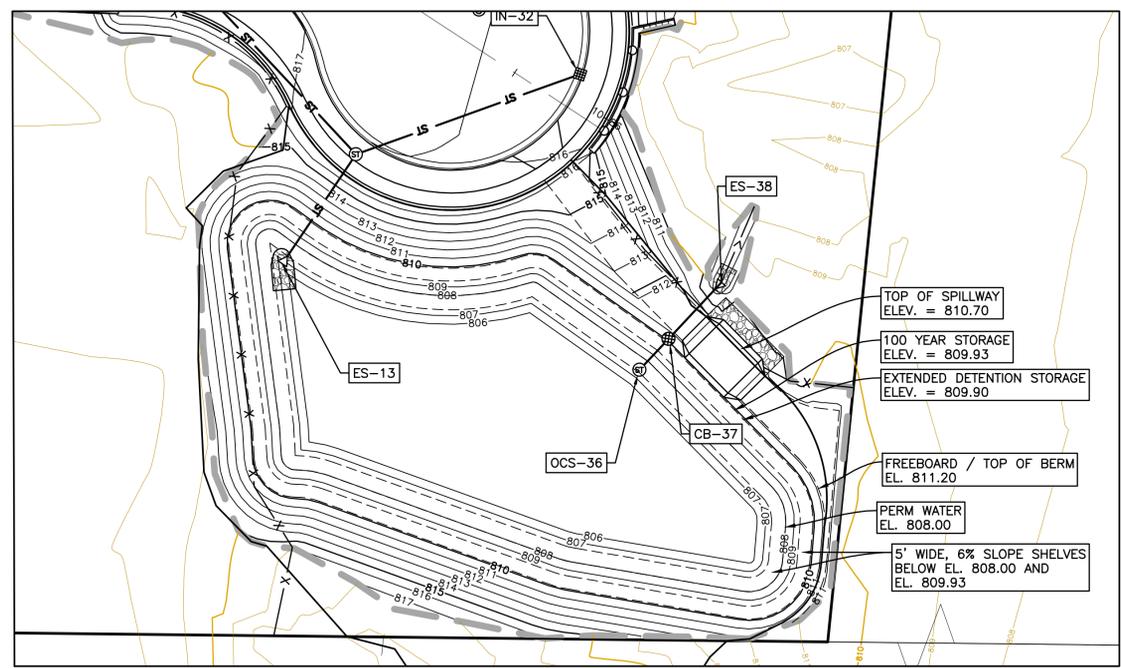
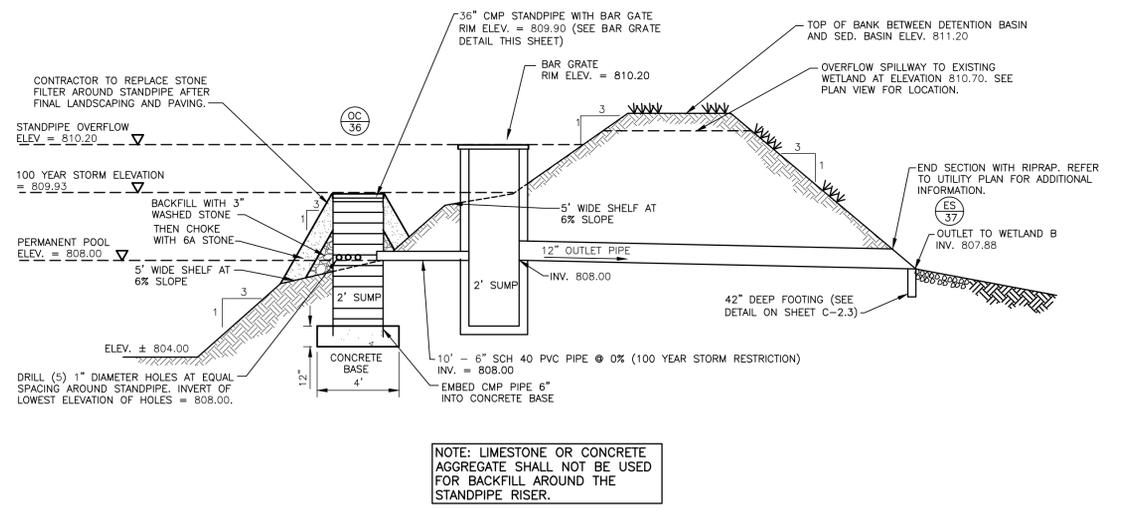


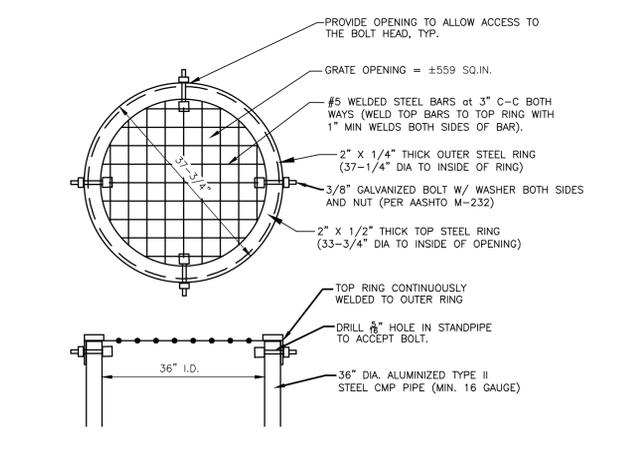
DETENTION BASIN DETAIL - PLAN VIEW



DETENTION BASIN DETAIL - SECTION THROUGH OCS-36 AND BERM



BAR GRATE DETAIL - FOR OUTLET CONTROL STRUCTURE



DETENTION POND CALCULATIONS

VOLUME SUMMARY

EXTENDED DETENTION VOLUME V_{ED} = 28,753 CF

100-YEAR VOLUME V_{100} = 29,254 CF

STORAGE ELEVATIONS

EXTENDED DETENTION ELEVATION = 809.70	VOLUME 1 = 25,173
ELEVATION = 810.00	VOLUME 2 = 30,445
ED ELEVATION (Zed) = 809.90	Ved = 28,753

100-YEAR ELEVATION = 809.70	VOLUME 1 = 25,173
ELEVATION = 810.00	VOLUME 2 = 30,445
100 ELEVATION (Z100) = 809.93	V100 = 29,254
100 YEAR STORAGE AREA = 18,344 SFT	

PROPOSED DETENTION BASIN SUMP

ELEVATION	AREA (FT)	AVG AREA (FT)	INC VOLUME (CF)	VOLUME (CF)
804	6,750	7,349		
805	7,948	8,609	7,349	7,349
806	9,270	9,969	8,609	15,958
807	10,668	11,181	9,969	25,927
807.7	11,694	12,979	7,827	33,754
808	14,264	3,894	3,894	37,647

PROPOSED DETENTION BASIN VOLUME

ELEVATION	AREA (FT)	AVG AREA (FT)	INC VOLUME (CF)	TTL VOLUME (CF)
808	13,466	14,251		
809	15,036	15,603	14,251	14,251
809.7	16,169	17,574	10,922	25,173
810	18,979	20,030	5,272	30,445
811	21,080	20,030	20,030	50,474

NOTE: ESTIMATED GROUNDWATER DEPTH IS AT 808.1 (SEE SOIL BORING SHEET V-2.2). PERMANENT WATER SURFACE IS ESTIMATED TO BE SLIGHTLY LOWER AT 808.0 ONCE POND HAS BEEN CONSTRUCTED.

OUTLET CONTROL STRUCTURE ORIFICE CALCULATIONS

EXTENDED DETENTION OUTLET RESTRICTION (DRILLED HOLES IN STANDPIPE)

RELEASE V_{ed} OVER 48 HOURS

$$Q_{ed} = \frac{V_{ed}}{T} = \frac{172,800}{48} = 0.1664 \text{ CFS}$$

OPENING INVERTS AT PERM WATER ELEV.

$$Z_{bottom} = 808.00$$

$$H_{avg} = \frac{2}{3} \times (Z_{ed} - Z_{bottom}) = 1.269 \text{ FT}$$

$$A_{ed} = \frac{Q_{ed}}{0.62\sqrt{2 \times g \times H_{avg}}} = 0.030 \text{ SF}$$

1" DIA HOLE HAS AN AREA OF $A_1 = 0.0055 \text{ SF}$

NO. OF 1" DIA HOLES $NO. \text{ OF HOLES} = \frac{A_{ed}}{A_1} = 5.44$

USE 5 - 1" DIA. HOLES

DETENTION TIME FOR 5 - 1" DIA. HOLES

$$Q_{fACTUAL} = A_{edACTUAL} \times 0.62\sqrt{2 \times g \times h} = 0.1529 \text{ CFS}$$

$$T_{ed} = \frac{V_{ed}}{Q_{ed}} = \frac{V_{ed}}{Q_{ed} \times 3600} = 52.25 \text{ HRS} > 48 \text{ HOURS}$$

< 72 HOURS

100 YEAR OUTLET CALCULATIONS (RESTRICTOR ON OUTLET)

$$Q_{100out} = A \times Q_a = 1.42 \text{ CFS}$$

$$H_{avg} = \frac{2}{3} \times (Z_{100} - Z_{bottom}) = 1.93 \text{ FT}$$

$$A_{100} = \frac{Q_{100}}{0.62\sqrt{2 \times g \times H_{avg}}} = 0.206 \text{ SF}$$

6" RESTRICTOR HAS AN AREA OF $A_{6"} = 0.1963$

FLOW THROUGH ONE (1) 6" DIA HOLE

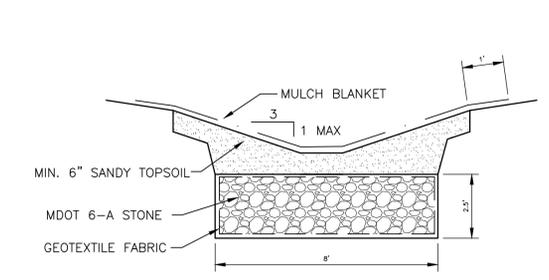
$$Q_{100ACTUAL} = 0.62 \times A_{100} \sqrt{2 \times g \times H_{100avg}} = 1.3580 \text{ CFS}$$

SUMMARY

FIVE (5) 1" DIAMETER HOLES AT 808.00 IN STANDPIPE

ONE (1) 6" RESTRICTOR AT 808.00 ON OUTLET

INFILTRATION TRENCH DETAIL



INFILTRATION TRENCH CALCULATIONS

INFILTRATION SWALE CALCULATIONS

INFILTRATION TRENCH VOLUMES

$L_{trench} = 908 \text{ FT}$

$D_{trench} = 2.5 \text{ FT}$

$W_{trench} = 8 \text{ FT}$

$A = D_{trench} \times W_{trench} = 20 \text{ SF}$

$e_{void \text{ space}} = 0.40$

$V_{trench} = e \times A_{trench} \times L_{trench} = 7264 \text{ CF}$

INFILTRATION VOLUME (OVER 6 HOURS)

$L_{trench} = 908 \text{ FT}$

$D_{trench} = 2.5 \text{ FT}$

$W_{trench} = 8.0 \text{ FT}$

$A = L_{trench} \times W_{trench} = 7,264 \text{ SF}$

$I = 3.60 \text{ IN/HR (AT BORING 2)}$

$t_{duration} = 6 \text{ HRS}$

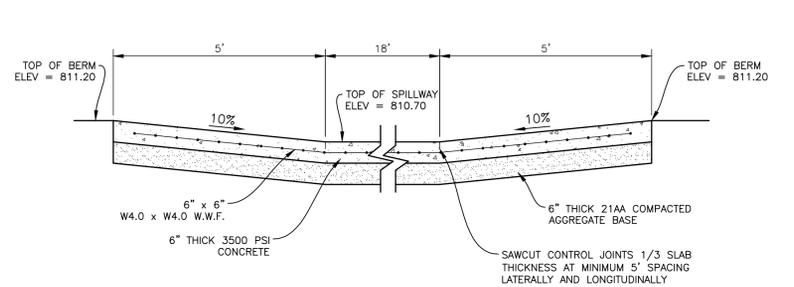
$V_{inf} = A_{inf} \times I \times t_{duration} = 13,075 \text{ CF}$

TOTAL VOLUME STORED IN THE ENGINEERED SWALES

$V_{total} = V_{trench} + V_{inf} = 20,339 \text{ CF} > 19,673 \text{ CF}$

INFILTRATION SWALES MEET INFILTRATION REQUIREMENTS

SPILLWAY DETAIL - CONCRETE - SECTION VIEW



DETENTION BASIN SPILLWAY CALCULATIONS

Weir Coefficient (C) = 3.4

$Z_{bank} = 811.20 \text{ FT}$

$Z_{weir} = 810.70 \text{ FT}$

$H = Z_{bank} - Z_{weir} = 0.50 \text{ FT}$

$Q = 100 \text{ YR INLET RATE} = 22.22 \text{ CFS}$

$L_{weir} = \frac{Q}{C \times H^{3/2}} = 18 \text{ FT}$

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PLYMOUTH, MI 48170
BRUCE MICHAEL
(248) 703-4653

STORM WATER CALCULATIONS

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

DATE	DESCRIPTION
09/13/2023	DATE
01/23/2024	RESUBMIT TO MDOT
03/14/2024	REVISED SITE PLAN PER CITY AND MDOT
03/28/2024	REVISED SITE PLAN PER MDOT
05/16/2024	PRELIMINARY SITE PLAN / WETLAND FLAGS
07/24/2024	REVISED SITE PLAN / WETLAND FLAGS
09/13/2024	REVISED PRELIMINARY SITE PLAN TO CITY
09/04/2024	REVISED PRELIMINARY SITE PLAN TO CITY

