. CONSTRUCT CONCRETE CURBING ONLY WHEN GROUND TEMPERATURE IS ABOVE 35 DEGREES F. AND BASE IS DRY.
- 10. ALL CEMENT USED IN CURB CONSTRUCTION SHALL BE PORTLAND CEMENT, TYPE I OR IA ASTM C-150. 11. WATER USED IN CONCRETE SHALL MEET THE REQUIREMENTS OF MDOT SECTION
- 12. AIR ENTRAINING ADMIXTURE SHALL BE SELECTED FROM THE MDOT QUALIFIED
- 13. ALL READY-MIXED CONCRETE SUPPLIERS MUST BE APPROVED BY THE OWNER AND MEET THE CURRENT REQUIRMENTS OF THE NATIONAL READY MIX CONCRETE ASSOCIATION (NRMCA). IF REQUESTED BY THE OWNER, SUBMIT A WRITTEN DESCRIPTION OF PROPOSED READY-MIXED CONCRETE MANUFACTURER, GIVING QUALIFICATIONS OF PERSONAL, LOCATION OF BATCHING PLANT, LIST OF PROJECTS SIMILAR IN SCOPE OF SPECIFIED WORK, AND OTHER INFORMATION AS MAY BE REQUESTED BY THE OWNER.
- 14. THE CONTRACTOR SHALL SUBMIT A STATEMENT OF PURCHASE FOR READY-MIXED CONCRETE: PRIOR TO ACTUAL DELIVERY OF CONCRETE, SUBMIT TO THE GEOTECHNICAL ENGINEER FOUR COPIES OF STATEMENT OF PURCHASE, GIVING THE DRY WEIGHTS OF CEMENT AND SATURATED SURFACE DRY WEIGHTS OF FINE AND COARSE AGGREGATES AND QUANTITIES. TYPE AND NAME OF ADMIXTURES (IF ANY) AND OF WATER PER CU.YD., THAT WILL BE USED IN THE MANUFACTURE OF THE CONCRETE. THE CONTRACTOR SHALL ALSO FURNISH EVIDENCE SATISFACTORY TO THE GEOTECHNICAL ENGINEER THAT THE MATERIALS TO BE USED AND PROPORTIONS SELECTED WILL PRODUCE CONCRETE OF THE QUALITY SPECIFIED. WHATEVER STRENGTHS ARE OBTAINED, THE QUANTITY OF CEMENT USED SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED.
- 15. READY-MIXED CONCRETE DELIVERY TICKETS: SUBMIT ONE COPY OF EACH DELIVERY TICKET TO THE GEOTECHNICAL ENGINEER AND CONTRACTOR IN ACCORDANCE WITH SECTION 16 OF ASTM C94.
- 16. READY-MIXED CONCRETE SHALL BE BATCHED, MIXED AND TRANSPORTED IN ACCORDANCE WITH ASTM C94, AND COMPLY WITH ACI 304 "RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING AND PLACING CONCRETE, EXCEPT AS OTHERWISE SPECIFIED HEREIN.
- 17. READY-MIXED CONCRETE SHALL BE MIXED AND DELIVERED TO THE POINT OF DISCHARGE AT THE JOB BY MEANS OF A READY MIX CONCRETE TRUCK.
- 18. NO WATER FROM THE TRUCK WATER SYSTEM OR ELSEWHERE SHALL BE ADDED AFTER THE INITIAL INTRODUCTION OF THE MIXING WATER FOR THE BATCH. UNDER NO CIRCUMSTANCES SHALL THE APPROVED MAXIMUM WATER CONTENT BE EXCEEDED NOR SHALL THE SLUMP EXCEED THE MAXIMUM SPECIFIED.
- 19. DISCHARGE OF THE CONCRETE SHALL BE COMPLETED WITHIN 1-1/2 HOURS OR BEFORE THE DRUM HAS REVOLVED 300 REVOLUTIONS, WHICHEVER COMES FIRST, AFTER THE INTRODUCTION OF THE MIXING WATER TO THE CEMENT AND AGGREGATES OR THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES.
- 20. IN HOT WEATHER (AIR TEMPERATURE 80-DEGREES F. AND ABOVE) OR UNDER CONDITIONS CONTRIBUTING TO QUICK STIFFENING OF THE CONCRETE, THE TIME SHALL BE REDUCED TO ONE HOUR.
- 21. CONCRETE DELIVERED IN COLD WEATHER (AIR TEMPERATURE 45-DEGREES F. AND LOWER) SHALL HAVE A TEMPERATURE NOT LESS THAN 60-DEGREES F. AT THE POINT OF DISCHARGE AT THE JOB, AND IN COMPLIANCE WITH ACI 306R "COLD WEATHER CONCRETING". CONCRETE PLACING WILL NOT BE PERMITTED WHEN THE AIR TEMPERATURE IS 35-DEGREES F. OR LOWER.
- 22. CONCRETE DELIVERED UNDER HOT WEATHER CONDITIONS CONTRIBUTING TO QUICK STIFFENING OF CONCRETE, OR IN AIR TEMPERATURE OF 80-DEGREES F. AND OVER, SHALL HAVE A TEMPERATURE BETWEEN 60- AND 80-DEGREES F. AT THE POINT OF DISCHARGE AT THE JOB, AND IN ACCORDANCE WITH ACI 305R "HOT WEATHER CONCRETING."
- 23. IN NO CASE SHALL THE MIXER OR TRUCK BE FLUSHED OUT ONTO THE STREET PAVEMENT, IN A CATCH BASIN OR SEWER MANHOLE, OR IN ANY PUBLIC RIGHT-OF-WAY. SEE SOIL EROSION CONTROL PLAN FOR CONCRETE WASHOUT
- 24. REINFORCEMENT BARS SHALL BE PER MDOT SECTION 905.
- 25. TIE WIRE SHALL BE BLACK, ANNEALED STEEL WIRE, NOT LESS THAN 16 GAUGE.

