

LEGEND **EXISTING** STORM SEWER SANITARY SEWER WATERMAIN GAS MAIN ELEC. TELE. CABLE STORM MANHOLE CATCH BASIN INLET REARYARD CATCH BASIN END SECTION SANITARY MANHOLE GATE VALVE AND WELL HYDRANT CONTOURS MATCH ELEVATION TOP OF CURB TOP OF SIDEWALK TOP OF PAVEMENT TOP OF CONCRETE STANDARD CURB REVERSE CURB DOWNSPOUT D.S.

ROOF DRAIN

R.D.

McWILLIAMS LICENSE NO.

Not to be Used as Construction Drawings

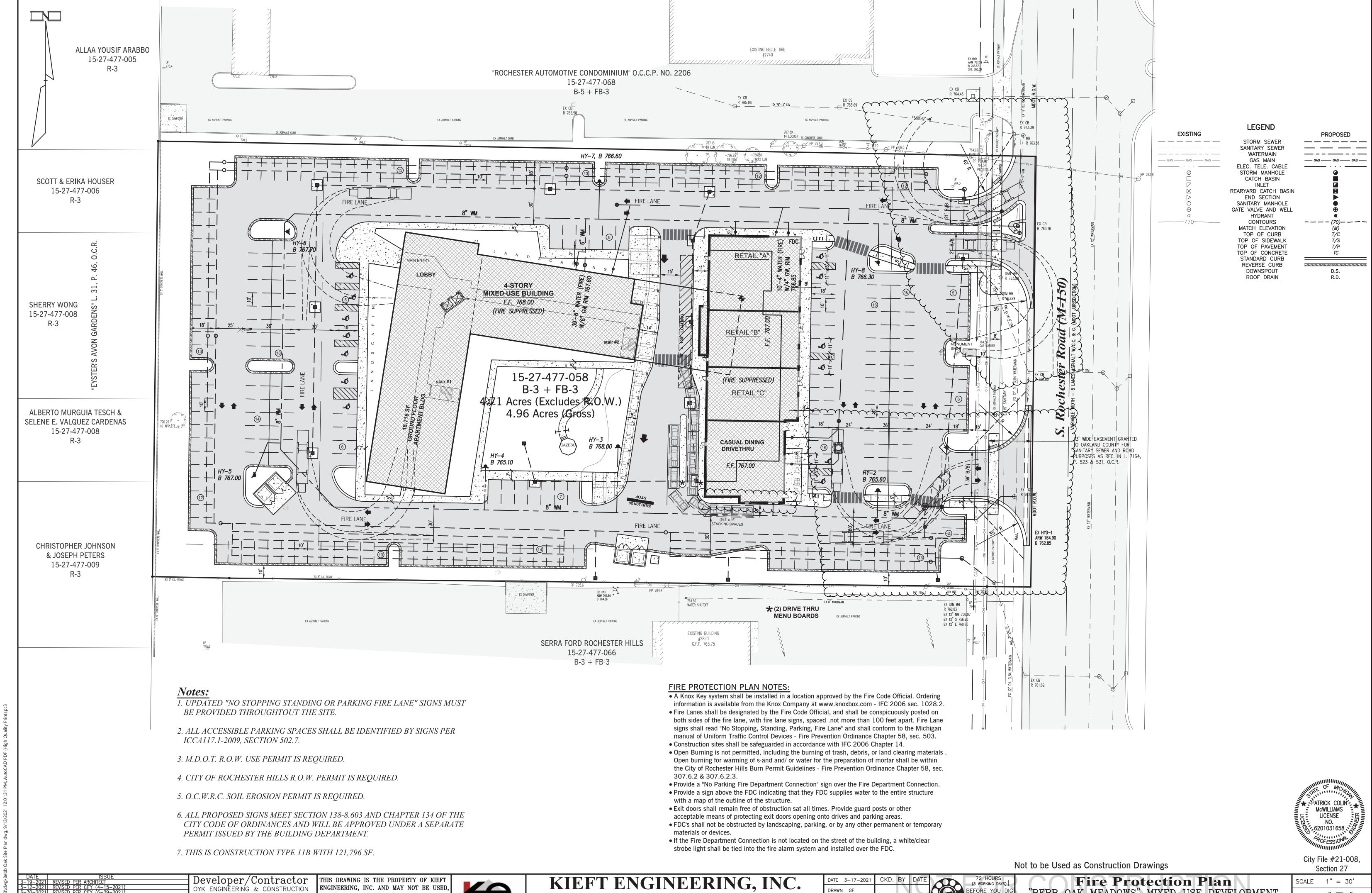
City File #21-008, Section 27

BINGHAM FARMS, MICHIGAN 48025 (248) 656-7695 FRED HADID

IN WHOLE, WITHOUT EXPRESSED WRITTEN PERMISSION FROM KIEFT ENGINEERING, INC.

Detailed Site Plan - West "BEBB OAK MEADOWS" MIXED USE DEVELOPMENT PART OF THE SE 1/4 OF SECTION 27, T3N, R11E, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN

SCALE 1" = 20'SHEET 5 OF 9 KE 2021.053



PHONE (248) 625-5251

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30700 TELEGRAPH ROAD, SUITE 2665

BINGHAM FARMS, MICHIGAN 48025

(248) 656-7695 FRED HADID

KIEFT ENGINEERING, INC. PROFESSIONAL ENGINEERS AND PROFESSIONAL SURVEYORS

5852 SOUTH MAIN STREET, SUITE 1, CLARKSTON, MICHIGAN 48346

www.kiefteng.com

DRAWN GF DESIGN PCM FAX (248) 625-7110 SECTION 27

72 HOURS (3 WORKING DAYS) CALL MISS DI 800-482-7171 Fire Protection Plan
"BEBB OAK MEADOWS" MIXED USE DEVELOPMENT PART OF THE SE 1/4 OF SECTION 27, T3N, R11E, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN

SCALE 1" = 30SHEET 6 OF 9 KE 2021.053

Bank Full Outlet Restriction: Bank Full Volume = 6,788 A*C = 25,258 cfRequired Area per LF = 6.68 sf

Detention Pipe Invert = 757.30 Water Depth in Pipe = 2.62 ft Zbf = 759.92Release Between 24 and 48 Hours:

Qavg (24 hours) = 0.292 cfsHavg (0.667*Zbf-Zout) = 1.75 ft $A = (Qavg/((0.62*(32.2*2*Havg)^0.5) = 0.0379 \text{ sf}$

BF Hole Dia. Provided = 2.75 in

BF Hole Area Provided = 0.0379 sf Qact bf = 0.292 cfs

Actual Holding Time = (Vbf/Qact*3600) = 24.03 hrs 25 Year Outlet Restriction:

Qallow = 0.942 cfs

Qbf = 0.292 cfsQadjusted = $(Qallow \cdot Qbf) = 0.65$

 $A = (Qadjusted/((0.62*(32.2*2*Hmax)^0.5)) = 0.1620 sf$ 25 Year Hole Dia. Provided = 5.50 in

25 Year Hole Area Provided = 0.1620 sf Qactual (total) = 0.942 cfs </= 0.942

10 YEAR SPILLWAY DESIGN (WITHIN MH-1) $I_{10 \text{ YR}} = 175 \text{ ; } T = 17.00; I = 175 = 4.17$

Q REQUIRED = ACI = (4.71 Ac.)(0.79)(4.17) = 15.52 C.F.S. REQUIRED

 $Q = (3.367)(6')(0.85)^{3/2} = 15.83$ CFS PROVIDED, OK!

-1" KEYWAY (TYPICAL) 0.58'\ 762.72 0.67**'**\` 7<u>62.05</u> · 6' DIA. MH STRUCTURE EMERGENCY OVERFLOW ELEVATIONS DUAL 24" DIA. TOP/WEIR STEPS (TYP) OPENINGS — 6" DIA. PVC SCH 40 PIPE WITH 5.5" DIA. HOLE CUT IN CAP FOR -RESTRICTED 25 YEAR OUTFLOW INVERT = 759.92MANHOLE STEPS-FLOW FROM UNDERGROUND (TYPICAL) 42" DIA. STORAGE PIPES FLOW PIPE IE 12" W = 757.20 6" THICK PRECAST PIPE IE 12" SE = 757.10 CONCRETE WEIR WALL--CONTINUOUS POLYURETHANE ELASTOMETRIC SEALANT ALONG -6" DIA. PERFORATED EDGE BOTH SIDES OF WALL (TYPICAL) DRAIN FROM DETENTION POND PRECAST (CONNECT TO MANHOLE ON CONCRETE WEIR WALL DOWNSTREAM SIDE OF WEIR) 4" DIA. PVC SCH 40 PIPE WITH-PLAV VIEW -SEAL BETWEEN PRECAST 2.75" DIA. HOLE CUT IN CAP FOR

CONCRETE FLOW RESTRICTOR

WALL & BASE WITH BUTYL ROPE

-MIN. 8" THICK REINFORCED

_12" OUTLET

CONCRETE TOP SLAB

6' DIA. OUTLET CONTROL STRUCTURE MH-1 DETAIL

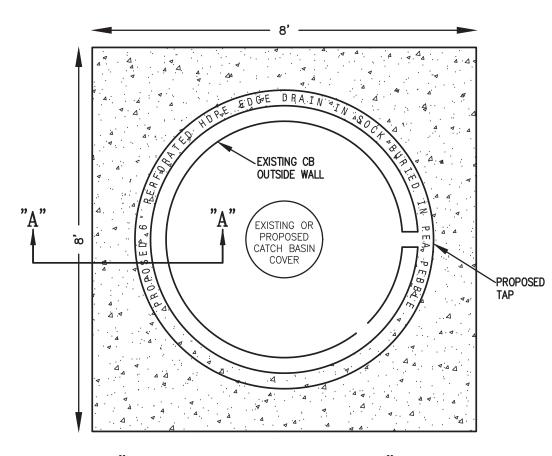
SECTION C-C

E.J.I.W. #1040 FRAME & TYPE "C" COVER (x 2)