ORIGINAL ISSUE DATE: 05/19/2022

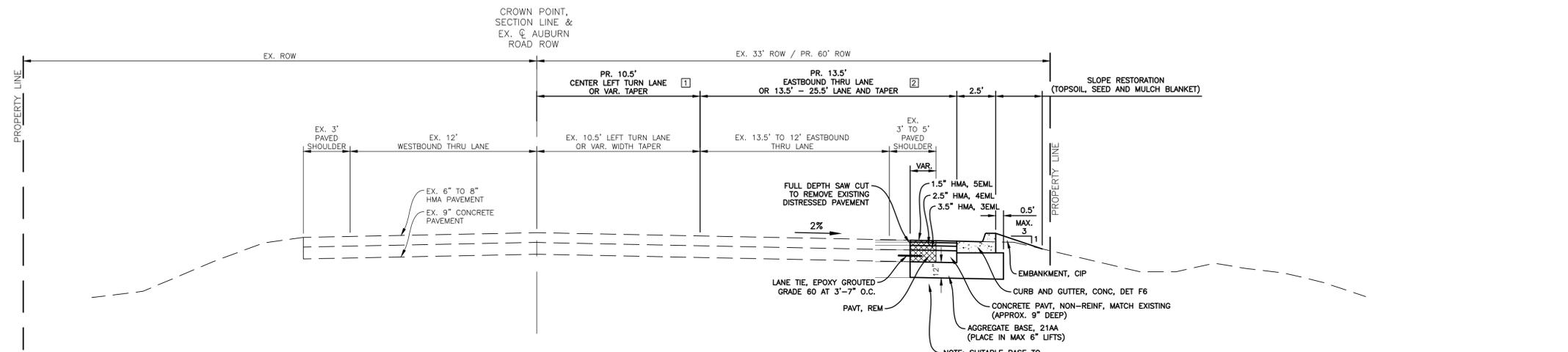
PROJECT NO: 22-051

SCALE: N/A

FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

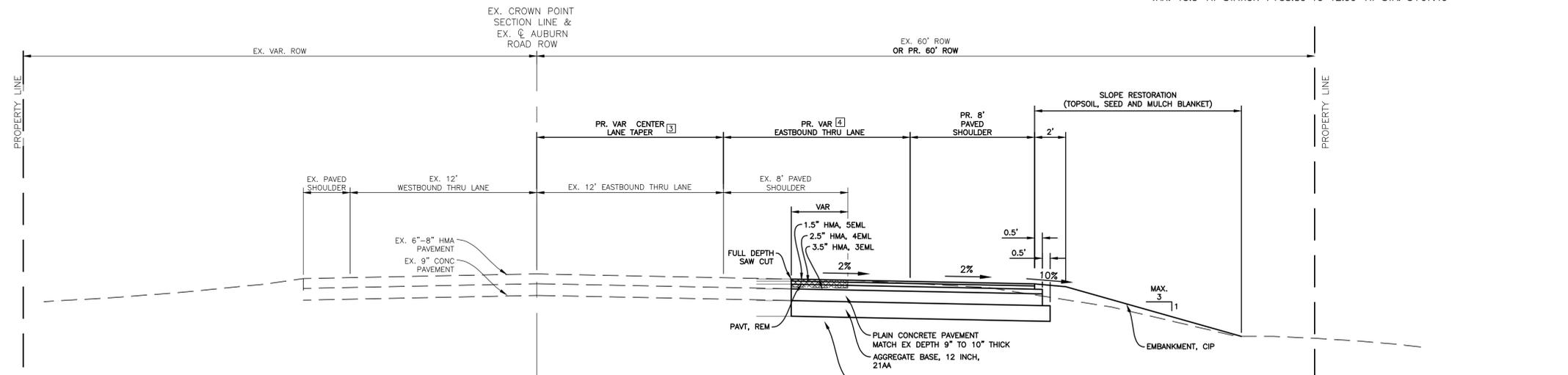
C-9.2

NOT FOR CONSTRUCTION



TYPICAL SECTION
 APPLIES:
 POB STATION 3+64.32 TO STATION 8+67.40

- NOTES**
- 1 10.5' FROM POB STA. 3+64.32 TO STA. 7+38.80
 VAR. 10.5' AT STA. 7+38.80 TO 6.29' AT STA. 8+67.40
 - 2 13.5' FROM STA. 3+64.32 TO STA. 4+49.97
 VAR 13.5' AT STA. 4+49.97 TO 25.5' AT STA. 4+99.97
 25.5' FROM STA. 4+99.97 TO STA. 5+09.97
 ANGARA OAKS INTERSECTION - STA. 5+09.97 TO STA. 6+01.43
 25.5' FROM STA. 6+01.43 TO STA. 6+11.43
 VAR. 25.5' AT STA. 6+11.43 TO 13.5' AT STATION 6+61.43
 13.5' FROM STATION 6+61.43 TO STATION 7+38.80
 VAR. 13.5' AT STATION 7+38.80 TO 12.90' AT STA. 8+67.40



TYPICAL SECTION
 APPLIES:
 STATION 8+67.40 TO STATION 10+58.80

- NOTES**
- 3 VARIES 6.29' AT STA. 8+67.40 TO 0' AT STA. 10+58.80
 - 4 VARIES 12.90' AT STA. 8+67.40 TO 12.00' (MATCH EX.) AT STA. 10+58.80

HMA APPLICATION TABLE					
IDENTIFICATION NO.	ITEM	THICKNESS	RATE PER SYD	PERFORMANCE GRADE	COMMENTS
5EML	HMA, 5EML	1.5 INCHES	165 LBS	64-22	AWI 260
4EML	HMA, 4EML	2.5 INCHES	275 LBS	64-22	
3EML	HMA, 3EML	3.5 INCHES	385 LBS	58-22	
P-1	PLAIN CONCRETE	10 INCHES			
APP	HMA APPROACH	5.0 INCHES	550 LBS	64-22	1.5" HMA, 13A ON 1.5" HMA, 13A ON 2" HMA, 13A ON 8" AGG BASE, 21AA
	BOND COAT		0.05 TO 0.15 GALLONS		SS-1h (FOR INFORMATION ONLY)

MDOT NOTES

1. CONTRACTOR TO NOTIFY MDOT A MINIMUM 3 DAYS PRIOR TO PLACING ANY SIGNS OR BEGINNING ANY WORK WITHIN MDOT ROW.
2. PROPER SIGNING IS REQUIRED BEFORE ANY WORK IN R.O.W. IS STARTED.
3. LANE CLOSURES RESTRICTED TO 9-3 MON-FRI.
4. MAINTAIN TWO-WAY TRAFFIC AT ALL TIMES ON AUBURN ROAD.
5. FLAG PERSON REQUIRED FOR TEMPORARY ONE-LANE ROADS.

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AUBURN ROAD TYPICAL SECTIONS
 AUBURN ANGARA OAKS
 PART OF SEC. 32, T3N, R11E
 CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

DATE	DESCRIPTION
09/13/2023	PLAN SUBMITTALS/REVISIONS
01/23/2024	REVISOR TO MDOT
03/14/2024	REVISOR SITE PLAN PER CITY AND MDOT
03/28/2024	REVISOR SITE PLAN PER MDOT
07/24/2024	PRELIMINARY SITE PLAN / WETLAND FLAGS
09/13/2024	REVISOR SITE PLAN / WETLAND FLAGS
09/04/2024	REVISOR PRELIMINARY SITE PLAN TO CITY

ORIGINAL ISSUE DATE:
 05/19/2022

PROJECT NO: 22-051

SCALE: N/A

FIELD: REICHERT
 DRAWN BY: MN
 DESIGN BY: KM
 CHECK BY: AP

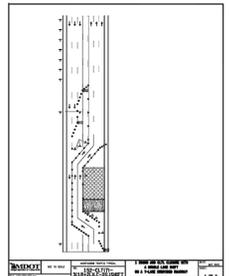
C-10.0

NOT FOR CONSTRUCTION

TYPICAL NUMBER KEY

CODES

AB = ARROW BOARD	LD = LANE OPEN
AW = ADVANCE WARNING	OUT = OUTSIDE OF SHOULDER
C = CLOSURE	WD = MIDDLE OF INTERSECTION OR ROAD
CLT = CENTER LEFT TURN LANE	NFW = NON-FREEWAY
CROSS = CROSSOVER	PARK = PARKING LANE
Crush = CRUSH AND SHAPE	PCMS = PORTABLE CHANGEABLE MESSAGE SIGN
EM = EARLY MERGE	RI = RIGHT
ENTR = ENTRANCE RAMP	ROLL = ROLLING ROADBLOCK
EXR = EXIT RAMP	RUM = RUMBLE STRIP
FW = FREEWAY	SD = SHORT DURATION
GEN = GENERAL INFORMATION	SML = SHOULDER CLOSURE
GORE = FREEWAY GORE AREA	SIGN = SIGN
IN = INSIDE	SP = SPECIAL
INT = INTERSECTION	SPEED = SPEED
L = LANE	STA = STOPPED TRAFFIC ADVISORY
LO = LEFT	TR = TRAFFIC REGULATOR
LC = LANE CLOSURE	TS = TEMPORARY SIGNAL
LD = LONG DURATION	ZIP = ZIPPER MERGE



1100 - GENERAL NOTES

1110 - TRAFFIC REGULATORS

1120 - NON-FREEWAY

1130 - CENTER LEFT TURN (CLT) LANES

1140 - PARKING LANES

1150 - CLT 7 LANE SECTIONS

1160 - SIGNAL WORK

200 - FREEWAY CLOSURES

210 - FREEWAY LANE SHIFTS

220 - FREEWAY ENTRANCE RAMP

230 - FREEWAY EXIT RAMP

300 - ADVANCE WARNINGS

310 - CROSSOVER CLOSURE

320 - CRUSH AND SHAPE

340 - MERGE SYSTEMS

350 - GORE LOCATIONS

360 - ROLLING ROADBLOCK

4000 - MAINTENANCE

5000 - SURVEY

EXAMPLE TYPICAL

CODE: 152-CLT7-3CLR+2JLC-2LSHIFT

152 = TYPICAL NUMBER

CLT7 = CENTER LEFT TURN LANE, 7 LANES TOTAL

3CLR+2JLC = 3 LANES CLOSED, 11 RIGHT LANE AND 2 LEFT LANES

2LSHIFT = 2 LANES SHIFTED TO THE LEFT

NOT TO SCALE

MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	TYPICAL NUMBERING KEY	DATE: DECEMBER 2021 SHEET: 1 OF 1
FILE: 100-GEN-KEY.dgn	NO.	100-GEN-KEY		

THE FORMULAS FOR THE MINIMUM LENGTH OF A MERGING TAPER IN DERIVING THE "L" VALUES SHOWN IN THE ABOVE TABLES ARE AS FOLLOWS:

TYPES OF TAPERS

UPSTREAM TAPERS

SHIFTING TAPER

SHOULDER TAPER

2 TO 1 LANE ROAD TAPER

DOWNSTREAM TAPERS (USE IS RECOMMENDED)

TAPER LENGTH

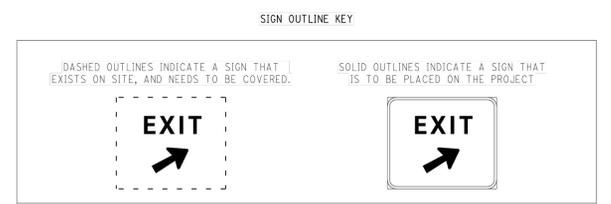
1/2 L - MINIMUM

1/3 L - MINIMUM

100' (PER LANE)

MAXIMUM SPACING FOR CHANNELIZING DEVICES

WORK ZONE SPEED LIMIT	DRUM AND 42" DEVICE SPACING (FT)	NIGHTTIME 42" DEVICE SPACING (FT)
< 45 MPH	1 x SPEED LIMIT	25 FEET
≥ 45 MPH	50 FEET	25 FEET



NOT TO SCALE

MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	"B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING SIGN BORDER KEY AND ROLL-AHEAD SPACING	DATE: MAY 2021 SHEET: 2 OF 3
FILE: 101-GEN-SPACING-CHARTS.dgn	NO.	101-GEN-SPACING-CHARTS		

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

- GENERAL NOTES
- SEE GEN-SPACING-CHARTS FOR COMMON VALUES INCLUDING:
 - D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
 - L = MINIMUM LENGTH OF TAPER
 - B = LENGTH OF LONGITUDINAL BUFFER
 - ROLL AHEAD DISTANCE
 - DISTANCE BETWEEN SIGNS, "D", THE VALUES FOR WHICH ARE SHOWN IN TYPICAL CHARTS ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
 - ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND WORKERS MUST WEAR HIGH VISIBILITY SAFETY VESTS. PROGRAM TEMPORARY SIGNS IN ACCORDANCE WITH THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
 - DO NOT STORE EQUIPMENT, MATERIALS OR PERFORM WORK IN ESTABLISHED BUFFER AREAS.
 - ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR TRAFFIC MARKINGS FOR WORK LESS THAN THREE DAYS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.
- SIGN NOTES
- ALL NON-APPLICABLE SIGNING WITHIN THE CIA MUST BE MODIFIED TO FIT CONDITIONS, COVERED, OR REMOVED FOR GUIDANCE. SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, SECTIONS 401.0P AND 401.0L.
 - R-10 SIGNS ARE ONLY REQUIRED ON FREEWAY PROJECTS WITH A DURATION OF 15 DAYS OR LONGER OR NON-FREEWAY PROJECTS WITH A DURATION OF 90 DAYS OR LONGER. TO APPLY THIS TYPICAL WITHOUT R-10 SIGNS, REMOVE THE SIGNS AND CONSOLIDATE THE MESSAGE AS APPROPRIATE.
 - R-16E IS ONLY REQUIRED IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. OMIT THIS SIGN IN SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE.
 - ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE WORK ZONE.
 - PLACE ADDITIONAL SPEED LIMIT SIGNS REFLECTING THE WORK ZONE SPEED AFTER EACH MAJOR CROSSROAD THAT INTERSECTS THE WORK ZONE, OR AFTER EACH ENTRANCE RAMP THAT COMES ONTO THE FREEWAY WHERE THE REDUCED SPEED IS IN EFFECT. PLACE ADDITIONAL SPEED LIMIT SIGNS AT INTERVALS ALONG THE ROADWAY SUCH THAT NO SPEED SIGN IS MORE THAN 3 MILES APART. WHEN REDUCED SPEED LIMITS ARE UTILIZED IN THE WORK AREA, PLACE ADDITIONAL SPEED LIMIT SIGNS RETURNING TRAFFIC TO THE NORMAL SPEED LIMITS AT THE END OF THE WORK AREA AS INDICATED. IF PERMANENT SIGNS DISPLAYING THE CORRECT SPEED ARE POSTED, OMIT ALL W-50 AND R-1 SIGNS AND REDUCE SPACING ACCORDINGLY.
 - FABRICATE SPECIAL SIGNS IN ACCORDANCE WITH CURRENT SIGNING DESIGN STANDARDS.
 - PLACE ADDITIONAL R-3 SIGNS AT A MAXIMUM 500' SPACING THROUGHOUT THE WORK ZONE.
 - WHEN SPEED LIMIT SIGNS CANNOT BE PLACED SIDE BY SIDE AS SHOWN, PLACE THEM "D" DISTANCE APART.
 - STOP SIGNS NOT REQUIRED IF SIGNALS ARE ON 4-WAY FLASHING RED. STOP AHEAD SIGNS ARE NOT REQUIRED IF THERE IS ADEQUATE VISIBILITY OF THE STOP SIGN OR IF SIGNALS ARE BEING USED TO CONTROL TRAFFIC.
 - PLACE REDUCED SPEED ZONE AHEAD SIGN (W-50) WHERE WHEN USING A SPEED REDUCTION IN THIS DIRECTION.
 - THE NUMBER OF W-6 SHIFTS SIGNS TO PLACE FOR A SHIFT IS AS FOLLOWS: SHIFTS 1 TO 12, PLACE ONE W-6; SHIFTS 13 TO 17, PLACE TWO W-6; SHIFTS MORE THAN 17, PLACE THREE OR MORE W-6; SHIFTS DEPENDENT UPON LENGTH OF SHIFT AND AS PER THE ENGINEER.
 - PLACE R-2-1 SIGNS AS DETAIL IN NOTE 53 WHEN THERE IS A SPEED REDUCTION IN THIS DIRECTION.
- TRAFFIC TYPICALS NOTE SHEET
- DATE: MAY 2021
SHEET: 1 OF 2

NOT TO SCALE

MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	TRAFFIC TYPICALS NOTE SHEET	DATE: MAY 2021 SHEET: 1 OF 2
FILE: 102-GEN-NOTES.dgn	NO.	102-GEN-NOTES		

DISTANCE BETWEEN TRAFFIC SIGNS, "D"

"D" DISTANCES	25	30	35	40	45	50	55	60	65	70	75
D (FEET)	250	300	350	400	450	500	550	600	650	700	750

GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE, "B"

"B" LENGTHS	20	25	30	35	40	45	50	55	60	65	70	75
B (FEET)	33	50	83	132	181	230	279	329	411	476	542	625

* POSTED SPEED, OFF-PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED.