CONCRETE CURB, SIDEWALK AND PAVEMENT SPECIFICATIONS, CONTINUED

- 26. BAR SUPPORTS SHALL CONFORM TO THE BAR SUPPORT SPECIFICATIONS CONTAINED IN CONCRETE REINFORCING STEEL INSTITUTE'S (CRSI) "MANUAL OF STANDARD PRACTICE." PROVIDE CHAIRS, SPACERS AND OTHER DEVICES SUITABLE FOR PROPER SPACING SUPPORTING AND FASTENING REINFORCING BARS.
- 27. WHEN FORMS ARE USED AND THE CURB RADIUS IS LESS THAN 200 FEFT. THE CURVED ALIGNMENT SHALL BE PROVIDED FOR BY EITHER STANDARD STEEL FORMS EQUIPPED WITH FLEXIBLE LINES OR BY FLEXIBLE FORMS. THE FORMS SHALL BE OF THE FULL DEPTH OF THE SECTION. CURB AND GUTTER FORMS SHALL BE SO CONSTRUCTED AS TO PERMIT THE INSIDE OF THE FORMS TO BE SECURELY FASTENED TO THE OUTSIDE FORMS.
- 28. ALL NEW CURB SHALL BE PLACED ONLY ON A PREPARED SUBGRADE, SMOOTH AND LEVELED TO THE GRADES ESTABLISHED BY THE ENGINEER.