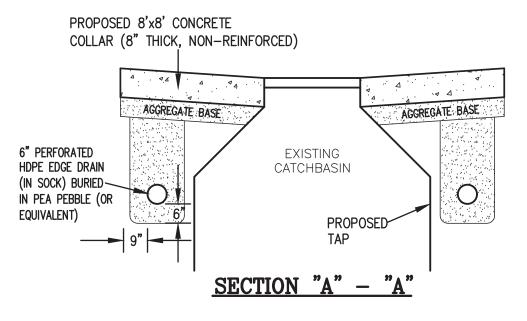
PROPOSED GROUND-

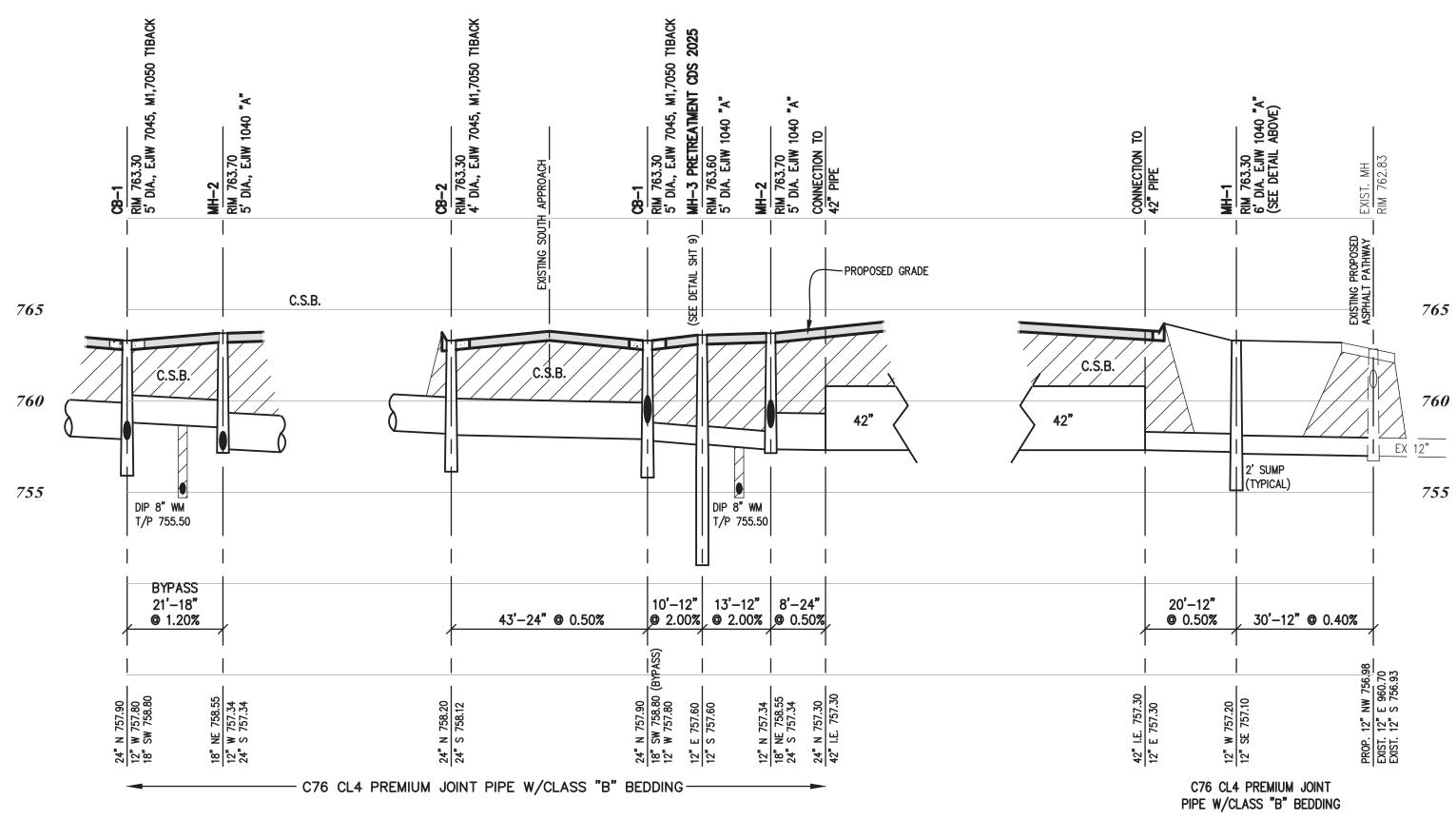
RESTRICTED BANK FULL OUTFLOW

INVERT = 757.10



8" CONCRETE COLLAR & 6" EDGE DRAIN PLAN DETAIL & SECTION SCALE: 1" = 2'





SCALE: 1" = 20' HORZ. 1" = 5' VERT.

> ★ PATRICK COLIN : McWILLIAMS LICENSE NO. 6201031658

Not to be Used as Construction Drawings

City File #21-008. Section 27

Developer/Contractor OYK ENGINEERING & CONSTRUCTION 30700 TELEGRAPH ROAD, SUITE 2665 BINGHAM FARMS, MICHIGAN 48025 (248) 656-7695 FRED HADID

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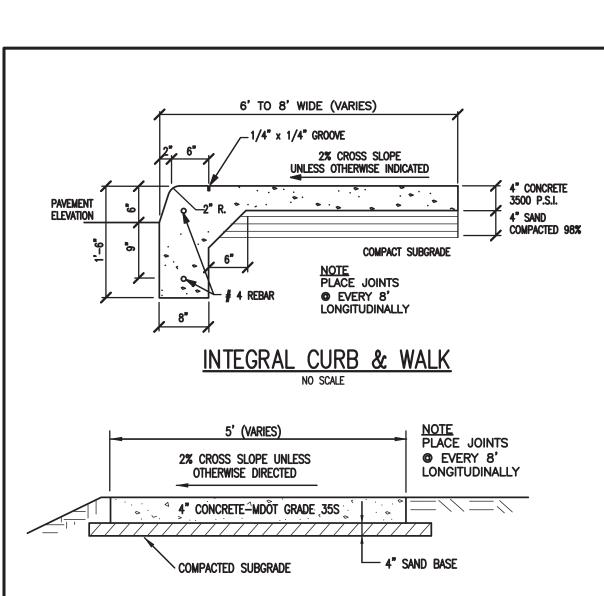
72 HOURS
(3 WORKING DAYS)

BEFORE YOU DIG
CALL MISS DIG
800-482-7171
(TOLL FREE) CKD. BY DATE 3-17-2021 DRAWN GF DESIGN PCM (TOLL FREE) SECTION 27 T- 3 -N. R- 11

Storm Sewer, Detention Calculations & Details "BEBB OAK MEADOWS" MIXED USE DEVELOPMENT PART OF THE SE 1/4 OF SECTION 27, T3N, R11E, CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN

SCALE N/A SHEET 7 OF 9 KE 2021.053

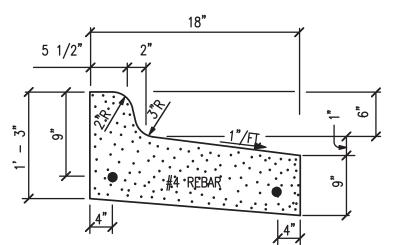
PHONE (248) 625-5251



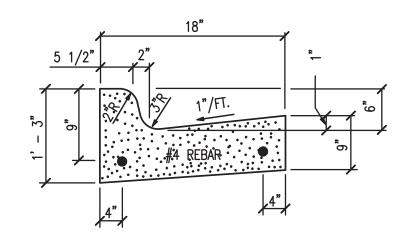
CONCRETE SIDEWALK (ON-SITE)

1 1/2" BIT. MIX. NO. 1300T 20AA 6" COMPACTED M.D.O.T. 21AA GRAVEL OR EXISTING SUBBASE

PAVEMENT SECTION-ONSITE NO SCALE



STRAIGHT FACED CURB AND GUTTER (REVERSE)
NO SCALE



STRAIGHT FACED CURB AND GUTTER NO SCALE

7 8"-3500 PSI CONCRETE W/6"x6"x#10 STEEL MESH 4" COMPACTED SAND BACKFILL

8" Concrete Pad Detail

ON-SITE SANITARY SEWER DESIGN

APARTMENT BUILDING: 93 UNITS UNIT FACTOR = $(0.60/\text{UNIT}) \times (93 \text{ UNITS}) = 55.8$

GENERAL RETAIL BUILDING: 9,660 SF

UNIT FACTOR = $(0.04/1000 \text{ SF}) \times (9,660 \text{ SF}) = 0.39$

DRIVE-THRU RESTAURANT: 3,782 SF UNIT FACTOR = 1.00

TOTAL UNIT FACTOR = 55.8+0.39+1.00 = 57.19 = 58

THUS, (58 UNIT FACTOR)(2.44 PERSONS/UNIT FACTOR) = 142 PERSONS

SANITARY DESIGN

"AVERAGE FLOW"