MINIMUM MERGING TAPER LENGTH, "L" (FEET)

OFFSET (FEET)	25	30	35	40	45	50	55	60	65	70	75
1	11	15	21	27	45	50	55	60	65	70	75
2	21	30	41	54	90	100	110	120	130	140	150
3	32	45	62	80	135	150	165	180	195	210	225
4	42	60	82	107	180	200	220	240	260	280	300
5	53	75	103	134	225	250	275	300	325	350	375
6	63	90	123	160	270	300	330	360	390	420	450
7	73	105	143	187	315	350	385	420	455	490	525
8	84	120	164	214	360	400	440	480	520	560	600
9	94	135	184	240	405	450	495	540	585	630	675
10	105	150	205	267	450	500	550	600	650	700	750
11	115	165	225	294	495	550	605	660	715	770	825
12	125	180	245	320	540	600	660	720	780	840	900
13	136	195	266	347	585	650	715	780	845	910	975
14	146	210	286	374	630	700	770	840	910	980	1050
15	157	225	307	400	675	750	825	900	975	1050	1125

NOT TO SCALE

MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	"B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING, SIGN BORDER KEY, AND ROLL-AHEAD SPACING	DATE: MAY 2021 SHEET: 1 OF 3
FILE: 101-GEN-SPACING-CHARTS.dgn	NO.	101-GEN-SPACING-CHARTS		

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES - TEST LEVEL 2

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE * (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5.5 TONS (STATIONARY)	40 MPH OR LESS	25 FT.

* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 4,410 POUND IMPACT VEHICLE WEIGHT.

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES - TEST LEVEL 3

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE * (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5 TONS (MOBILE)	45 MPH	100 FT.
	50-55 MPH	150 FT.
	60-75 MPH	175 FT.
12 TONS (STATIONARY)	45 MPH	25 FT.
	50-55 MPH	50 FT.

* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 10,000 POUND IMPACT VEHICLE WEIGHT.

NOT TO SCALE

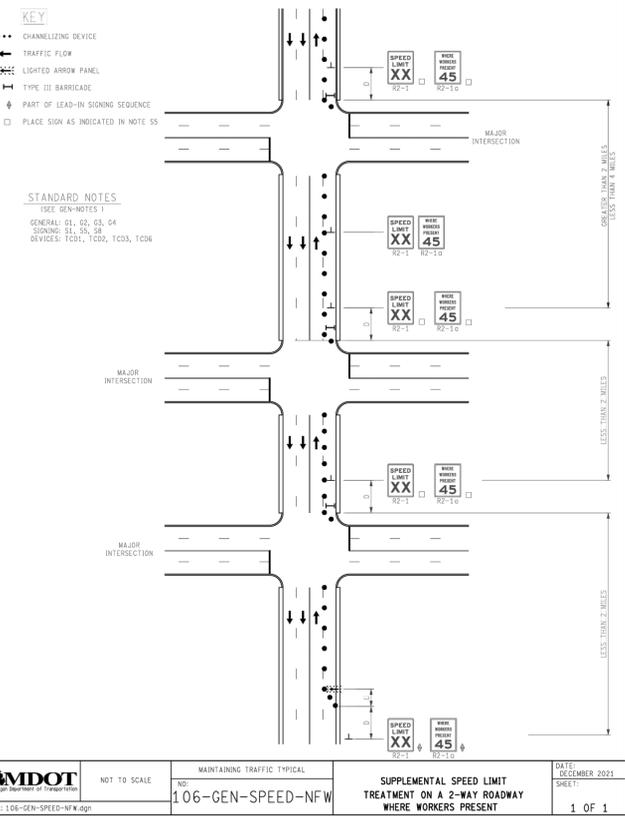
MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	"B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING, SIGN BORDER KEY AND ROLL-AHEAD SPACING	DATE: MAY 2021 SHEET: 3 OF 3
FILE: 101-GEN-SPACING-CHARTS.dgn	NO.	101-GEN-SPACING-CHARTS		

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

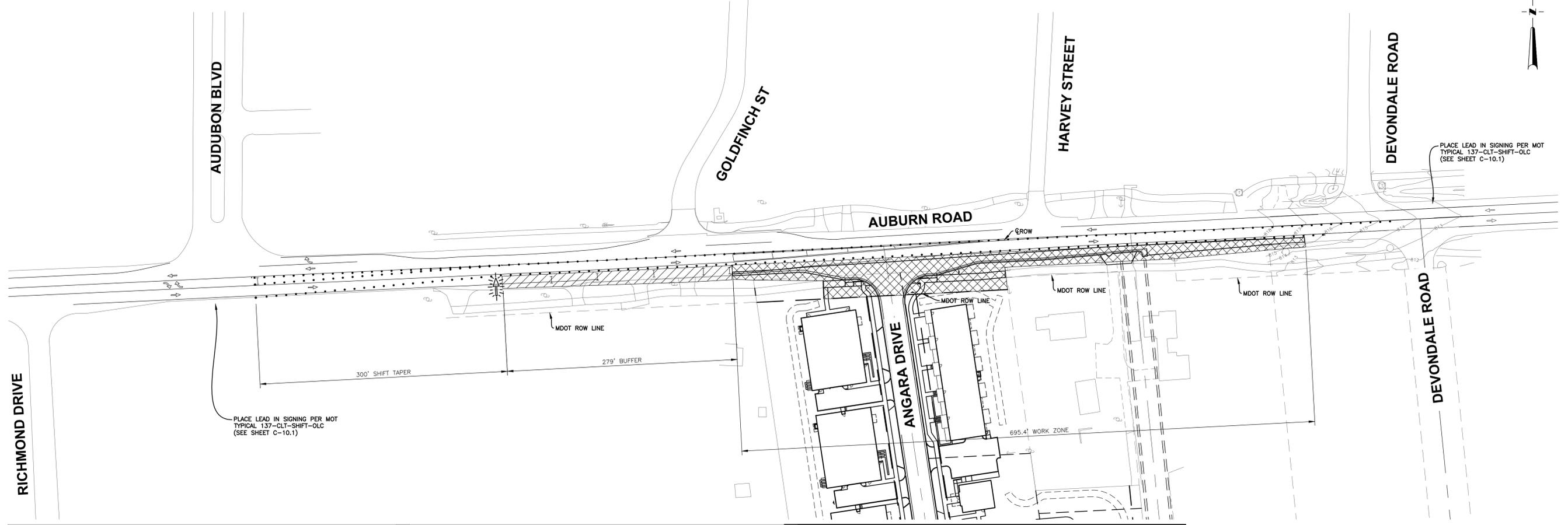
- SIGNAL NOTES
- EXISTING SIGNAL MUST BE EITHER 4-WAY FLASHING RED, BAGGED, OR TURNED OFF.
 - SIGNAL IS IN OPERATION.
 - DELINEATE THE WORK ZONE AREA WITH 28 INCH CONES FOR DAYTIME WORK, OR 42 INCH CHANNELIZING DEVICES FOR NIGHTTIME WORK.
 - THE CONTRACTOR MUST HAVE A DESIGNATED SPOTTER IF THE AERIAL BUCKET TRUCK IS LOCATED OVER ACTIVE TRAVEL LANES.
 - THE LOWEST POINT OF THE BUCKET MAY NOT TRAVEL BELOW 14 FOOT VERTICAL CLEARANCE. THE CONTRACTOR MUST UTILIZE AN ALTERNATE SET UP OR PLACE THE INTERSECTION IN A 4 WAY STOP IF THE 14 FOOT VERTICAL CLEARANCE IS COMPROMISED. USE TRAFFIC REGULATORS TO CONTROL TRAFFIC THROUGH THE INTERSECTION WHEN TRAFFIC IS PLACED IN A 4 WAY STOP.
 - DELINEATE THE TRUCK WITH CHANNELIZING DEVICES. THE POSITION OF THE TRUCK MAY BE MOVED TO FACILITATE WORK.
- MAINTENANCE AND SURVEYING NOTES
- WHENEVER STOPPING SIGHT DISTANCE EXISTS TO THE REAR, THE SHADOW VEHICLES SHOULD MAINTAIN THE RECOMMENDED DISTANCE FROM THE WORK AREA AND PROCEED AT THE SAME SPEED. WORKING VEHICLES SHOULD SLOW DOWN AND TRAVEL AT A FARTHER DISTANCE TO PROVIDE ADEQUATE SIGHT DISTANCE IN ADVANCE OF VERTICAL OR HORIZONTAL CURVES.
 - WORKERS OUTSIDE OF VEHICLES SHOULD WORK WITHIN 100' OF WORK VEHICLES WITH AN ACTIVATED BEACON BETWEEN THE "BEGIN WORK CONVOY" SIGN AND THE "END WORK CONVOY" SIGN, OR BETWEEN THE "WORK ZONE BEGINS" AND "END ROAD WORK" SIGN.
 - WORK OR SHADOW VEHICLES WITH OR WITHOUT A TMA MAY BE USED TO SEPARATE THE WORK SPACE FROM TRAFFIC. IF USED, THE VEHICLES SHOULD BE PARALLEL TO THE ROLL-AHEAD DISTANCE.
 - WORK AND SHADOW VEHICLES SHALL BE APPROPRIATELY EQUIPPED WITH AN ACTIVATED AMBER BEACON.
 - WHEN WORKERS ARE OUTSIDE THEIR VEHICLES IN AN EXISTING LANE WHILE A MOBILE OPERATION IS OCCURRING DURING THE NIGHTTIME HOURS, CHANNELIZING DEVICES TO DELINEATE OPEN OR CLOSED LANES AT 90 FT SPACING MUST BE USED. AN EXAMPLE OF AN OPERATION (BUT NOT LIMITED TO) IS THE LAYOUT OF CONCRETE PATCHES.
 - W2-6 AND W20-1 SIGNS MAY BE SUBSTITUTED AS DETERMINED BY THE TYPE OF WORK TAKING PLACE AS PER THE ENGINEER.
- TRAFFIC TYPICALS NOTE SHEET
- DATE: MAY 2021
SHEET: 2 OF 2

NOT TO SCALE

MDOT	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	TRAFFIC TYPICALS NOTE SHEET	DATE: MAY 2021 SHEET: 2 OF 2
FILE: 102-GEN-NOTES.dgn	NO.	102-GEN-NOTES		



ANGARA OAKS TRAFFIC CONTROL PLAN



INNOVATIVE GEOSPATIAL & ENGINEERING SOLUTIONS

MEGA
MONUMENT ENGINEERING GROUP ASSOCIATES, INC.

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(OFFICE) 517-223-3512
MONUMENTENGINEERING.COM

SERVICE DISABLED VETERAN OWNED
SMALL BUSINESS (SDVOSSB)

KEVIN C. McDEVITT
ENGINEER
NO. 6201043260

Kevin C. McDevitt

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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 LOCATION, DEPTH AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION.

CLIENT :

AUBURN ANGARA OAKS, LLC

14496 N SHELDON RD
SUITE 230
PLYMOUTH, MI 48170
BRUCE MICHAEL
(248) 703-4653

MOT PLAN

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

KEY

- TRAFFIC REGULATOR
- CHANNELIZING DEVICES
- LIGHTED ARROW PANEL (CAUTION MODE)
- TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S5
- PLACE SIGN AS INDICATED IN NOTE S2

STANDARD NOTES
(SEE GEN-NOTES)

GENERAL: G1, G2, G3, G4
SIGNING: S1, S2, S3, S4, S5
TRAF. REG.: TR1, TR2
DEVICES: TCD1, TCD2, TCD3

MDOT NOT TO SCALE
NO. 110-TR-NFW-2L
DATE: MAY 2021
SHEET: 1 OF 1
FILE: 110-TR-NFW-2L.dgn

KEY

- CHANNELIZING DEVICES
- LIGHTED ARROW PANEL (CAUTION MODE)
- TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S2

STANDARD NOTES
(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4
SIGNING: S1, S2, S3, S5
DEVICES: TCD1, TCD2, TCD3, TCD4

MDOT NOT TO SCALE
NO. 122-NFW-SHL-(R)
DATE: MAY 2021
SHEET: 1 OF 1
FILE: 122-NFW-SHL-(R).dgn

KEY

- CHANNELIZING DEVICES
- TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S5
- PLACE SIGN AS INDICATED IN NOTE S2

STANDARD NOTES
(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4, G5
SIGNING: S1, S2, S3, S5, S11, S12
DEVICES: TCD1, TCD2, TCD3

MDOT NOT TO SCALE
NO. 137-CLT-SHIFT-OLC
DATE: DECEMBER 2021
SHEET: 1 OF 1
FILE: 137-CLT-SHIFT-OLC.dgn

LEGEND

- CHANNELIZING DEVICES
- TYPE III LIGHTED BARRICADE
- SIGN, TYPE (A OR B), TEMPORARY
- LIGHTED ARROW, TYPE C
- TRAFFIC FLOW
- WORK AREA
- BUFFER ZONE

- MAINTENANCE OF TRAFFIC NOTES**
- TEMPORARY TRAFFIC SIGNS TO BE SPACED AS SHOWN IN 101-GEN-SPACING-CHARTS, OR AS DIRECTED BY THE MDOT PERMIT ENGINEER.
 - CONSTRUCTION ZONE SPEED LIMIT TO BE CHANGED TO 35 MPH USING SIGNING AS SHOWN IN 106-GEN-SPEED-NFW.
 - CENTER LANE CLOSURE AND SHIFT TO BE CONVERTED TO SHOULDER CLOSURE SIGNING AS IDENTIFIED IN MOT TYPICAL 122-NFW-SHL-(R), ONCE PAVEMENT WITHIN AUBURN ROW HAS BEEN COMPLETED, UNTIL ANGARA DRIVE IS OPEN TO TRAFFIC.
 - ADDITIONAL SIGNS NEEDED DURING TEMPORARY LANE CLOSURES WITH FLAG CONTROL, AS IDENTIFIED IN MOT TYPICAL XXX, SHALL BE PLACED ON TEMPORARY SUPPORTS, AND REMOVED OR COVERED WHEN NOT NEEDED.
 - LANE CLOSURES ARE ONLY ALLOWED DURING THE HOURS OF 9:00 A.M. TO 3:30 P.M., MONDAY THROUGH FRIDAY. WEEKEND LANE CLOSURES SHALL ONLY BE ALLOWED WITH THE WRITTEN CONSENT OF THE MDOT ENGINEER.
 - ALL SIDE STREET APPROACHES (NON-DEAD END) SHALL HAVE W20-1 "ROAD WORK AHEAD" SIGNS, IN COMBINATION WITH D3-1 "AUBURN ROAD", 300' IN ADVANCE OF THE INTERSECTION WITH AUBURN ROAD, IF WITHIN THE INFLUENCE OF M0120a OR M0150a SIGNING. AT A MINIMUM, XXXX AND XXXX SHALL HAVE THESE SIGNS INSTALLED ON GROUND MOUNTED SUPPORTS.