29. COMPACT AND CUT-TO-GRADE SUBGRADE UNDER FORMS SO THAT FORMS WHEN

- SET WILL BE UNIFORMLY SUPPORTED FOR THE ENTIRE LENGTH. SECURELY STAKE AND BRACE OR TIE FORMS TO PREVENT LEAKAGE OF MORTAR. BRACING WITH EARTH WILL NOT BE PERMITTED.
- 30. COAT SURFACES OF FORMS TO BE IN CONCRETE WITH A LIGHT CLEAR PARAFFIN OIL OR PARTING COMPOUND WHICH WILL NOT STAIN THE CONCRETE.
- 31. THE INTERIOR SURFACES OF CONCRETE CONVEYING EQUIPMENT SHALL BE MAINTAINED FREE OF HARDENED CONCRETE, DEBRIS, WATER, SNOW, ICE AND OTHER DELETERIOUS MATERIALS.
- 32. CURBING MAY BE CONSTRUCTED EITHER BY USE OF FORMS OR BY A MECHANICAL CURB AND GUTTER PAVER. PROVIDED THE REQUIRED FINISH, AND CROSS-SECTION, AS SHOWN ON DRAWINGS ARE OBTAINED. CONCRETE SHALL BE PLACED TO PROVIDE ONE COURSE MONOLITHIC STRUCTURE WITHOUT THE USE OF MORTAR TOPPING OR SAND-CEMENT DRIER. CONCRETE SHALL BE SPADED OR VIBRATED SUFFICIENTLY TO ENSURE SATISFACTORY CONSOLIDATION.
- 33. PROVIDE REINFORCEMENT FOR CONCRETE CURB AS SHOWN ON THE DRAWINGS. REINFORCEMENT SHALL BE KEPT CLEAN AND FREE FROM OBJECTIONABLE RUST BENDS OR KINKS IN REINFORCING BARS SHALL BE CORRECTED BEFORE PLACING. ALL REINFORCEMENT SHALL BE ACCURATELY LOCATED IN FORMS AND SECURELY HELD IN PLACE BEFORE AND DURING CONCRETE PLACING. BY SUPPORTS ADEQUATE TO PREVENT DISPLACEMENT DURING THE COURSE OF CONSTRUCTION.
- 34. THE CONCRETE CURB SURFACE SHALL BE STRUCK OFF THE REQUIRED CROSS-SECTION WITH A TEMPLATE. AFTER THE CONCRETE CURB HAS BEEN FLOATED TO AN EVEN SURFACE, THE CONTRACTION JOINT SHALL BE CUT AND ALL SLAB EDGES ROUNDED WITH A 1/2 INCH RADIUS EDGING TOOL THAT WILL FINISH TO A WIDTH OF 2 INCHES. AFTER THE CONCRETE HAS SLIGHTLY SET. A BROOM SHALL BE BRUSHED LIGHTLY ACROSS THE SURFACE PARALLEL TO FORMS SO AS TO IMPART A ROUGH FINISH.
- 35. CONTRACTION JOINTS SHALL BE CUT IN CONCRETE CURBING AT MINIMUM 10' INTERVALS. THE JOINT SHALL CUT 1/4 INCH WIDE BY 1/3 THE DEPTH OF THE CONCRETE CURB SECTION. JOINTS SHALL ALSO BE LOCATED ADJACENT TO CURB
- 36. ISOLATION JOINTS SHALL BE PLACED IN CURBING AT TANGENT POINTS IN CURB RETURNS AT INTERSECTIONS, AT BOTH SIDES OF STRUCTURES LOCATED IN THE LINE AND IN RUNS OF CURB AT INTERVALS NOT EXCEEDING 400 FEET. ISOLATION JOINTS SHALL BE 1" THICK PRE-FORMED JOINT FILLER STRIPS. THE STRIPS SHALL EXTEND THE FULL DEPTH OF THE CONCRETE CURB SECTION. ISOLATION JOINTS SHALL BE PLACED IN CURB AT THE END OF EACH DAYS POUR AND WHEN ABUTTING PREVIOUSLY POURED CURB.