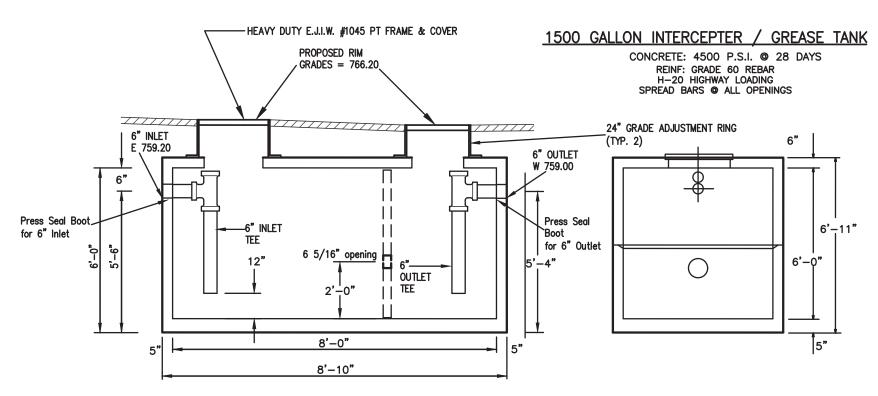
142 PERSONS x 100 GPCD = 14,200 GPD = 0.0142 MGPD x 1.55 (conversion) Q = 0.0220 CFS

"PEAK FLOW" 142 PERSONS/1000 = 0.142

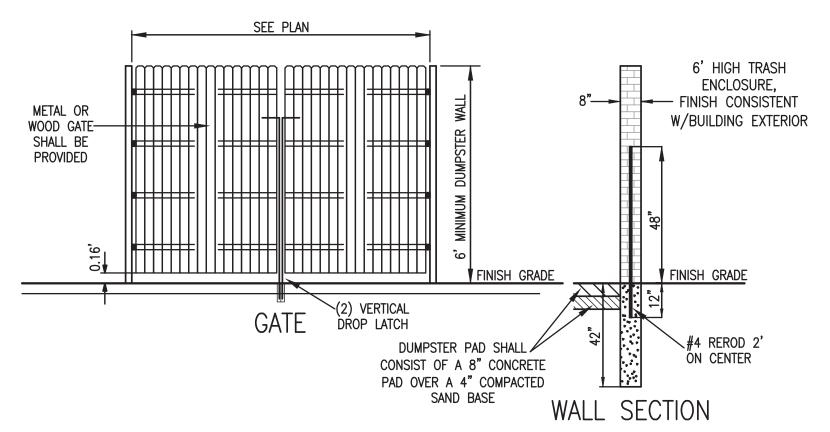
 $Q = 100 \times (18 + \sqrt{P})/(4 + \sqrt{P}) = 419.87 GPCD$

142 PERSONS x 419.87 GPCD = 59,621.54 GPD = 0.059621 MGPD x 1.55 (conversion) Q = REQUIRED = 0.0924 CFS

NOTE: AN 8" TRUSS PIPE @ 0.40% (MINIMUM) CAN CARRY 0.765 CFS @ 2.19 FPS A 10" TRUSS PIPE @ 0.30% (MINIMUM) CAN CARRY 1.19 CFS @ 2.19 FPS



SECTION VIEW 1500 GALLON HEAVY DUTY GREASE TRAP INTERCEPTOR



<u>Dumpster Detail</u> NOT TO SCALE

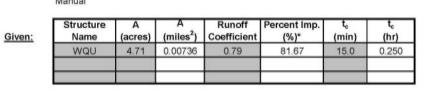


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Purpose: To calculate the first flush runoff flow rate (WQF) over a given site area. In this situation the WQV to be analyzed is the runoff produced by the first 0.5" of rainfall.

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55

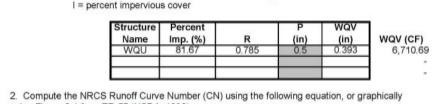


* Assumes runoff coefficient of 0.3 for pervious areas and 0.9 for impervious areas.

The Water Quality Flow (WQF) is calculated using the Water Quality Volume (WQV). This WQV, converted to watershed inches, is substituted for the runoff depth (Q) in the Natural Resources Conservation Service (formerly Soil Conservation Service), TR-55 Gr Compute WQV in watershed inches using the following equation:

WQV = P * R

where: WQV = water quality volume (watershed inches) P = design precipitation (inches) R = volumetric runoff coefficient = 0.05 + 0.009(I)



30"Ø x 4'

CONTRACTOR TO GROUT TO

FIBERGLASS

SEPARATION -CYLINDER & INLET

OIL BAFFLE

SEPARATION

SOLIDS STORAGE

SCREEN

SUMP

INLET 1

12"Ø RCP

(20"Ø OPENING)

FINISHED GRADE

5'Ø I.D. —

FRAME AND COVER

OUTLET 1

PLAN VIEW

ELEVATION VIEW

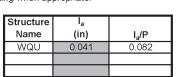
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using Figure 2-1 from TR-55 (USDA, 1986): $CN = 1000 / [10+5P+10Q-10(Q^2+1.25QP)^{1/2}]$

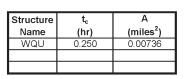
where: CN = Runoff Curve Number P = design precipitation (inches) Q = runoff depth (watershed inches)

Structure Name	Q (in)	CN
WQU	0.393	98.96

3. Using computed CN, read initial abstraction (I_a) from Table 4-1 in Chapter 4 of TR-55; compute I_a/P, interpolating when appropriate.



4. Compute the time of concentration (t_r) in hours and the drainage area in square miles. A minimum t_c of 0.167 hours (10 minutes) should be used



5. Read the unit peak discharge (q_u) from Exhibit 4-II in Chapter 4 of TR-55 for appropriate t_c for type II rainfall distribution.