PLAN SUBMITTALS/REVISIONS	DATE
RESUBMIT TO MDOT	09/13/2023
REVISED SITE PLAN PER CITY AND MDOT	01/23/2024
REVISED SITE PLAN PER MDOT	03/14/2024
PRELIMINARY SITE PLAN TO CITY	03/28/2024
REVISED SITE PLAN / WETLAND FLAGS	05/16/2024
REVISED SITE PLAN TO CITY	07/24/2024
REVISED PRELIMINARY SITE PLAN TO CITY	09/13/2024
REVISED PRELIMINARY SITE PLAN TO CITY	09/04/2024

ORIGINAL ISSUE DATE: 05/19/2022

PROJECT NO: 22-051

SCALE: 1"=60'

0 1/2" 1"

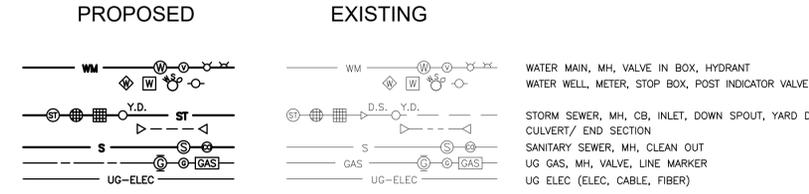
FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

C-10.2

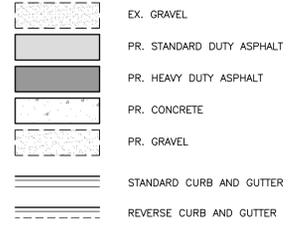
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UTILITY LEGEND



PAVEMENT LEGEND



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SMALL BUSINESS (SDVOBS)

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ENGINEER
NO. 6201043260

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CLIENT :

AUBURN ANGARA OAKS, LLC

14496 N SHELDON RD
SUITE 230
PLYMOUTH, MI 48170
BRUCE MICHAEL
(248) 703-4653

CONSTRUCTION PLAN

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

PLAN SUBMITTALS/REVISIONS	DATE
RESUBMIT TO MDOT	09/13/2023
REVISED SITE PLAN SUBMITTAL	01/23/2024
REVISED SITE PLAN PER CITY AND MDOT	03/14/2024
REVISED SITE PLAN PER MDOT	03/28/2024
PRELIMINARY SITE PLAN TO CITY	05/16/2024
REVISED SITE PLAN / WETLAND FLAGS	07/24/2024
REVISED PRELIMINARY SITE PLAN TO CITY	09/13/2024
REVISED PRELIMINARY SITE PLAN TO CITY	09/04/2024

ORIGINAL ISSUE DATE: 05/19/2022

PROJECT NO: 22-051

SCALE: 1" = 40'

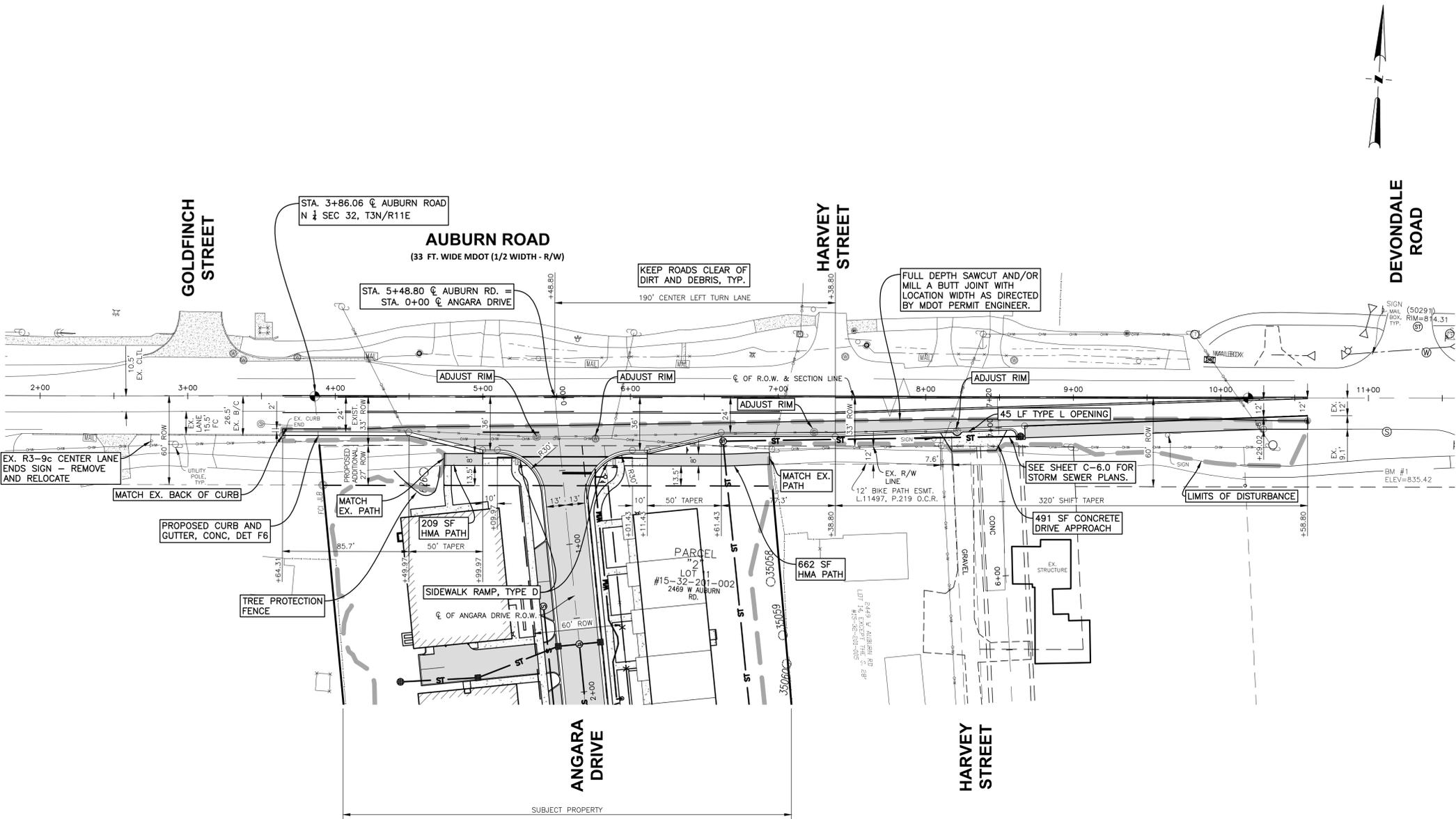
FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

C-10.4

NOT FOR CONSTRUCTION

MDOT NOTES

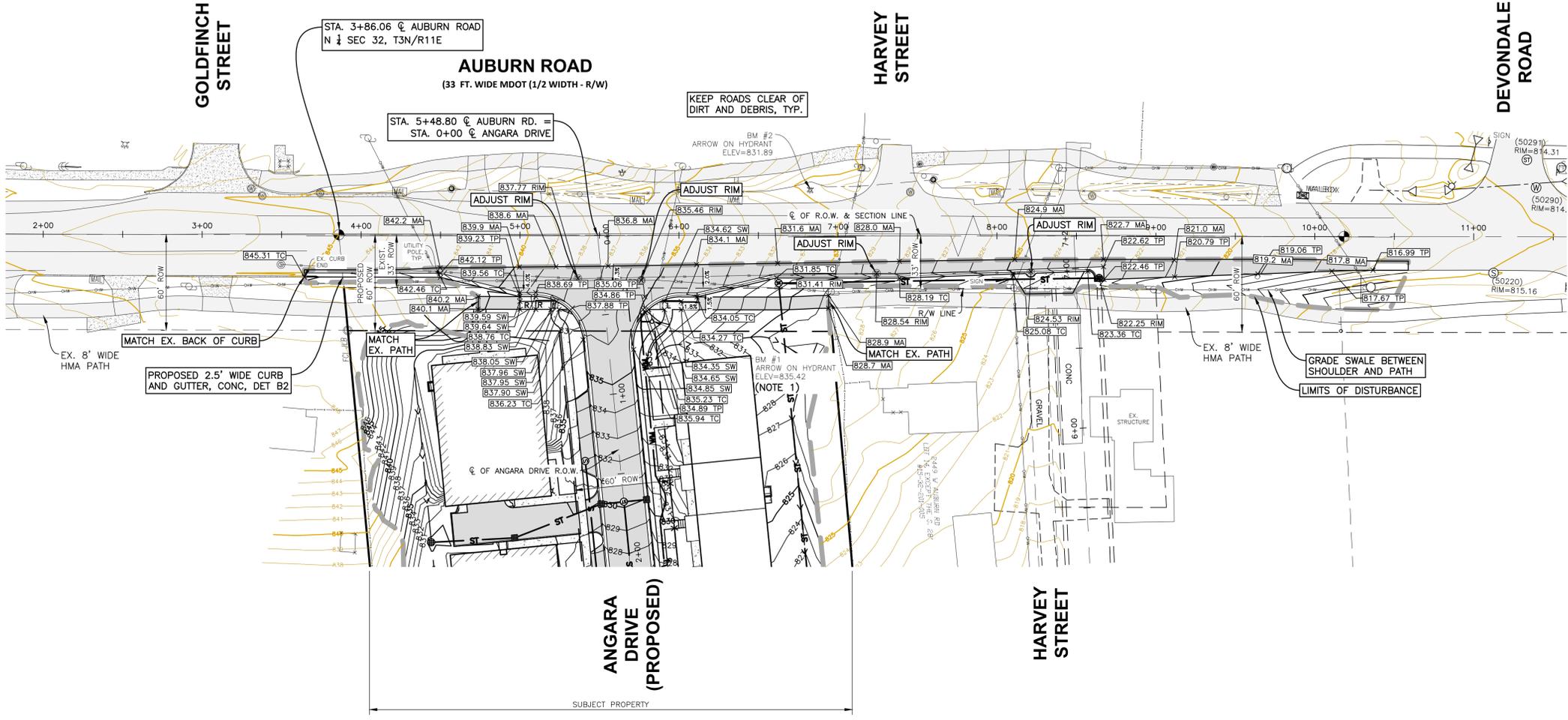
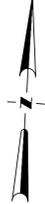
- CALL INSPECTOR OR PERMIT SUPERVISOR BEFORE BEGINNING ANY WORK IN R.O.W.
- PROPER SIGNING IS REQUIRED BEFORE ANY WORK IN R.O.W. IS STARTED.
- LANE CLOSURES RESTRICTED TO 9-3 MON-FRI.
- MAINTAIN TWO-WAY TRAFFIC AT ALL TIMES.
- FLAG PERSON REQUIRED FOR TEMPORARY ONE-LANE ROADS.





GRADING LEGEND

	PROPOSED TOP OF PAVEMENT GRADE
	PROPOSED SIDEWALK GRADE
	PROPOSED FINISH GRADE
	PROPOSED TOP CURB GRADE
	PROPOSED GUTTER PAN GRADE
	MATCH EXISTING
	PROPOSED FINISH FLOOR GRADE
	PROPOSED RIM GRADE
	ADJUSTED RIM GRADE
	EXISTING ELEVATION
	EXISTING CONTOUR
	PROPOSED CONTOUR
	LIMITS OF DISTURBANCE



MDOT NOTES

- CONTRACTOR TO NOTIFY MDOT THROUGH MI-PERMITS 3 DAYS PRIOR TO BEGINNING ANY WORK IN R.O.W.
- PROPER SIGNING IS REQUIRED BEFORE ANY WORK IN R.O.W. IS STARTED.

GRADING NOTES

- CONTRACTOR TO ESTABLISH NEW BENCHMARK PRIOR TO REMOVING EXISTING HYDRANT.