- 37. THE CURING COMPOUND SHALL BE A WHITE PARAFIN BASED COMPOUND SELECTED FROM MDOT'S QUALIFIED PRODUCTS LIST APPLIED AT 200 SQ/FT/GAL.
- 38. ALL CONTRACTION JOINTS IN CONCRETE CURB SECTIONS SHALL BE SEALED WITH EITHER HOT POURED JOINT SEALER OR COLD APPLIED JOINT SEALER.
- 39. SLIGHTLY UNDERFILL JOINT GROOVE WITH JOINT SEALER TO PREVENT EXTRUSION OF THE SEALER. REMOVE EXCESS JOINT SEALER MATERIALS AS SOON AFTER
- 40. FRESHLY PLACED CONCRETE SHALL BE PROTECTED AS REQUIRED TO MAINTAIN THE TEMPERATURE OF THE CONCRETE AT NOT LESS THAN 50 DEGREES F. NOR MORE THAN 80 DECREES E AND IN A MOIST CONDITION CONTINUOUSLY FOR THI PERIOD OF TIME NECESSARY FOR THE CONCRETE TO CURE. CHANGES IN TEMPERATURE OF THE CONCRETE DURING CURING SHALL BE AS UNIFORM A POSSIBLE AND SHALL NOT EXCEED 5 DEGREES F. IN ANY ONE HOUR, NOR 50 DEGREES F. IN ANY 24 HOUR PERIOD.
- 41. COLD WEATHER PROTECTION: WHEN THE TEMPERATURE OF THE ATMOSPHERE IS 40-DEGREES F. AND BELOW, THE CONCRETE SHALL BE PROTECTED BY HEATING, INSULATION COVERING, OR COMBINATION THEREOF AS REQUIRED TO MAINTAIN THE CONDITION CONTINUOUSLY FOR THE CONCRETE CURING PERIOD. COLD WEATHER PROTECTION SHALL MEET THE REQUIREMENTS OF ACI 306R "COLD WEATHER
- 42. HOT WEATHER PROTECTION: WHEN THE TEMPERATURE OF THE ATMOSPHERE IS 90-DEGREES F. AND ABOVE, OR DURING OTHER CLIMATIC CONDITIONS WHICH WILL CAUSE TOO RAPID DRYING OF THE CONCRETE, THE CONCRETE SHALL BE PROTECTED BY WINDBREAKS, SHADING, FOG SPRAYING LIGHT COLORED MOISTURE RETAINING COVERING, OR A COMBINATION OF THEREOF AS REQUIRED TO MAINTAIN THE TEMPERATURE OF THE CONCRETE BELOW 80-DEGREE F. AND IN A MOIST CONDITION CONTINUOUSLY FOR THE CONCRETE CURING PERIOD. HOT WEATHER PROTECTION SHALL MEET THE REQUIREMENTS OF ACI 305R "HOT WEATHER
- 43. ALL FORMS, RAILS AND STAKES SHALL BE REMOVED WITHIN 24 HOURS AFTER PLACING THE CURB. EXPOSED EDGES OF CONCRETE SHALL BE IMMEDIATELY BACKFILLED OR SPRAYED WITH CURING COMPOUND
- 44. AFTER COMPLETION OF CONCRETE CURBING IN AN AREA, REMOVE ALL WEATHER PROTECTION MATERIALS, RUBBISH AND DEBRIS RESULTING FROM SPECIFIED WORK, SWEEP CONCRETE CURBS CLEAN, AND SEAL JOINTS.
- 45. ALL CEMENT USED IN SIDEWALK CONSTRUCTION SHALL BE PORTLAND CEMENT, TYPE I OR IA ASTM C-150. 46. ALL NEW WALKS AND CONCRETE PAVEMENTS SHALL BE PLACED ONLY ON A PREPARED SUBGRADE, SMOOTHED AND LEVELED TO THE GRADES ESTABLISHED BY