Structure	t _c		q _u
Name	(hr)	I _a /P	(csm/in)
WQU	0.250	0.082	731

6. Substituting WQV (watershed inches) for runoff depth (Q), compute the water quality flow (WQF) from the following equation:

$WQF = (q_u)^*(A)^*(Q)$

where: WQF = water quality flow (cfs) q_u = unit peak discharge (cfs/mi²/inch) A = drainage area (mi²) Q = runoff depth (watershed inches)

WQU 731 0.00736 0.393 2.11	Structure Name	q _u (csm/in)	A (miles ²)	Q (in)	WQF (cfs)
	WQU	731	0.00736	0.393	2.11
					/

Estimated Net Annual Solids Load Reduction Based on the Rational Rainfall Method

Mixed Use Development Rochester Hills, MI **C**NTECH **Water Quality Unit**

AREA (acres): 4.71 WEIGHTED C: 0.79

Tc (minutes): 15

PVC HYDRAULIC

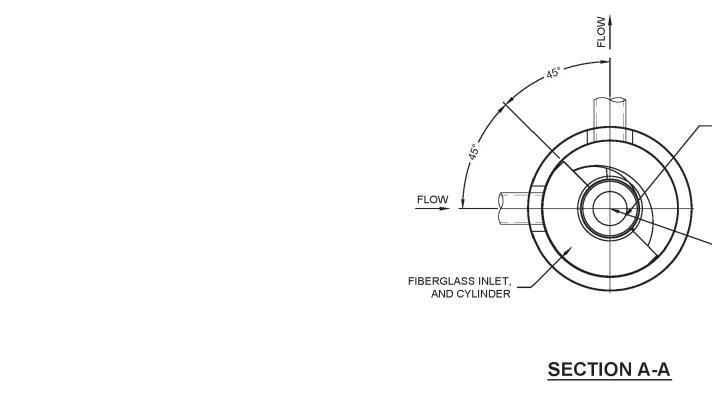
CENTER OF CDS STRUCTURE. SCREEN AND SUMP OPENING

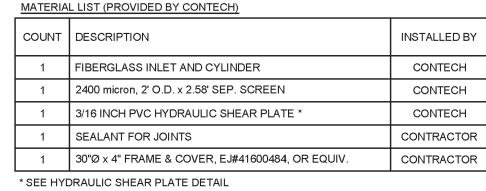
CDS MODEL: 2025 PARTICLE SIZE (µm): 110

Rainfall ntensity¹ (in/hr)	Percent Rainfall Volume ¹	Cumulative Rainfall Volume	Total Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	13.13%	13.1%	0.07	100.00	13.13
0.04	11.36%	24.5%	0.15	99.17	11.27
0.06	10.08%	34.6%	0.22	98.07	9.88
0.08	7.49%	42.1%	0.30	96.96	7.26
0.10	7.01%	49.1%	0.37	95.86	6.72
0.12	5.37%	54.4%	0.45	94.75	5.09
0.14	4.73%	59.2%	0.52	93.65	4.43
0.16	4.13%	63.3%	0.60	92.54	3.82
0.18	3.53%	66.8%	0.67	91.44	3.23
0.20	2.99%	69.8%	0.74	90.33	2.70
0.25	5.50%	75.3%	0.93	87.57	4.82
0.30	4.47%	79.8%	1.12	84.81	3.79
0.35	3.85%	83.6%	1,30	82.04	3,16
0.40	2.16%	85.8%	1.49	79.3	1.7
0.45	2.09%	87.9%	1.67	74.2	1.6
0.50	1.31%	89.2%	1.86	66.8	0.9
0.75	5.07%	94.3%	2.79	44.5	2.3
1.00	2.58%	96.9%	3.72	33.4	0.9
1.50	2.50%	99.4%	5.58	22.3	0.6
2.00	0.51%	99.9%	7.44	16.7	0.1
2.54	0.15%	100.0%	9.45	13.1	0.0
			1882		87.21
			Predicted % Annu	al Rainfall Treated =	93.8%
		Predicted	Net Annual Load Re	emoval Efficiency =	87.2%

redicted Net Annual Load Removal Efficiency = 87.2%

Based on Rainfall Data from DETROIT METRO AP Station - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes





RIM ELEV. = 763.60 ±

TOP OF STRUCTURE

INV. ELEV. = 760.00

OUTSIDE BOTTOM

ELEV. 753.51

ELEV. = 763.14

OUTLET 1

12"Ø RCP

PERMANENT

POOL ELEV.

PVC HYDRAULIC

SHEAR PLATE

(20"Ø OPENING)

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE. 2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com 3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS

DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT. 4. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO. 5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER

REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING. 6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

BE SPECIFIED BY ENGINEER OF RECORD. B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE

C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE. D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES. E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

STRUCTURE WEIGHT

APPROXIMATE HEAVIEST PICK = 9500 LBS.

STRUCTURE IS DELIVERED IN 3 PIECES

MAX FOOTPRINT = Ø6'

PROPOSAL DRAWING

CAN PLECTON IN ENGINEERED SOLUTIONS L 03/26/21 1/4" = 1'-0" MSB MSB HECKED: NCI PROJECT No.: SEQUENCE No.: LAYOUT 1A 673885 20