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KEVIN C. MCDEVITT
ENGINEER
NO. 6201043260

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CLIENT :

AUBURN ANGARA OAKS, LLC

14496 N SHELDON RD
SUITE 230
PLYMOUTH, MI 48170
BRUCE MICHAEL
(248) 703-4653

GRADING AND SECC PLAN

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

DATE	DESCRIPTION
09/13/2023	REVISION TO MDOT
01/23/2024	REVISION TO MDOT
03/14/2024	REVISION TO MDOT
03/28/2024	REVISION TO MDOT
05/16/2024	PRELIMINARY SITE PLAN TO CITY
07/24/2024	REVISION TO MDOT
09/13/2024	REVISION TO MDOT

ORIGINAL ISSUE DATE:
05/19/2022

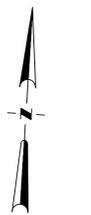
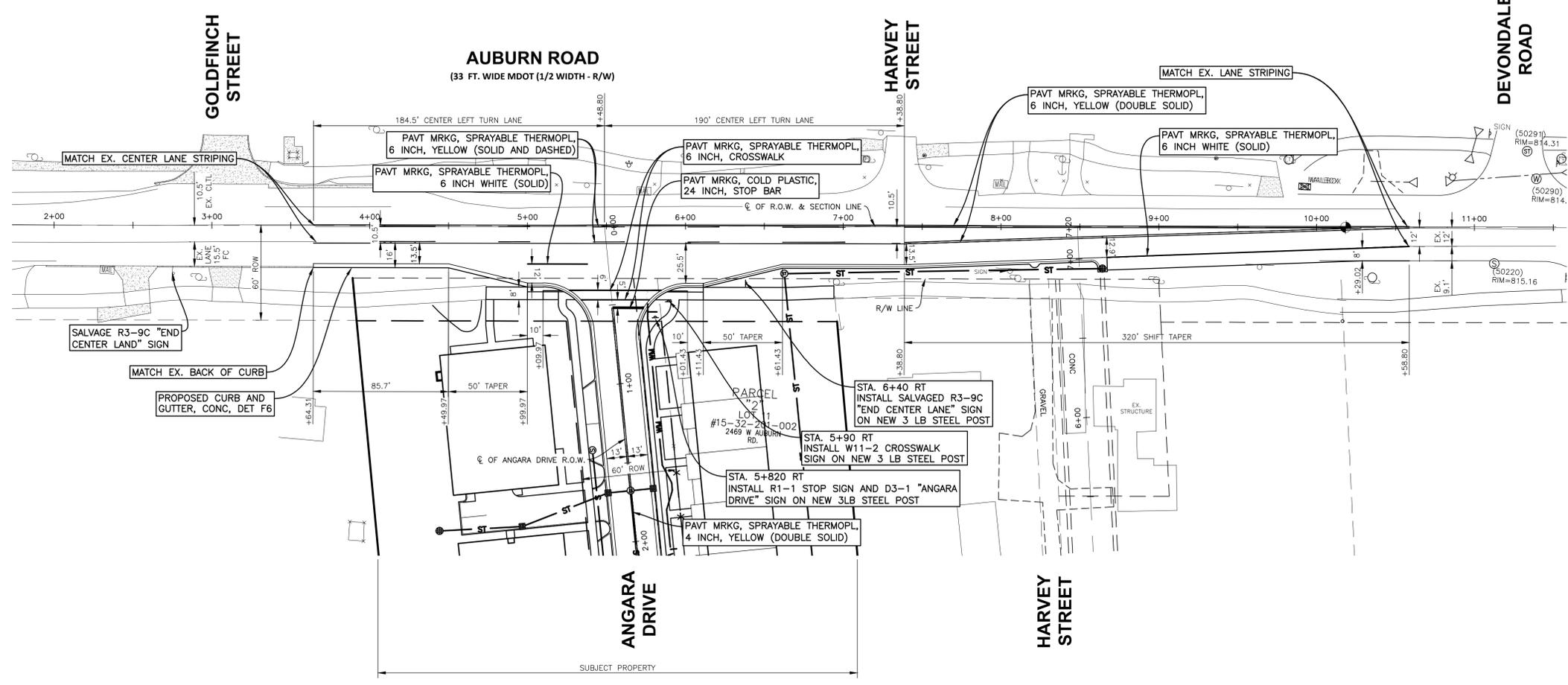
PROJECT NO: 22-051

SCALE: 1" = 60'
0 1/2" 1"

FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

C-10.5

NOT FOR CONSTRUCTION



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CLIENT :

AUBURN ANGARA OAKS, LLC

14496 N SHELDON RD
SUITE 230
PLYMOUTH, MI 48170
BRUCE MICHAEL
(248) 703-4653

PAVEMENT MARKING AND SIGNAGE PLAN

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

PLAN SUBMITTALS/REVISIONS	DATE
RESUBMIT TO MDOT	09/13/2023
REVISED SITE PLAN SUBMITTAL	01/23/2024
REVISED SITE PLAN PER CITY AND MDOT	03/14/2024
REVISED SITE PLAN PER MDOT	03/28/2024
PRELIMINARY SITE PLAN TO CITY	05/16/2024
REVISED SITE PLAN / WETLAND FLAGS	07/24/2024
REVISED PRELIMINARY SITE PLAN TO CITY	09/04/2024

ORIGINAL ISSUE DATE:
05/19/2022

PROJECT NO: 22-051

SCALE: 1" = 60'

0 1/2" 1"

FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

C-10.6

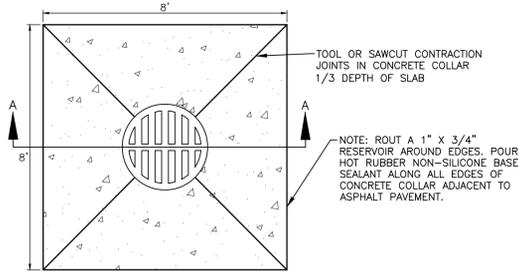
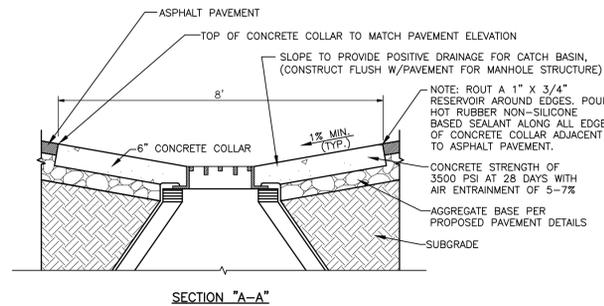
MDOT NOTES

1. CALL INSPECTOR OR PERMIT SUPERVISOR BEFORE BEGINNING ANY WORK IN R.O.W.
2. PROPER SIGNING IS REQUIRED BEFORE ANY WORK IN R.O.W. IS STARTED.
3. LANE CLOSURES RESTRICTED TO 9-3 MON-FRI.
4. MAINTAIN TWO-WAY TRAFFIC AT ALL TIMES.
5. FLAG PERSON REQUIRED FOR TEMPORARY ONE-LANE ROADS.

NOT FOR CONSTRUCTION

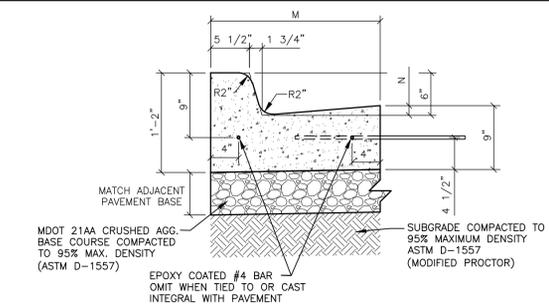


APRON DETAIL - CONCRETE AROUND CATCH BASIN



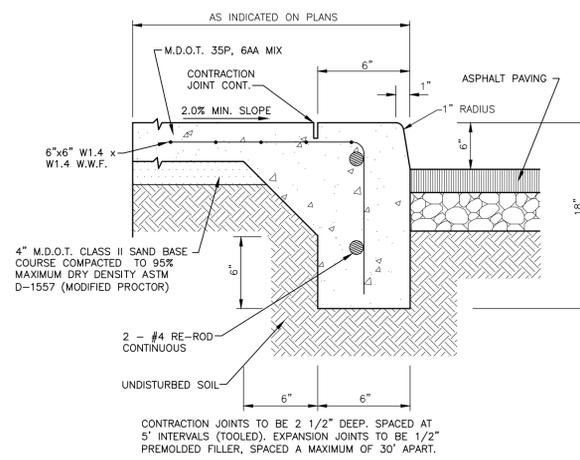
NOTE: TO BE USED FOR SIDEWALK ADJACENT TO STANDARD CURB SECTION WITHIN RIGHT OF WAY.

CURB AND GUTTER DETAIL - MDOT - FX - WITH TABLE

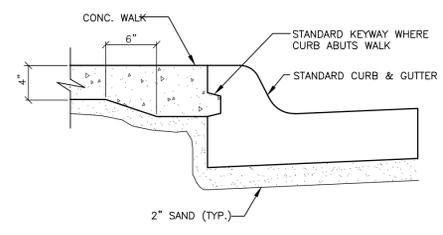


DETAIL	DIMENSION		LANE TIES	CONCRETE CYD / LFT
	M	N		
F1	1'-6"	7/8"	AS SHOWN	0.0484
F2	1'-6"	7/8"	OMITTED	0.0484
F3	2'-0"	1 3/8"	AS SHOWN	0.0610
F4	2'-0"	1 3/8"	OMITTED	0.0610
F5	2'-6"	1 7/8"	AS SHOWN	0.0737
F6	2'-6"	1 7/8"	OMITTED	0.0737

INTEGRAL CURB AND SIDEWALK DETAIL



SIDEWALK DETAIL - KEYWAY SECTION



Standard Details:

Standard Notes:

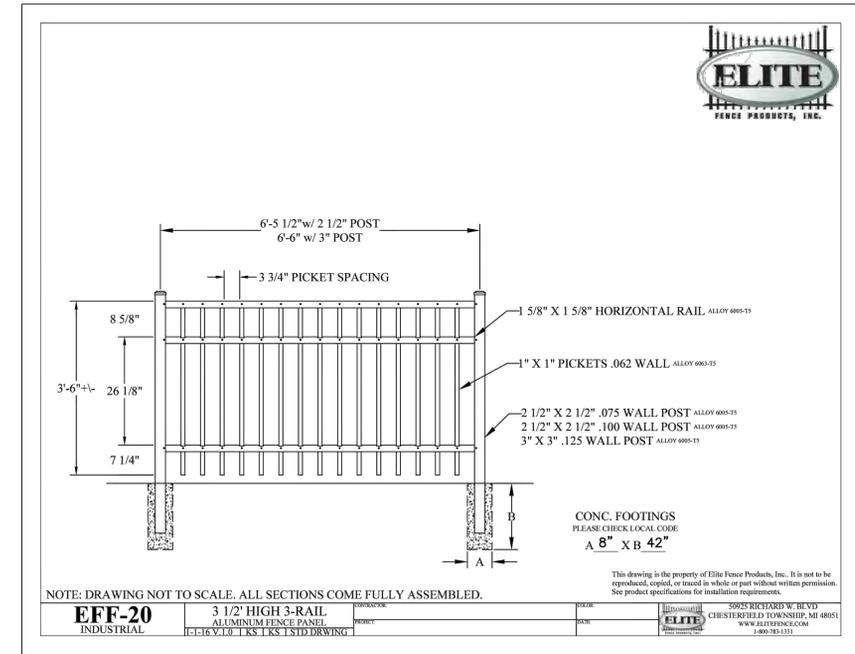
- Maximum grade of 8.33% along pathway (less than 5% is recommended).
- 1% cross slope (i.e. super elevation) for drainage off and away from pathway and graded shoulders (2% maximum cross-slope).
- 60' minimum center line radii for pathway horizontal alignment.
- Provide a minimum of 3' horizontal clearance and 10' vertical clearance from all fixed objects and the edge of pathway surface. Relocation of existing objects (i.e. mail boxes, signs, etc.) shall be considered incidental work items.
- Pathway ramps shall be constructed in accordance with MDOT standard detail R-28 Series and shall have a minimum clear opening of 8' wide.
- A clean saw cut joint shall be provided wherever new pavement matches existing pavement (incidental work item).
- Utility structures shall be adjusted in accordance with the City of Rochester Hills standards and shall match the proposed grade of the pathway.
- Pathway shall be 6 inch thick HMA or concrete through residential drives and 9 inch thick HMA or 8 inch thick concrete through commercial drives.
- Pathway asphalt shall be paid for as "Shared Use Path, HMA" when part of public improvement project.
- Ramps and landings shall be 6 inch thick concrete.
- ADA detectable warning plates shall be preformed and brick red in color. Acceptable products included ADA Solutions, Inc., Armor-Tile, E.U., or approved equal. Irrigation overspray shall not broadcast onto City pathway or sidewalk.

CITY OF ROCHESTER HILLS STANDARD DETAIL FOR: Pathway Details: Hot-Mixed Asphalt Pathway Construction, Extensions and Relocations

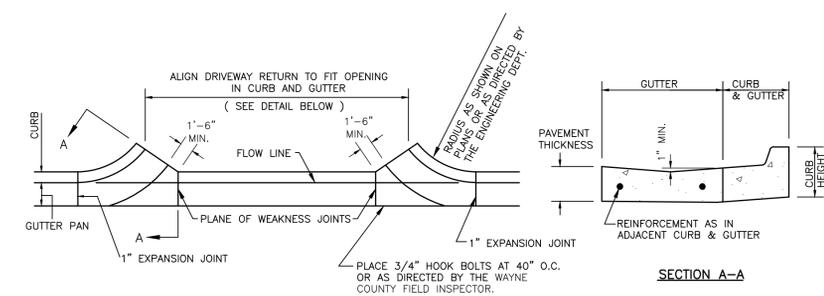
DRAWN BY: R. GEORGE	PLAN DATE: 8/28/1996	REVISIONS: 2/8/2022, 4/12/2012, 2/25/2016, 8/22/2018, 11/12/2019, 01/12/2022, 01/25/2022
APPROVED BY: PAUL SHUMEJKO, MBA, M.S., P.E., PTOE	CITY TRANSPORTATION ENGINEERING MANAGER	

NOT TO SCALE SHEET 1 OF 1

ELITE INDUSTRIAL ALUMINUM PICKET FENCE



M.D.O.T. DRIVEWAY OPENING DETAIL "M"



INNOVATIVE GEOSPATIAL & ENGINEERING SOLUTIONS

MEGA Engineering Group Associates, Inc.

298 VETERANS DRIVE FOWLERVILLE, MICHIGAN 48836 (OFFICE) 517-223-3512 MONUMENTENGINEERING.COM

SERVICE DISABLED VETERAN OWNED SMALL BUSINESS (SDVOSB)

KEVIN C. McDEVITT ENGINEER NO. 6201043260

Kevin C. McDevitt

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CLIENT: AUBURN ANGARA OAKS, LLC

14496 N SHELDON RD SUITE 230 PLYMOUTH, MI 48170 BRUCE MICHAEL (248) 703-4653

DETAILS

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

DATE	DESCRIPTION
09/13/2023	PLAN SUBMITTALS/REVISIONS
01/23/2024	RESUBMIT TO MDOT
03/14/2024	REVISED SITE PLAN PER CITY AND MDOT
03/28/2024	REVISED SITE PLAN PER MDOT
07/24/2024	PRELIMINARY SITE PLAN / WETLAND FLAGS
09/13/2024	REVISED SITE PLAN / WETLAND FLAGS
09/04/2024	REVISED PRELIMINARY SITE PLAN TO CITY

ORIGINAL ISSUE DATE: 05/19/2022

PROJECT NO: 22-051

SCALE: N/A

FIELD: REICHERT
DRAWN BY: MN
DESIGN BY: KM
CHECK BY: AP

C-11.0

NOT FOR CONSTRUCTION



STONE STRONG SYSTEMS
www.stonestrong.com

SYSTEM COMPONENTS

6-28 TOP BLOCK

CONCRETE VOL. 0.21 C.Y. 0.16 m³
VOID VOL. 0.04 C.Y. 0.03 m³
(2 SIDE VOIDS PER BLOCK)VOID VOL. 0.08 C.Y. 0.06 m³

Block Wt.	840 lbs	380 kg
Form Wt.	1,580 lbs	715 kg
Concrete Volume	0.21 CY	0.16 m ³
Aggregate Infill (per face area)	0.16 CY	0.12 m ³
	0.07 ton/sf	700 kg/m ²

STONE STRONG SYSTEMS
Version 09.13.23

DIMENSIONS AND VOLUMES

STONE STRONG SYSTEMS
www.stonestrong.com

SYSTEM COMPONENTS

24-62 BLOCK

CONCRETE VOL. 1.70 C.Y. 1.30 m³
VOID VOL. 0.73 C.Y. 0.56 m³
(2 SIDE VOIDS PER BLOCK)VOID VOL. 1.36 C.Y. 1.04 m³

Block Wt.	6,800 lbs	3,080 kg
Form Wt.	6,580 lbs	2,990 kg
Concrete Volume	1.70 CY	1.30 m ³
Aggregate Infill (per face area)	2.82 CY	2.16 m ³
	0.2 tons/sf	2,000 kg/m ²

STONE STRONG SYSTEMS
Version 04.16.23

DIMENSIONS AND VOLUMES

STONE STRONG SYSTEMS

Stone Strong Maximum Gravity Heights AASHTO/CHBDC LRFD

3/16/22

AASHTO LRFD - Battered Face

Soil Type	Backfill Slope	Level	Level	3H:1V	Level
	Surcharge	0 psf	250 psf	0 psf	0 psf
	Seismic PGA	0g	0g	0g	0.20g
	Clay, φ = 26°	13.5 ft.	10.5 ft.	10.5 ft.	13.5 ft.
	Sand, φ = 30°	16.5 ft.	13.5 ft.	13.5 ft.	16.5 ft.
	Sand/Gravel, φ = 34°	18.0 ft.	15.0 ft.	16.5 ft.	18.0 ft.
	Crushed Stone, φ = 38°	19.5 ft.	16.5 ft.	18.0 ft.	19.5 ft.