BELOW THE SIDEWALK BASE AND FILLED WITH APPROVED SAND MEETING MDOT

CLASS II, SAND DESIGNATION. 47. CONSTRUCT CONCRETE SURFACE COURSE ONLY WHEN GROUND TEMPERATURE IS

THE ENGINEER. IN CLAY SOILS THE SUBGRADE SHALL BE EXCAVATED 2-INCHES

48. SIDEWALKS SHALL PITCH TOWARD THE STREET OR AWAY FROM BUILDINGS WITH A MAXIMUM CROSS SLOPE OF 1/4-INCH PER FOOT OF WIDTH AND A MINIMUM CROSS SLOPE OF 1/8-INCH PER FOOT OF WIDTH. CROSS SLOPE DIRECTION RANSITIONS SHALL BE ACCOMPLISHED IN LENGTHS OF 10 FEET OR LESS.

ABOVE 35 DEGREES F. AND BASE IS DRY.

- 49. PRIOR TO PLACING THE CONCRETE, ALL DEBRIS, STONES, DIRT, ETC., SHALL BE REMOVED FROM THE SUBGRADE. THE SUBGRADE SHALL BE MOISTENED WITH WATER IN SUCH A MANNER AS TO THOROUGHLY WET THE MATERIAL WITHOUT FORMING PUDDLES OR POCKETS OF WATER. NO CONCRETE SHALL BE PLACED ON FROZEN SUBGRADE.
- 50. FORMS SHALL BE METAL OR WOOD AND OF AN APPROVED SECTION. THEY SHALL BE STRAIGHT, FREE FROM DISTORTION AND SHALL SHOW NO VERTICAL VARIATION GREATER THAN 1/8-INCH IN 10-FOOT LENGTHS FROM THE TRUE PLANE SURFACE ON THE TOP OF THE FORMS WHEN TESTED WITH A 10-FOOT STRAIGHTEDGE, AND SHALL SHOW NO LATERAL VARIATION GREATER THAN 1/4-INCH IN 10-FEET FROM THE TRUE PLANE SURFACE OF THE LATERAL FACE OF THE FORM WHEN TESTED WITH A 10-FOOT STRAIGHTEDGE. THEY SHALL BE OF THE DEPTH SPECIFIED FOR THE SIDEWALK, OR CONCRETE PAVEMENT PER PLANE AND DETAILS, AND BE SECURELY HELD IN PLACE AND TRUE TO LINE AND GRADE.
- 51. THE CONCRETE SHALL BE DEPOSITED CONTINUOUSLY IN THE FORMS IN SUCH A MANNER AS TO AVOID SEGREGATION AND IT SHALL BE THOROUGHLY TAMPED OR VIBRATED SO THAT THE FORMS ARE ENTIRELY FILLED AND THE CONCRETE THOROUGHLY CONSOLIDATED. THE SLABS SHALL BE PLACED IN SECTIONS OR BLOCKS IN ONE OPERATION AS A MONOLITH.
- 52. THE CONCRETE SURFACE SHALL BE STRUCK OFF TO A PLANE SURFACE WITH A STRAIGHTEDGE. AFTER THE CONCRETE HAS BEEN FLOATED TO AN EVEN SURFACE, THE CONTRACTION JOINT SHALL BE CUT AND ALL SLAB EDGES ROUNDED WITH A 1/2-INCH RADIUS EDGING TOOL THAT WILL FINISH TO A WIDTH OF 2-INCHES. AFTER THE CONCRETE HAS SLIGHTLY SET, A BROOM SHALL BE BRUSHED LIGHTLY ACROSS THE SURFACE AT RIGHT ANGLES TO FORMS SO AS TO IMPART A ROUGH FINISH.
- 53. CONTRACTION JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF THE SIDEWALK OR CONCRETE PAVEMENT AND PERPENDICULAR TO THE SURFACE AND AT A DEPTH OF AT LEAST 1/4 THE SLAB THICKNESS WITH A MINIMUM DEPTH OF 1-1/4-INCHES FOR SIDEWALKS AND 3-INCHES FOR CONCRETE PAVEMENT SLABS.
- 54. CONTRACTION JOINTS IN SIDEWALKS SHALL BE SPACED AT A MINIMUM OF EVERY 5-FEET IN 4" SIDEWALK, OR 8-FEET IN 6" SIDEWALK, OR AS SHOWN ON THE

CONCRETE CURB. SIDEWALK AND PAVEMENT SPECIFICATIONS, CONTINUED

- 55. ISOLATION PAPERS SHALL BE OF THE PRE-MOLDED, NON-EXTRUDING, ASPHALT IMPREGNATED TYPE, NOT LESS THAN 1/2-INCH THICK. THE LENGTH SHALL BE EQUAL TO THE WIDTH OF THE SLAB, AND THE DEPTH EQUAL TO THE THICKNESS
- OF THE SLAB PLUS 1-INCH. 56. ISOLATION JOINTS SHALL BE PLACED AT THE FOLLOWING LOCATION FOR