2025-5-FGIS

S2025-5-C - 673885 OYK MIXED USE ROCHESTER, MI for SYSTEM: MH-4

Not to be Used as Construction Drawings

City File #21-008 Section 27

SCALE N/A

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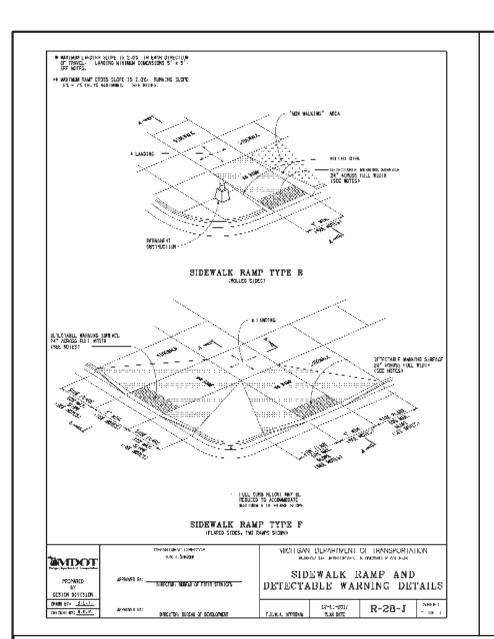
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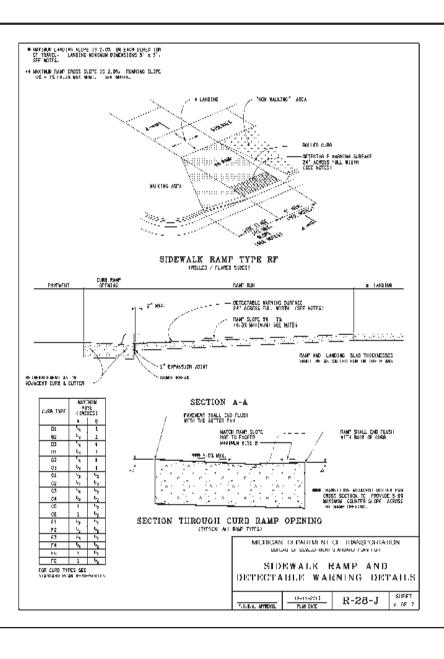
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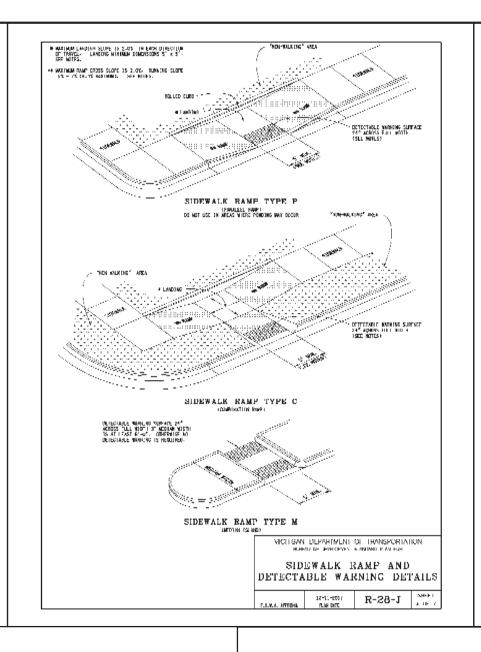
DATE 3-17-2021 DRAWN GF DESIGN PCM SECTION 27 T- 3 -N. R- 11

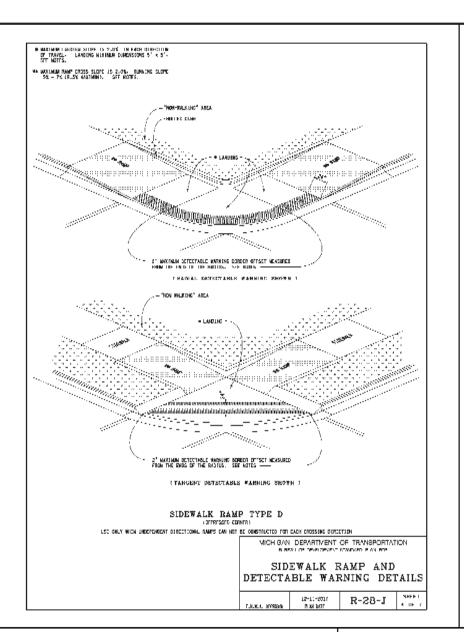


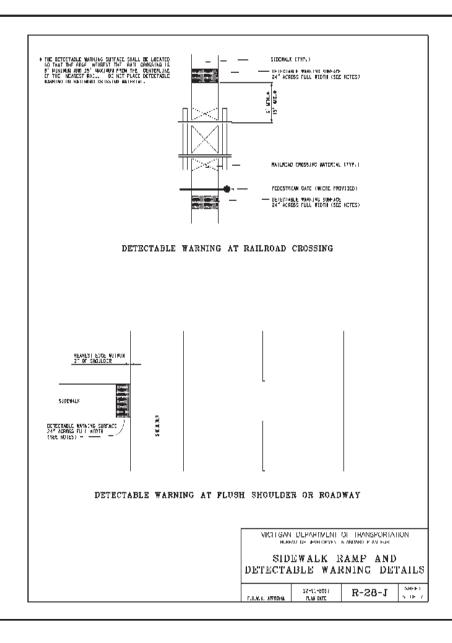
Sanitary Calculations & Details
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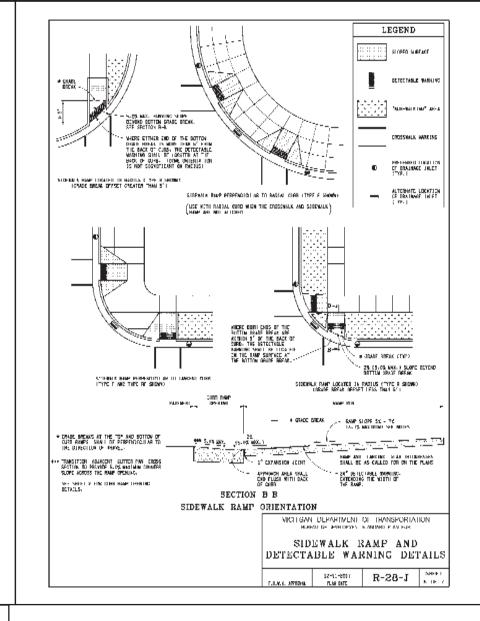