AASHTO LRFD - Vertical Face

Soil Type	Backfill Slope	Level	Level	3H:1V	Level
	Surcharge	0 psf	250 psf	0 psf	0 psf
	Seismic PGA	0g	0g	0g	0.20g
	Clay, φ = 26°	13.5 ft.	10.5 ft.	10.5 ft.	13.5 ft.
	Sand, φ = 30°	15.0 ft.	13.5 ft.	13.5 ft.	15.0 ft.
	Sand/Gravel, φ = 34°	16.5 ft.	13.5 ft.	15.0 ft.	16.5 ft.
	Crushed Stone, φ = 38°	16.5 ft.	15.0 ft.	16.5 ft.	16.5 ft.

CHBDC LRFD - Battered Face

Soil Type	Backfill Slope	Level	Level	3H:1V	Level
	Surcharge	0 kPa	16 kPa	0 kPa	0 kPa
	Seismic PGA	0g	0g	0g	0.20g
	Clay, φ = 26°	4.1 m	2.7 m	2.7 m	4.1 m
	Sand, φ = 30°	5.0 m	3.2 m	3.7 m	4.6 m
	Sand/Gravel, φ = 34°	5.5 m	4.1 m	4.6 m	5.0 m
	Crushed Stone, φ = 38°	5.9 m	5.0 m	5.5 m	5.5 m

CHBDC LRFD - Vertical Face

Soil Type	Backfill Slope	Level	Level	3H:1V	Level
	Surcharge	0 kPa	16 kPa	0 kPa	0 kPa
	Seismic PGA	0g	0g	0g	0.20g
	Clay, φ = 26°	4.1 m	2.7 m	3.2 m	4.1 m
	Sand, φ = 30°	4.6 m	3.7 m	3.7 m	4.6 m
	Sand/Gravel, φ = 34°	5.0 m	4.1 m	4.6 m	4.6 m
	Crushed Stone, φ = 38°	5.5 m	4.6 m	5.0 m	5.0 m

The max heights listed are preliminary based on simple boundary conditions and general soil parameters, and should be confirmed or adjusted by a licensed professional engineer based on a site specific analysis.

© S T O N E S T R O N G S Y S T E M S

FENCE SLEEVE
NOT TO SCALE

42" SLEEVE FOR POST; COVER TOP. INSTALL SLEEVES WITH WALL. COORDINATE LOCATIONS WITH FENCE INSTALLER.

DISCLAIMER: These typical details are preliminary and conceptual in nature. They are provided for general information purposes only. Anyone making use of these details and related information does so at their own risk and assumes all liability for such use. Site specific design should be performed by a licensed Professional Engineer based on actual site conditions, materials, and local practices.

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PROJECT: TYPICAL DETAILS
STONE STRONG SYSTEMS

DATE: 4/18/23 | FILE: 33_64-FenceSleeve

24-62 WALL BASE
NOT TO SCALE

NOTE: BEARING CONDITIONS SHALL BE OBSERVED BY THE SITE GEOTECHNICAL ENGINEER. BASE DIMENSIONS MAY BE INCREASED TO ADDRESS DEFICIENT SOIL BEARING CONDITIONS.

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Gravity Design Tables

3/16/22

AASHTO Load Case 2 - Highway Surcharge (Battered Face)

Backslope: flat effective grade
Surcharge: 250 psf (set back 5 ft. from face)
Standard: AASHTO LRFD Bridge Design Specifications
Retained Soil: design for weakest soil within zone extending up at 1H:1V slope starting 12 in. behind heel
foundation soil either sand (φ=30°) or clay (φ=26°, c=100psf)

Cohesive Backfill
φ=26°, c=0psf, γ=125pcf

Total Wall Height (ft)	Total Wall Height (ft)					
	3.0	4.5	6.0	7.5	9.0	10.5
5th Course						
4th Course						6-28
3rd Course					6-28	24SF
2nd Course			6-28	24SF	24SF	24SF
Bottom Course	24SF	24SF	24-62	24-62	24-86	24-86

Sand Backfill
φ=30°, c=0psf, γ=125pcf

Total Wall Height (ft)	Total Wall Height (ft)					
	4.5	6.0	7.5	9.0	10.5	12.0
6th Course						
5th Course						6-28
4th Course					6-28	24SF
3rd Course			6-28	24SF	24SF	24SF
2nd Course	6-28	24SF	24SF	24SF	24SF	24-62
Bottom Course	24SF	24SF	24SF	24-62	24-86	24-86

Gravel Backfill
φ=34°, c=0psf, γ=125pcf

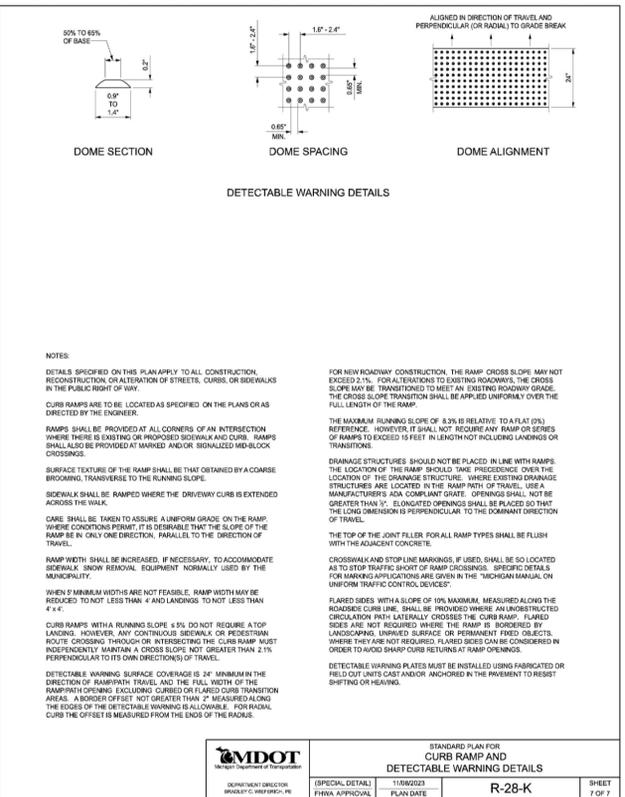
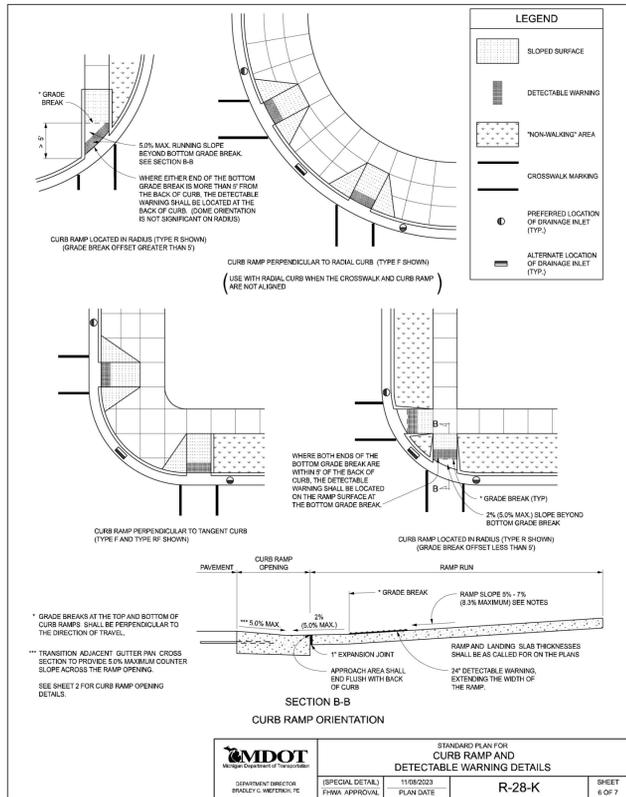
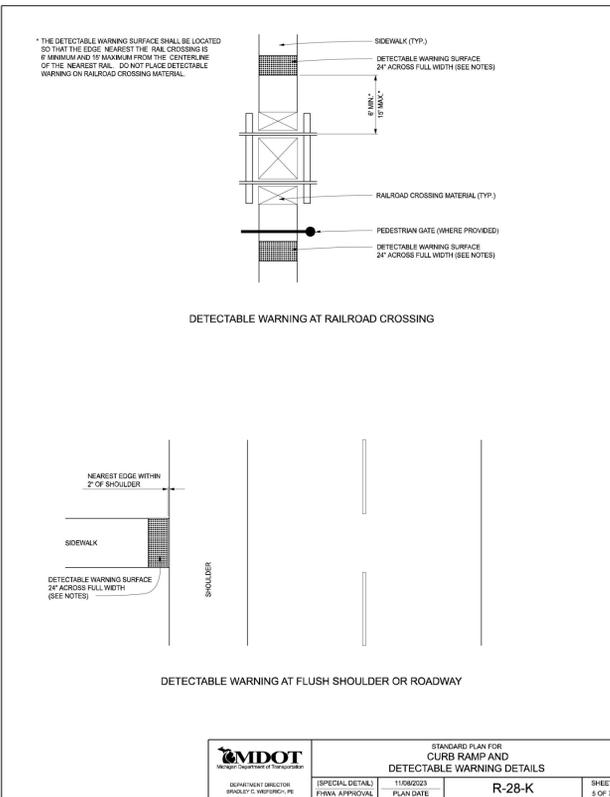
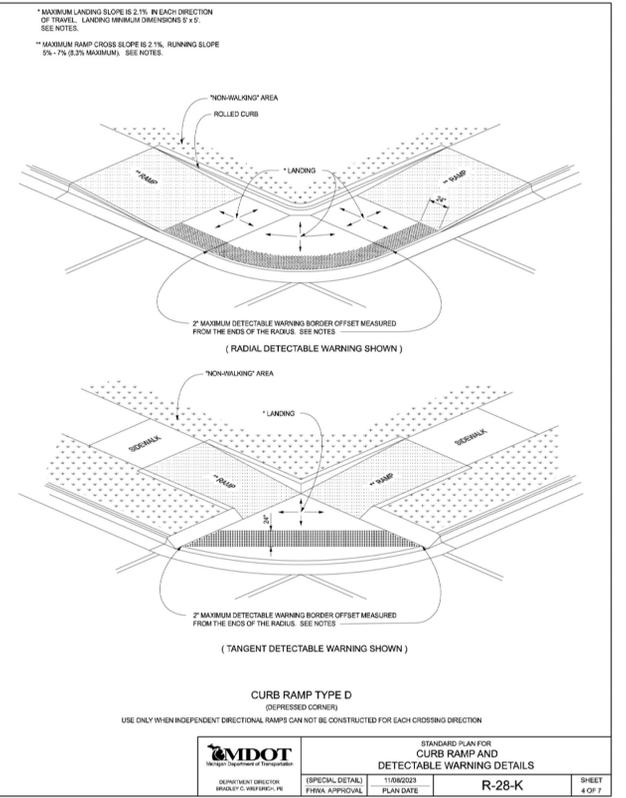
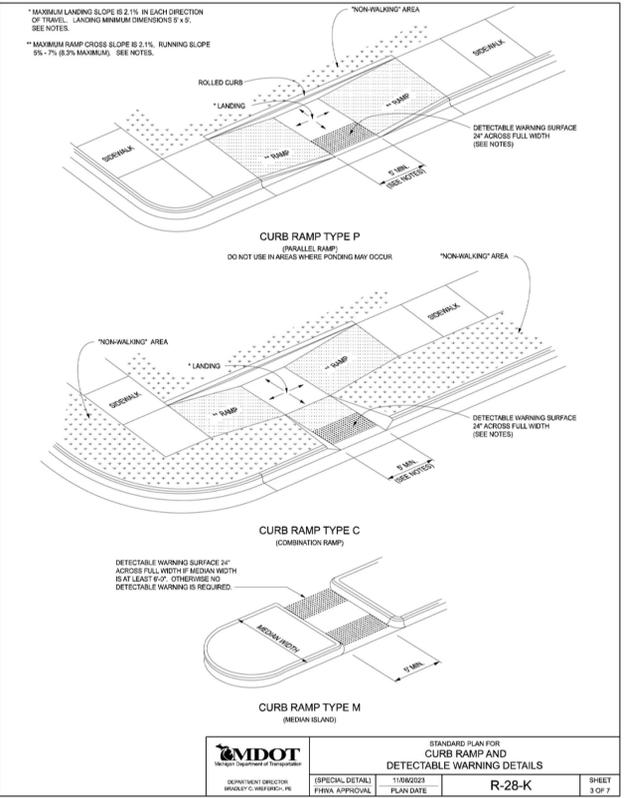
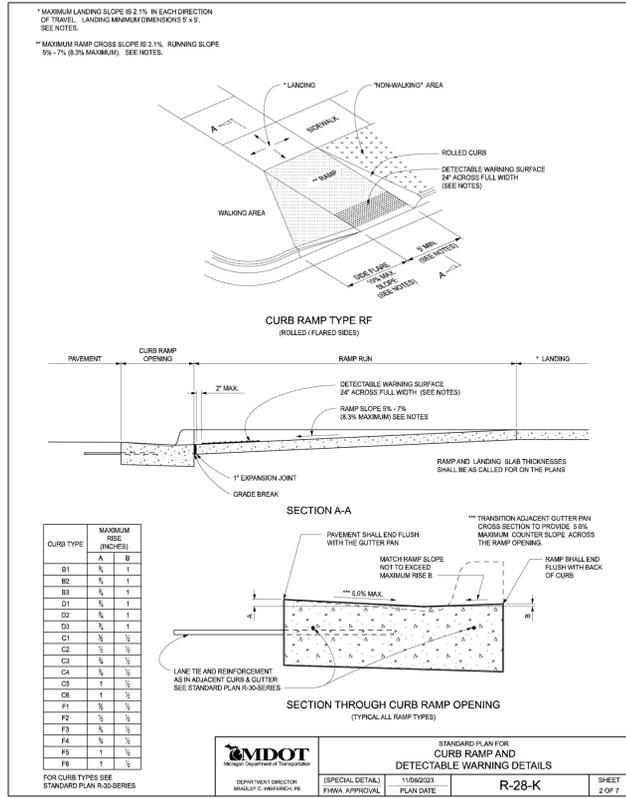
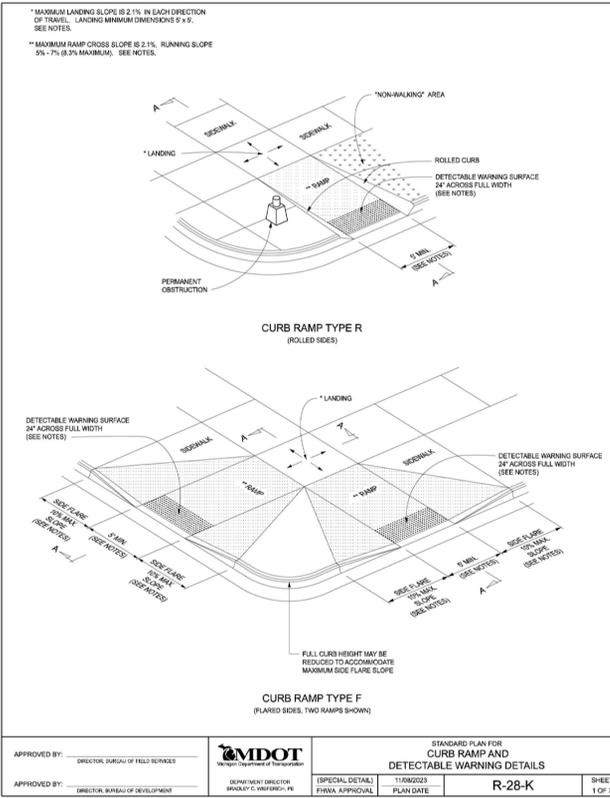
Total Wall Height (ft)	Total Wall Height (ft)						
	6.0	7.5	9.0	10.5	12.0	13.5	15.0
7th Course							
6th Course							
5th Course						6-28	24SF
4th Course					6-28	24SF	24SF
3rd Course			6-28	24SF	24SF	24SF	24-62
2nd Course	24SF	24SF	24SF	24SF	24-62	24-62	24-62
Bottom Course	24SF	24SF	24SF	24-62	24-86	24-86	24-86