SIDEWALKS AND CONCRETE PAVEMENTS:

- A. AT THE BACK OF THE CURB AND FRONT EDGE OF THE SIDEWALKS AND PAVEMENT SLABS ADJACENT TO EACH DRIVEWAY APPROACH AND SERVICE
- B. AT INTERVALS NOT TO EXCEED 50-FEET IN ALL PUBLIC SIDEWALKS.
- C. AT THE BACK OF THE CURB WHERE THE RAMPS EXTEND FROM THE KEY FLAG TO THE PAVEMENT.
- D. BETWEEN THE KEY FLAG AND THE RAMP IN ALL CASES, EXCEPT WHERE THERE ARE EXISTING EXPANSION JOINTS AT THE INTERSECTIONS OF THE SIDEWALKS AND THE KEY FLAG.
- E. AT ANY PLACE WHERE A SIDEWALK OR CONCRETE PAVEMENT ABUTS A BUILDING OR FIXED STRUCTURE.
- 57. CONTRACTION JOINTS IN THE CONCRETE PAVEMENT WILL BE AS FOLLOWS:

F. AT ANY OTHER LOCATIONS INDICATED ON THE PLAN.

AND LOOSE PARTICLES, AND DRY SURFACE.

A. TRANSVERSE JOINTS SHALL BE AT MAXIMUM 10-FOOT INTERVALS OR AS SHOWN ON PLANS AND DETAILS.

B. LONGITUDINAL JOINTS SHALL BE AT MAXIMUM 12-FOOT INTERVALS OR AS

SHOWN ON PLANS AND DETAILS. 58. PRIOR TO APPLYING JOINT SEALER, CLEAN JOINT GROOVE OF FOREIGN MATTER

TRAFFIC LANE AND PARKING LOT MARKING

- PROVIDE ALL MATERIALS, LABOR, EQUIPMENT, AND SERVICES NECESSARY TO COMPLETE ALL TRAFFIC LANE AND PARKING LOT MARKINGS AS INDICATED IN THE CONSTRUCTION DOCUMENTS.
- 2. WORK INCLUDES, BUT NOT LIMITED TO PAINTING OF LETTERS, MARKINGS, STRIPES AND ISLANDS ON THE PAVEMENT SURFACE APPLIED IN ACCORDANCE WITH THIS SPECIFICATION AND AT THE LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- 3. THE PAINT SHALL MEET THE REQUIREMENTS OF FEDERAL SPECIFICATION TT-P-115C(3), WITH OR WITHOUT REFLECTORIZED BEADS AS REQUIRED ON THE
- 4. COLOR SHALL BE AS SPECIFIED ON THE PLANS OR AS FOLLOWS:
- A. TRAFFIC LANE STRIPING SHALL BE WHITE OR YELLOW REFLECTORIZED, AS SHOWN ON THE PLANS.

B. TRAFFIC MARKING AND CURB FACES SHALL BE WHITE UNLESS NOTED

- OTHERWISE. C. PARKING LOT STRIPING SHALL BE WHITE, UNLESS NOTED OTHERWISE.
- D. HANDICAP STALL STRIPING MEETING CURRENT ADA REQUIREMENTS SHALL BE BLUE UNLESS NOTED OTHERWISE. 5. THE PAINTING SHALL BE PERFORMED ONLY WHEN THE EXISTING SURFACE IS DRY AND CLEAN, WHEN THE ATMOSPHERIC TEMPERATURE IS ABOVE 40-DEGREES F.
- 6. ALL EQUIPMENT FOR THE WORK SHALL BE APPROVED BY THE CONTRACTOR AND SHALL INCLUDE THE APPARATUS NECESSARY TO PROPERLY CLEAN THE EXISTING SURFACE, A MECHANICAL MARKING MACHINE, AND SUCH AUXILIARY HAND