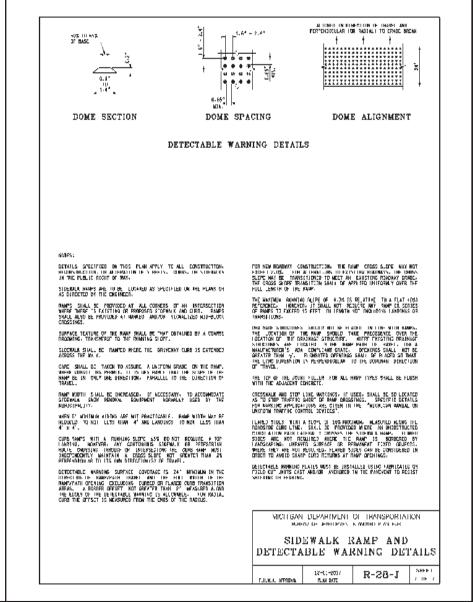






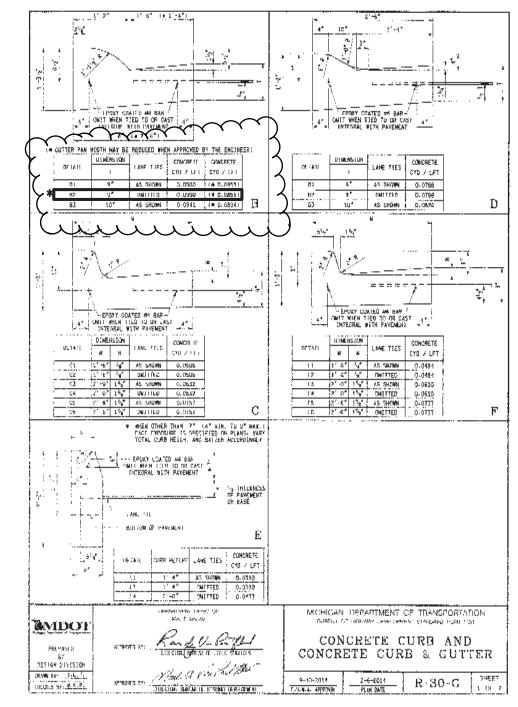


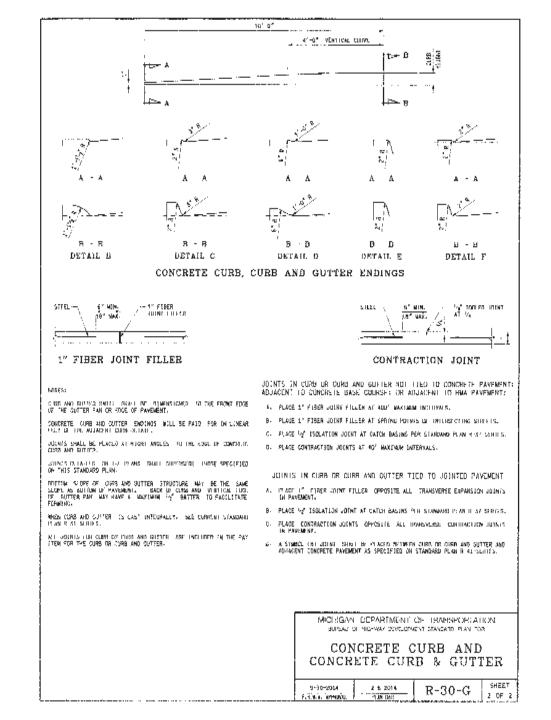


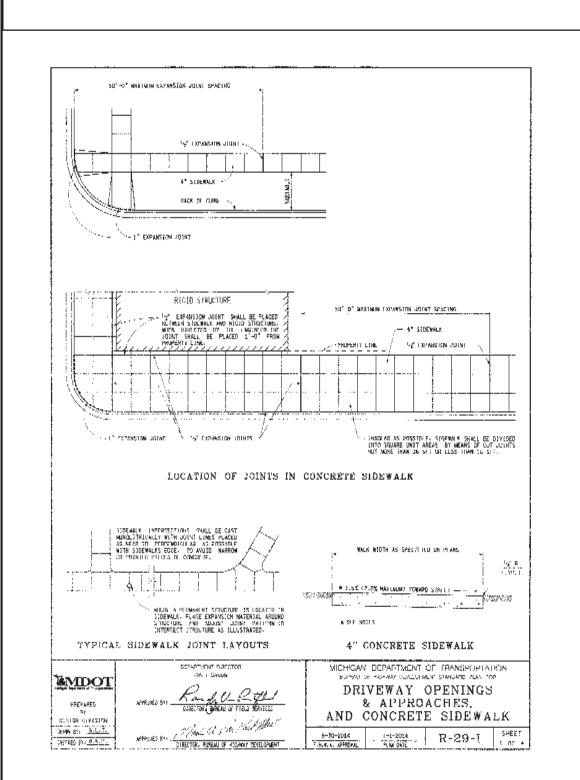


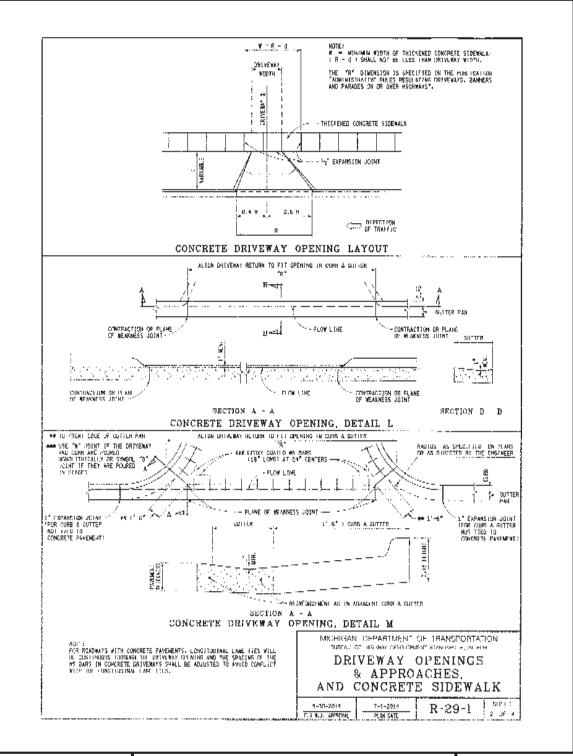
MDOT NOTES

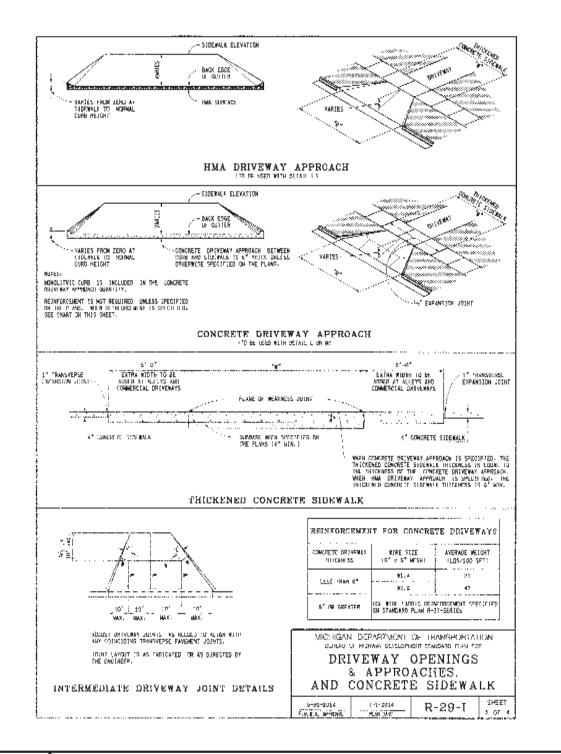
- ANY REGULATORY SIGNS SHALL BE MAINTAINED.
- THE CONTRACTOR SHALL HAVE AN APPROVED PLAN AND PERMIT ON SITE AT ALL TIMES.
- THE CONTRACTOR SHALL ELECTRONICALLY SUBMIT AN ADVANCE NOTICE TO MDOT A MINIMUM OF 5 DAYS PRIOR TO THE START OF CONSTRUCTION.
- ALL UTILITIES INCLUDING DRAINAGE FACILITIES SHALL BE LOCATED PRIOR TO EXCAVATION IN THE MDOT RIGHT-OF-WAY.
- THE CONTRACTOR SHALL EMPLOY THE MDOT VISIBILITY POLICY. THE EXISTING SIDEWALK SHALL BE MAIN THROUGH THE DRIVE APPROACH AND NOT RAMPED DOWN.
- LABEL THE MDOT ROW LINE ON ALL PLAN SHEETS.
- THE EXISTING DRIVE APPROACH SHALL BE MAINTAINED.
- NO ADVERTISING ALLOWED IN MDOT ROW.
- ALL UTILITY WORK (GAS, ELECTRIC, PHONE, ETC.) WORK PROPOSED IN MDOT ROW WILL REQUIRE SEPARATE PERMITS FROM THE UTILITY COMPANY. PLEASE ADVISE ANY UTILITY COMPANIES YOU ARE WORKING WITH THAT THEY ARE REQUIRED TO PULL THEIR OWN PERMIT.
- PROVIDE CONTRACTOR INFORMATION (NAME, ADDRESS, PHONE #, EMAIL).
- INSURANCE THE PERMIT APPLICANT OR THE APPLICANT'S CONTRACTOR MUST SUBMIT AN ELECTRONIC CERTIFICATE OF INSURANCE IN THE MDOT E-BOND SYSTEM BEFORE THE PERMIT CAN BE ISSUED. PLEASE ELECTRONICALLY SUBMIT MDOT CERTIFICATE OF INSURANCE FOR