Crushed Stone Backfill
φ=38°, c=0psf, γ=125pcf

Total Wall Height (ft)	Total Wall Height (ft)						
	7.5	9.0	10.5	12.0	13.5	15.0	16.5
8th Course							
7th Course							
6th Course						6-28	24SF
5th Course					6-28	24SF	24SF
4th Course				6-28	24SF	24SF	24SF
3rd Course	6-28	24SF	24SF	24SF	24SF	24SF	24SF
2nd Course	24SF	24SF	24SF	24SF	24SF	24-62	24-62
Bottom Course	24SF	24SF	24SF	24-62	24-86	24-86	24-86

Configurations shown are preliminary and conceptual, and should not be used without site specific analysis and adjustment by a licensed Professional Engineer.

24-86 units may be substituted for 24-62 units
Two 6SF units may be substituted for 24SF units
6SF units may be substituted for 6-28 units



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THE LOCATION AND UTILITIES 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 UTILITIES, DEPTHS AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION.

CLIENT:

AUBURN ANGARA OAKS, LLC

14496 N SHELTON RD
 SUITE 230
 PLYMOUTH, MI 48170
 BRUCE MICHAEL
 (248) 703-4653

MDOT R-28

AUBURN ANGARA OAKS

PART OF SEC. 32, T3N, R11E
 CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MI

DATE	DESCRIPTION
09/13/2023	PLAN SUBMITTALS/REVISIONS
01/23/2024	REVISIONS TO PLAN SUBMITTALS
03/17/2024	REVISED SITE PLAN PER CITY AND MDOT
03/28/2024	REVISED SITE PLAN PER MDOT
07/24/2024	PRELIMINARY SITE PLAN / WETLAND FLAGS
09/13/2024	REVISED SITE PLAN / WETLAND FLAGS
09/04/2024	REVISED PRELIMINARY SITE PLAN TO CITY

ORIGINAL ISSUE DATE:
 05/19/2022

PROJECT NO: 22-051

SCALE: N/A

0 1/2" 1"

FIELD: REICHERT
 DRAWN BY: MN
 DESIGN BY: KM
 CHECK BY: AP

C-11.2

NOT FOR CONSTRUCTION

GENERAL NOTES

- 1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE LOCAL MUNICIPALITY, THE LOCAL WATER AND/OR SEWER AUTHORITY, THE COUNTY DRAINAGE DEPARTMENT, MICHIGAN COMMISSIONER, MICHIGAN DEPARTMENT OF TRANSPORTATION, MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES AND ENERGY, THE STATE OF MICHIGAN, AND THE COUNTY ROAD COMMISSION WHERE APPLICABLE.
2. RULES, REGULATIONS OR LAWS OF ANY CONTROLLING GOVERNMENTAL AGENCY SHALL GOVERN, WHEN THEY ARE MORE STRINGENT THAN THE REQUIREMENTS OF THESE SPECIFICATIONS.
3. SHOULD THE CONTRACTOR ENCOUNTER A CONFLICT BETWEEN THESE PLANS AND SPECIFICATIONS OR THE REQUIREMENTS OF ANY OTHER 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 CONTRACTOR.
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 PERIODS OF CONSTRUCTION. 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 GOVERNING 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 WELLS 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 ALSO APPLY.
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 OF TRASH, STUMPS OR OTHER DEBRIS WILL NOT BE ALLOWED.
15. ALL REFERENCES TO M.D.O.T. SPECIFICATIONS REFER TO THE MOST CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
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 PERFORM 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 OTHER 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 WORKERS 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 MATERIALS 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.
26. 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.
27. 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 EARTH.
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 SITE. THESE SPECIFICATIONS SHALL BE ENFORCED.
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 ISSUED.

STORM SEWER SPECIFICATIONS

- 1. 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 AND DETAILS.
7. BACKFILL, UNLESS OTHERWISE NOTED, SHALL BE COARSE SAND, FINE GRAVEL OR SAND WITH A FINING 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.
8. 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 ELASTOMERIC 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 ASTM D-2729. JOINTS SHALL BE MODIFIED GROOVED TONGUE WITH RUBBER GASKET CONFORMING TO ASTM C-443.
9. 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-478-84T.
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 SOUND 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 M007 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 DIRECTIONS.
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-TAMPING 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 3500 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 EXPEDITE THE TRENCH.
17. 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 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 ALLOW FOR FORMS, CONSTRUCTION OF WALLS, CONNECTIONS AND FOR INSPECTION.
20. PROVIDE REQUIRED TIMBER SHEETING, BRACING AND SHORING TO PROTECT SIDES OF EXCAVATION. DO NOT BRACE SHEETING AGAINST PIPE. PROVIDE SUITABLE 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 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 ABOVE TOP OF PIPE.
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:
* DEPTH BRICK CONCRETE PRE-CAST CONCRETE
* 0' - 10' 8" 6" 6"
* 10' - 16' 12" 8" 8"
* 16' - 25' 16" 12" 12"
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%) AND 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 STRUCTURES.
35. ENDS OF HEADWALL AND END SECTIONS FOR PIPES LARGER THAN 6 INCHES, SHALL BE FITTED WITH A #4 ROUNDED MINIMUM WELDED STEEL ROD GRATING. RODS SHALL BE SPACED 6" O.C. MAXIMUM. WELD ROD AT ALL INTERSECTIONS. GRATE SHALL BE REMOVED 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. 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 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.
38. ALL CONNECTIONS TO EXISTING SEWERS SHALL BE PER MUNICIPALITY REQUIREMENTS, AND ALL COSTS INCLUDING TESTING AND/OR VIDEO OF SEWERS SHALL BE INCIDENTAL TO THE JOB.

WATER MAIN SPECIFICATIONS

- 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. 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 VERTICAL 11-1/4 BENDS PROPERLY ANCHORED.
5. 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.
6. BEFORE ANY WATER MAIN WILL BE ACCEPTED BY THE GOVERNING AGENCY, IT MUST PASS A PRESSURE TEST COMPLYING WITH THE CURRENT SPECIFICATIONS AND PROCEDURES OF THE AGENCY.
7. BEFORE ANY WATER MAIN SYSTEM WILL BE ACCEPTED BY THE GOVERNING AGENCY, THE FIRE HYDRANTS MUST BE PAINTED AS INDICATED ON THE WATER MAIN STANDARD DETAIL SHEETS.
8. TWO INCH (2") DIAMETER CORPORATION STOPS SHALL BE PROVIDED IN BOTH THE EXISTING WATER MAIN AND THE NEW WATER MAIN AT ALL NEW CONNECTIONS.
9. ALL TEES, BENDS CONNECTIONS, ETC. ARE INCIDENTAL TO THE JOB.
10. PHYSICAL CONNECTIONS SHALL NOT BE MADE BETWEEN EXISTING AND NEW WATERMANS UNTIL TESTING IS SATISFACTORILY COMPLETED.

WATER MAIN SPECIFICATIONS, CONTINUED

- 11. 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.
12. 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 1.5.
13. 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 SIEVE.
14. 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.
15. THRUST BLOCKS, IF REQUIRED BY THE MUNICIPALITY, SHALL BE MADE OF 3000 PSI CONCRETE NET MIX
16. 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"
17. OPEN NO MORE TRENCH IN ADVANCE OF PIPE LAYING THAN IS NECESSARY TO EXPEDITE THE WORK.
18. 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.
19. WHERE UNSTABLE SOIL IS ENCOUNTERED, CONTRACTOR SHALL NOT PLACE PIPE UNTIL A SOLID BED HAS BEEN PROVIDED.
20. EXCAVATION FOR STRUCTURES SHALL EXTEND A SUFFICIENT DISTANCE FROM THE WALLS AND FOOTINGS TO ALLOW FOR FORMS, CONSTRUCTION OF WALLS, CONNECTIONS AND FOR INSPECTION.
21. 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 FLAT 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.
22. GATE WELL STEPS SHALL BE BUILT INTO AND THOROUGHLY ANCHORED TO WALLS.
23. ALL PIPING ENTERING OR LEAVING GATE WELLS SHALL BE ADEQUATELY SUPPORTED BY POURED-IN-PLACE CONCRETE FILL FROM PIPE CENTER TO UNDISTURBED GROUND.
24. THE OUTSIDE SURFACES OF BRICK OR CONCRETE MASONRY PORTION OF GATE WELLS SHALL BE PLASTERED AND TROWELED SMOOTH WITH 1/2" LAYERS OF CEMENT MORTAR.
25. SET FRAMES IN FULL BED OF STIFF MORTAR OR BITUMINOUS MASTIC JOINTING COMPOUND AT FINAL ELEVATION.
26. 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 UTILIZED, ALL FITTINGS SHALL HAVE RESTRAINED JOINTS PER THE MANUFACTURER.
27. 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.
28. 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.
29. 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.
30. 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.
31. 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).
32. 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 TAMPERS.
33. 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.

SANITARY SEWER SPECIFICATIONS

- 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.
2. THE GOVERNING AGENCY WILL INSPECT THE INSTALLATION OF ALL SANITARY SEWER PIPING.
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. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO MATERIALS, EQUIPMENT AND WORK.
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 PHENOMENA.
6. 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.
7. ALL SEWERS OF 24" DIAMETER OF LESS, WHERE THE GROUND WATER LEVEL ABOVE THE TOP OF THE SEWER IS SEVEN (7) FEET OR LESS, SHALL BE SUBJECT TO AIR TESTS OR EXFILTRATION TESTS.
8. NO SANITARY SEWER INSTALLATION OR PORTION THEREOF SHALL HAVE INFILTRATION EXCEEDING 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOUR PERIOD.
9. 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.
10. ALL SEWERS OF 24" DIAMETER OF LESS, WHERE THE GROUND WATER LEVEL ABOVE THE TOP OF THE SEWER IS SEVEN (7) FEET OR LESS, SHALL BE SUBJECT TO AIR TESTS OR EXFILTRATION TESTS.

SANITARY SEWER SPECIFICATION, CONTINUED

- 11. 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.
12. SANITARY SEWER PIPING AND FITTINGS SHALL BE OF THE SIZE AND TYPE INDICATED ON THE DRAWINGS AND SHALL CONFORM TO THE REQUIREMENTS OF THE GOVERNING AGENCY.
13. 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 OR AASHTO M-199.
14. OPEN NO MORE TRENCH IN ADVANCE OF PIPE LAYING THAN IS NECESSARY TO EXPEDITE THE WORK.
15. 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.
16. PROVIDE REQUIRED TIMBER SHEETING, BRACING AND SHORING TO PROTECT SIDES OF EXCAVATION. DO NOT BRACE SHEETING AGAINST PIPE. PROVIDE SUITABLE LADDERS WHERE REQUIRED.
17. 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.
18. 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.
19. 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.
20. 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 WVE SHALL BE PER PLAN OR AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
21. SERVICE LEADS SHALL TERMINATE (WITH AN APPROVED STOPPER) PER PLANS OR AS DIRECTED BY OWNER OR OWNER'S REPRESENTATIVE.
22. 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 OF THE PIPE.
23. DOWNSPOUTS, WEEP TILE, FOOTING DRAINS, OR ANY CONDUIT, THAT CARRIES STORM OR GROUND WATER SHALL NOT BE ALLOWED TO DISCHARGE INTO A SANITARY SEWER.
24. 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 FLOW 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 TELEVISION REQUIRED BY THE LOCAL MUNICIPALITY, SHALL BE INCLUDED IN THE CONTRACT PRICE FOR THE MAIN SEWER UNLESS OTHERWISE PROVIDED IN THE PROPOSAL.
25. WHEN CONNECTIONS ARE MADE WITH SEWERS OR DRAINS CARRYING FLUIDS, SPECIAL CARE MUST BE TAKEN THAT NO PART OF THE PIPE 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.
26. 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.
27. 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.
28. 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 MAXIMUM DRY DENSITY PER ASTM D-1557.
29. 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.
30. 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 HAND TAMPERS.
31. 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.
32. 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 KORE AND SEAL CO." OR APPROVED EQUAL.
33. 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, SHALL BE SUBJECT TO AIR TESTS OR EXFILTRATION TESTS.
34. NO SANITARY SEWER INSTALLATION OR PORTION THEREOF SHALL HAVE INFILTRATION EXCEEDING 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOUR PERIOD.