WHEN RAIN IS NOT FORECASTED FOR AT LEAST 2 HOURS AFTER PAINT IS

AND WHEN THE WEATHER IS NOT EXCESSIVELY WINDY, DUSTY OR FOGGY AND

- EQUIPMENT AS MAY BE NECESSARY TO SATISFACTORILY COMPLETE THE JOB. THE MECHANICAL MARKER SHALL BE AN APPROVED ATOMIZING SPRAY-TYPE MARKING MACHINE SUITABLE FOR APPLICATION OF TRAFFIC PAINT. IT SHALL PRODUCE AN EVEN AND UNIFORM FILM THICKNESS AT THE REQUIRED COVERAGE AND SHALL BE DESIGNED SO AS TO APPLY MARKINGS OF UNIFORM CROSS-SECTIONS AND CLEAR-CUT EDGES WITHOUT RUNNING OR SPATTERING AND WITHIN THE L LIMITS FOR STRAIGHTNESS SET FORTH HEREIN. WHEN NEEDED, A DISPENSER SHALL BE FURNISHED. WHICH IS PROPERLY DESIGNED FO ATTACHMENT TO THE MECHANICAL MARKER AND SUITABLE FOR DISPENSING THE
- REQUIRED QUANTITY OF REFLECTIVE BEADS. 8. SUITABLE ADJUSTMENTS SHALL BE PROVIDED ON THE SPRAYER/SPRAYERS OF A MACHINE FOR PAINTING THE WIDTH REQUIRED. MULTIPLE PARALLEL PASSES TO
- PAINT THE REQUIRED WIDTH WILL NOT BE ALLOWED. 9. IMMEDIATELY BEFORE APPLICATION OF THE PAINT, THE EXISTING SURFACE SHALL BE DRY AND ENTIRELY FREE FROM DIRT, GREASE, OIL, ACIDS, DEBRIS, OR OTHER FOREIGN MATTER WHICH WOULD REDUCE THE BOND BETWEEN THE COAT OF PAINT AND THE PAVEMENT. THE SURFACE SHALL BE THOROUGHLY CLEANED BY SWEEPING AND BLOWING AS REQUIRED TO REMOVE ALL DIRT. DEBRIS AND LOOSE MATERIALS. AREAS WHICH CANNOT BE SATISFACTORILY CLEANED BY BROOMING AND BLOWING SHALL BE SCRUBBED AS DIRECTED WITH A WATER SOLUTION OF TRI-SODIUM PHOSPHATE (10% BY WEIGHT) OR AN APPROVED EQUAL SOLUTION AFTER SCRUBBING, THE SOLUTION SHALL BE RINSED OFF AND THE SURFACE
- DRIED PRIOR TO PAINTING. 10. EXISTING MARKINGS OR STRIPES WHICH ARE TO BE ABANDONED OR REMOVED SHALL BE OBLITERATED OR OBSCURED BY THE BEST METHODS SUITED FOR THE
- PURPOSE AND TO THE SATISFACTION OF THE OWNER OR OWNER'S 11. THE CONTRACTOR IS RESPONSIBLE FOR LAYING OUT A SAMPLE SECTION OF STRIPING WHICH IS TO BE APPROVED BY THE OWNER OR OWNERS REPRESENTATIVE AS TO QUALITY BEFORE THE CONTRACTOR MAY PROCEED WITH THE STRIPING. THE CONTRACTOR IS TO INSURE THAT ALL SUBSEQUENT STRIPING
- MEETS THE QUALITY OF THE APPROVED SAMPLE APPLICATION. 12. ON THOSE SECTIONS OF PAVEMENTS WHERE NO PREVIOUSLY APPLIED FIGURES, MARKINGS, OR STRIPES ARE AVAILABLE TO SERVE AS A GUIDE, SUITABLE LAYOUTS AND LINES OF PROPOSED STRIPES SHALL BE SPOTTED IN ADVANCE OF THE PAINT APPLICATION. CONTROL POINTS SHALL BE SPACED AT SUCH
- 13. THE CONTRACTOR SHALL PROVIDE AN EXPERIENCED TECHNICIAN TO SUPERVISE

INTERVALS AS WILL ENSURE ACCURATE LOCATION OF ALL MARKINGS.