PERMITTED ACTIVITIES FORM 2020, WHICH REFLECTS THE INSURANCE REQUIREMENTS AND CONDITIONS. THE APPLICANT/CONTRACTORS INSURANCE AGENT SHALL CONTACT LAURI OLSEN (MDOT LANSING PERMIT OFFICE) AT 517-241-3028 TO REGISTER FOR THE ELECTRONIC SUBMITTAL SYSTEM.
- BOND AN INDIVIDUAL PERFORMANCE BOND IS REQUIRED. IF THE BOND PRINCIPAL IS NOT THE PERMIT APPLICANT, A CERTIFICATE OF AGENCY (MDOT FORM 2209) MUST BE SUBMITTED WHICH APPOINTS THE DESIRED PARTY AS AGENT TO ACT AS PRINCIPAL. THE BOND SHALL BE ELECTRONICALLY SUBMITTED IN THE MDOT E-BOND SYSTEM. YOUR INSURANCE AGENT SHALL CONTACT LAURI OLSEN (MDOT LANSING PERMIT OFFICE) AT 517-241-3028 TO REGISTER FOR THE ELECTRONIC SUBMITTAL SYSTEM. ONCE THE BOND IS ELECTRONICALLY FILED, I WILL NEED A SIGNED AND SEALED PAPER COPY FOR THE FILE ALONG WITH THE POWER OF ATTORNEY.

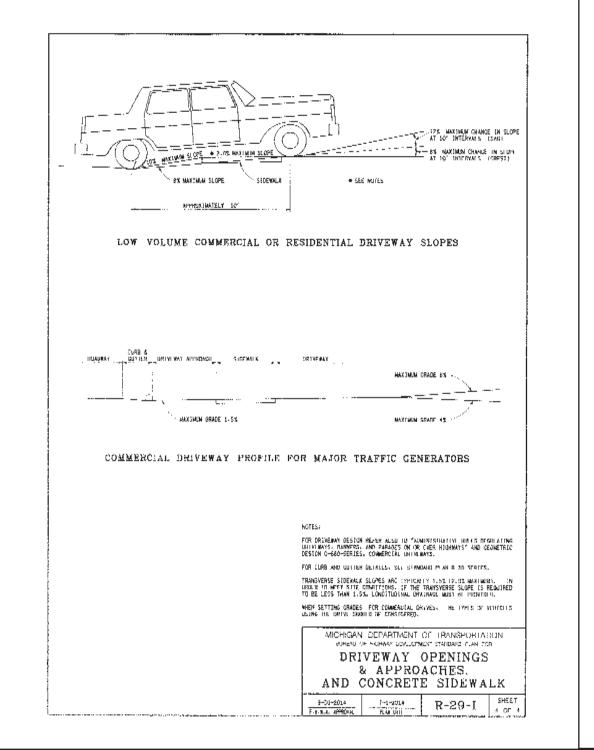




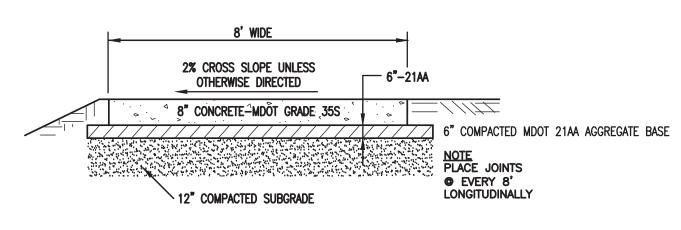




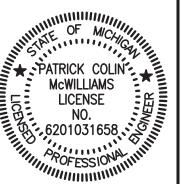




FAX (248) 625-7110



Concrete Safety Path
NO SCALE



Not to be Used as Construction Drawings

City File #21-008 Section 27

NO CHANGES
REVISED ENTRANCE APPROACHES PER CLIENT (9-8-20

Developer/Contractor OYK ENGINEERING & CONSTRUCTION 30700 TELEGRAPH ROAD, SUITE 2665 BINGHAM FARMS, MICHIGAN 48025 (248) 656-7695 FRED HADID

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5852 SOUTH MAIN STREET, SUITE 1, CLARKSTON, MICHIGAN 48346

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