- THE LOCATION ALIGNMENT, LAYOUT, DIMENSIONS AND APPLICATION OF THE PAINT. 14. MARKINGS SHALL BE APPLIED AT THE LOCATIONS AND TO THE DIMENSIONS AND SPACING INDICATED ON THE PLANS OR AS SPECIFIED. PAINT SHALL NOT BE APPLIED UNTIL THE INDICATED ALIGNMENT IS LAID OUT AND THE CONDITIONS OF THE EXISTING SURFACE HAVE BEEN APPROVED BY THE OWNER OR OWNER'S
- 15. THE PAINT SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS BEFORE APPLICATION. THE PAINT SHALL BE THOROUGHLY MIXED AND APPLIED TO THE SURFACE OF THE PAVEMENT WITH THE MARKING MACHINE AT ITS ORIGINAL CONSISTENCY WITHOUT THE ADDITION OF THINNER. IF THE PAINT IS APPLIED BY BRUSH, THE SURFACE SHALL RECEIVE TWO (2) COATS; THE FIRST COAT SHALL BE THOROUGHLY DRY BEFORE THE SECOND COAT IS
- BLEED EXCESSIVELY, CURL, OR DISCOLOR WHEN APPLIED TO BITUMINOUS OR CONCRETE SURFACES. CURING COMPOUND MUST BE REMOVED FOR THE ENTIRE WIDTH OF THE PAINTED STRIPE OR SYMBOL PRIOR TO PAINTING NEW CONCRETE. 17. IN THE APPLICATION OF STRAIGHT STRIPES, ANY DEVIATION IN THE EDGES EXCEEDING 1/2-INCH IN 50-FEET SHALL BE OBLITERATED AND THE MARKING CORRECTED. THE WIDTH OF THE MARKINGS SHALL BE AS DESIGNATED WITHIN A

BITUMINOUS SEAL COAT, SLURRY SEAL OR THE PLACEMENT OF THE BITUMINOUS SURFACE COURSE AND THE MARKING OF THE PAVEMENT. THE PAINT SHALL NOT

16. A MINIMUM OF ONE (1) WEEK SHALL ELAPSE BETWEEN APPLICATION OF THE

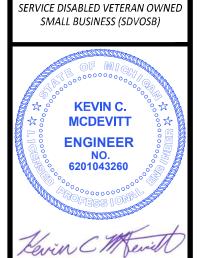
WORKMANLIKE MANNER. 18. PAINT SHALL BE APPLIED UNIFORMLY BY SUITABLE EQUIPMENT AT A RATE OF 0.0094 GAL./S.F. FOR STENCILS AND 0.00313 GAL./FT. FOR STRIPING. PAINT APPLICATION SHALL PRODUCE AN AVERAGE WET FILM THICKNESS OF

TOLERANCE OF 5 PERCENT (5%). ALL PAINTING SHALL BE PERFORMED TO THE

SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE BY COMPETENT AND

EXPERIENCED EQUIPMENT OPERATORS, LABORERS, AND ARTISANS IN A NEAT AND

19. AFTER APPLICATIONS OF THE PAINT, ALL MARKINGS SHALL BE PROTECTED WHILE THE PAINT IS DRYING. THE FRESH PAINT SHALL BE PROTECTED FROM INJURY OR DAMAGE OF ANY KIND. THE CONTRACTOR SHALL BE DIRECTLY RESPONSIBLE AND SHALL ERECT OR PLACE SUITABLE WARNING SIGNS, FLAGS, OR BARRICADES, PROTECTIVE SCREENS OR COVERINGS AS REQUIRED. ALL SURFACES SHALL PROTECTED FROM DISFIGURATION BY SPATTER, SPLASHES, SPILLAGE, DRIPPINGS OF PAINT OR OTHER MATERIAL.



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