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 ACRE 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.

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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 SUB-SURFACE CONDITIONS. THE CONTRACTOR IS RESPONSIBLE TO ACCOUNT 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. DETERMINING IF 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 QUANTITY 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 REGIONAL 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 SHALL SUBMIT 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. THE CONTRACTOR SHALL SUBMIT AN OUTLINE OF HIS EARTHWORK METHODS WHICH SHALL TAKE INTO ACCOUNT THE OVERALL CONSTRUCTION SCHEDULE AND 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 WILL BE ALLOWED.
- 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 THE GRADING AND EARTHWORK OPERATION SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HE WILL BE RESPONSIBLE TO THE AGENCY WHOSE PROPERTY OR DISPOSE OF THE SURPLUS WITHOUT ADDITIONAL COST TO THE OWNER.
- 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 SITE.
- MATERIALS FOR FILL OR BACKFILL REQUIRED TO GRADE THE SITE AND ACHIEVE DESIGN ELEVATIONS SHALL BE EITHER ON OR OFF-SITE SLOES WHICH ARE FREE OF ORGANIC MATTER AND DEBRIS. NO TOPSOIL SHALL BE USED AS ENGINEERED FILL.
- NO FILL MAY BE PLACED UNTIL THE EXPOSED SURFACES HAVE BEEN APPROVED BY THE GEOTECHNICAL ENGINEER. ALL FILL MATERIALS SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT.
- 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.
- ALL FILL MATERIAL SHALL BE PLACED AND COMPACTED AT THE OPTIMUM MOISTURE CONTENT OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- NO FROZEN MATERIAL SHALL BE USED AS FILL NOR WILL ANY FILL BE PLACED ON A FROZEN BASE.
- NO ROCK OR SIMILAR MATERIAL GREATER THAN 6" DIAMETER SHALL BE PLACED IN 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.
- 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 COMPACTATION DENSITIES WILL BE ALLOWED UNLESS SPECIFICALLY RECOMMENDED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE OWNER AND OWNER'S REPRESENTATIVE.

FILL AREAS	% OF MAXIMUM DRY DENSITY
FILL UNDER BUILDING (EXTENDING 5' BEYOND FOOTINGS AT A SLOPE OF 1 ON 1)	98%
FILL UNDER PAVEMENT OR SIDEWALKS	95%
FILL PLACED UNDER OR BEHIND RETAINING WALLS	95%
ALL OTHER FILL	90%

- ALL FILL MATERIAL SHALL BE PLACED AND COMPACTED IN LIFTS, THAT WILL NOT EXCEED THE DEPTH OF LIFT IN CONFORMANCE WITH THE SPECIFICATIONS. THE MAXIMUM DENSITY REQUIRED FOR THE ENTIRE DEPTH OF THE MATERIAL PLACED IN THE LIFT.
- ALL AREAS WHERE FILL HAS BEEN PLACED ON THE EXISTING SOILS HAVE BEEN DISTURBED SHALL BE SUBJECT TO COMPACTATION TESTING BY THE GEOTECHNICAL ENGINEER AND SHALL BE TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER, OWNER AND OWNER'S REPRESENTATIVE.
- 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.
- 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.
- 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 GRADES.
- THE CONTRACTOR SHALL STOCKPILE EXCAVATED MATERIAL ONLY IN DESIGNATED AREAS AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
- 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.
- NEWLY GRADED AREAS SHALL BE PROTECTED FROM THE ACTION OF THE ELEMENTS. ANY SETTLEMENT, DISPLACEMENT, PONDING OR SLIDING THAT MAY OCCUR PRIOR TO COMMENCING THE NEXT PHASE OF CONSTRUCTION SHALL BE REPAIRED, AND GRADES REESTABLISHED TO THE REQUIRED ELEVATIONS AND SLOPES.
- 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.
- 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.
- 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 EXCAVATION SOILS, REGRADE TO PROPOSED ELEVATIONS AND COMPACT SOILS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER AND OWNER'S REPRESENTATIVE.
- 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 FROM THE APPLICABLE AUTHORITY BEFORE DISCHARGING RUN-OFF WATER TO THEIR SYSTEM. SEE EROSION CONTROL NOTES FOR ADDITIONAL REQUIREMENTS.
- 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:
 - AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).
 - THE ASPHALT INSTITUTE (TAI)
 - MICHIGAN DEPARTMENT OF TRANSPORTATION/ CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION (MDOT)
 - 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 MDOT SECTION 904, GRADE CSS-1H.
- AGGREGATE SHALL CONSIST OF CRUSHED STONE, CRUSHED GRAVEL, A MIXTURE OF UNCRUSHED GRAVEL WITH EITHER CRUSHED STONE OR CRUSHED GRAVEL, OR 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 MDOT STANDARD SPECIFICATIONS, SECTION 902, 21AA. CONTRACTOR MAY USE CRUSHED HMA AGGREGATE SCREENED TO MEET THE REQUIREMENTS OF MDOT 21AA MATERIAL.
- FINE AGGREGATE SHALL BE WELL GRADED FROM COARSE TO FINE AND CONSIST OF NATURAL SAND, STONE SCREENINGS, OR A BLEND OF NATURAL SAND AND ANGLULAR 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 III MATERIAL.
- ASPHALT CEMENT SHALL COMPLY WITH THE REQUIREMENTS OF MDOT SECTION 904.
- HOT MIXED ASPHALT (HMA) SHALL COMPLY WITH MDOT SECTION 501 OF STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- BITUMINOUS LEVELING COURSE SHALL BE MDOT HMA, 13A, UNLESS OTHERWISE REQUIRED BY THE MUNICIPALITY OR ROAD AGENCY WITH JURISDICTION.
- 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 ENGINEER.
- 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.
- 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.
- 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.
- 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).
- BITUMINOUS CONCRETE PAVEMENT CONSTRUCTION METHODS SHALL CONFORM TO APPLICABLE PORTIONS OF SECTION 501 OF THE MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- THE CONTRACTOR SHALL NOT PLACE THE AGGREGATE BASE COURSE OR THE BITUMINOUS BASE COURSE PRIOR TO THE APPROVAL OF THE SUBGRADE BY THE GEOTECHNICAL ENGINEER.
- EACH LIFT AND COURSE OF BITUMINOUS CONCRETE SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER, PRIOR TO THE PLACEMENT OF A SUCCEEDING COURSE OR LIFT.
- APPLY BITUMINOUS TACK COATS ONLY WHEN TEMPERATURE HAS NOT BEEN BELOW 35 DEGREES F. FOR 12 HOURS IMMEDIATELY PRIOR TO APPLICATION. CONSTRUCTION OF BITUMINOUS CONCRETE WEARING COURSE ONLY WHEN ATMOSPHERIC TEMPERATURE IS ABOVE 40-DEGREES F AND RISING, AND PROCEEDING COURSE 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 ENGINEER.
- 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.
- 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 PAYER. 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 PAYER SHALL BE REGULATED TO ELIMINATE PULLING AND TEARING OF THE BITUMINOUS MAT, UNLESS OTHERWISE SPECIFIED. THE MIXTURE OF 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.
- 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.
- THE BITUMINOUS CONCRETE SHALL BE PLACED AT A TEMPERATURE OF NOT LESS THAN 250 NOR HIGHER THAN THE RECOMMENDED TEMPERATURE OF THE BINDER PRODUCER OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- 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 UNIFORM DISPLACEMENT, CRACKING AND SHOWING. THE SEQUENCE OF ROLLING OPERATIONS SHALL BE AT THE DISCRETION OF THE CONTRACTOR.
- 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 REVERSE OPERATION OF THE ROLLER, OR FROM ANY OTHER CAUSE, SHALL BE CORRECTED AT ONCE.
- 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 FILL DENSITY IS OBTAINED.
- 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.
- 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.
- TO PREVENT ADHESION OF THE BITUMINOUS CONCRETE TO THE ROLLER, THE WHEELS SHALL BE KEPT PROPERLY MOISTENED, BUT EXCESSIVE WATER WILL NOT BE PERMITTED.
- IN AREAS NOT ACCESSIBLE TO THE ROLLER, THE BITUMINOUS CONCRETE SHALL BE THOROUGHLY COMPACTED WITH HOT HAND TAMPERS.
- 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.
- THE CONTRACTOR SHALL PROVIDE AT LEAST TWO ROLLERS FOR EACH PAYER OPERATING ON THE WORK. THE CONTRACTOR SHALL USE ADDITIONAL ROLLERS AS REQUIRED TO OBTAIN THE SPECIFIED PAVEMENT DENSITY.

BITUMINOUS PAVING SPECIFICATIONS, CONTINUED

- THE CONTRACTOR SHALL CAREFULLY MAKE JOINTS BETWEEN OLD AND NEW PAVEMENTS, OR BETWEEN SUCCESSIVE DAYS' WORK, TO ENSURE A CONTINUOUS BOND BETWEEN ADJOINING WORK. CONTRACT 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 MAKING THE JOINT.
- THE CONTRACTOR SHALL TEST THE FINISHED SURFACE OF EACH BITUMINOUS CONCRETE COURSE FOR SMOOTHNESS, USING A 10 FOOT STRAIGHTEDGE APPLIED PARALLEL WITH AND AT RIGHT ANGLES TO CENTERLINE OF PAVED AREA. SURFACE SHALL NOT BE ACCEPTABLE IF EXCEEDING THE FOLLOWING TOLERANCES FOR SMOOTHNESS.
 - LEVELING COURSE SURFACE: 1/4 INCH, PLUS OR MINUS 1/4 INCH.
 - SURFACE COURSE: 1/4 INCH
- 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.
- 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.
- THE AGGREGATE BASE MUST EXTEND A MINIMUM OF 1' BEHIND THE BACK-OF-CURB OR BEYOND EDGE OF PAVEMENT WHEN NO CURB IS PROPOSED.
- 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.
- REFERENCE SPECIFICATIONS WHERE APPLICABLE TO WORK UNDER THIS SECTION ARE REFERRED BY ABBREVIATION AS FOLLOWS:
 - AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).
 - AMERICAN CONCRETE INSTITUTE (ACI)
 - MICHIGAN DEPARTMENT OF TRANSPORTATION/ CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION (MDOT)
 - AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
- THE FINE AGGREGATE SHALL MEET ALL REQUIREMENTS OF SECTION 902 OF MDOT SPECIFICATION FOR NO. 2MS 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.
- THE CONTRACTOR SHALL SUBMIT TO THE GEOTECHNICAL ENGINEER, JOB MIX-FORMULAS FOR EACH REQUIRED CEMENT-AGGREGATE MIXTURE. MIX DESIGNS SHALL BE WITHIN ALLOWABLE TOLERANCES AS SPECIFIED FOR THE PARTICULAR APPLICATION.
- CONCRETE MIX SHALL BE AIR-ENTRAINED AND PROPORTIONED TO PROVIDE THE FOLLOWING:
 - COMPRESSIVE STRENGTH AT 28 DAYS: 3500 PSI MIN. OR AS INDICATED ON PLANS.
 - TOTAL AIR CONTENT BY VOLUME: 5% TO 8%.
 - SLUMP 3 INCH MAXIMUM, OR AS INDICATED ON PLANS.
- THE CONTRACTOR SHALL AT HIS EXPENSE FURNISH SAMPLES OF FRESH CONCRETE AND PROVIDE SAFE AND SATISFACTORY FACILITIES FOR OBTAINING THE SAMPLES.
- CONSTRUCT CONCRETE CURBING ONLY WHEN GROUND TEMPERATURE IS ABOVE 35 DEGREES F. AND BASE IS DRY.
- ALL CEMENT USED IN CURB CONSTRUCTION SHALL BE PORTLAND CEMENT, TYPE I OR IA ASTM C-150.
- WATER USED IN CONCRETE SHALL MEET THE REQUIREMENTS OF MDOT SECTION 911.
- AIR ENTRAINING ADMIXTURE SHALL BE SELECTED FROM THE MDOT QUALIFIED PRODUCTS LIST.
- ALL READY-MIXED CONCRETE SUPPLIERS MUST BE APPROVED BY THE OWNER AND MEET THE CURRENT REQUIREMENTS OF THE NATIONAL READY MIX CONCRETE ASSOCIATION (NRMA). 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.
- 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.
- 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.
- 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.
- READY-MIXED CONCRETE SHALL BE MIXED AND DELIVERED TO THE POINT OF DISCHARGE AT THE JOB BY MEANS OF A READY MIX CONCRETE TRUCK.
- 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 WATER BE ADDED TO THE BATCH AFTER IT HAS EXCEEDED NOR SHALL THE SLUMP EXCEED THE MAXIMUM SPECIFIED.
- 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.
- 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.
- 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.
- 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.
- CONTRACTOR JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF THE SIDEWALK OR SIDEWALK AND PAVEMENT AND PERPENDICULAR TO THE SURFACE. 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.
- 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 PLANS.

CONCRETE CURB, SIDEWALK AND PAVEMENT SPECIFICATIONS, CONTINUED

- BAR SUPPORTS SHALL CONFORM TO THE BAR SUPPORT SPECIFICATIONS CONTAINED IN CONCRETE REINFORCING STEEL INSTITUTE'S (CRS) "MANUAL OF STANDARD PRACTICE." PROVIDE CHAIRS, SPACERS AND OTHER DEVICES SUITABLE FOR PROPER SPACING SUPPORTING AND FASTENING REINFORCING BARS.
- WHEN FORMS ARE USED AND THE CURB RADIUS IS LESS THAN 200 FEET, 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.
- ALL NEW CURB SHALL BE PLACED ONLY ON A PREPARED SUBGRADE, SMOOTH AND LEVELED TO THE GRADES ESTABLISHED BY THE ENGINEER.
- 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 THE FORMS TO PREVENT LEAKAGE OF MORTAR. BRACING WITH EARTH WILL NOT BE PERMITTED.
- COAT SURFACES OF FORMS TO BE IN CONCRETE WITH A LIGHT CLEAR PARAFFIN OIL OR PARTING COMPOUND WHICH WILL NOT STAIN THE CONCRETE.
- THE INTERIOR SURFACES OF CONCRETE CONVEYING EQUIPMENT SHALL BE MAINTAINED FREE OF HARDENED CONCRETE, DEBRIS, WATER, SNOW, ICE AND OTHER DELETERIOUS MATERIALS.
- CURBING MAY BE CONSTRUCTED EITHER BY USE OF FORMS OR BY A MECHANICAL CURB AND GUTTER PAYER, PROVIDED THE REQUIRED FINISH, AND CROSS-SECTION, ARE OBTAINED AND THE ANGULAR GRAINS OF QUARTZ AND MEET THE REQUIREMENTS OF MDOT STANDARD SPECIFICATIONS, SECTION 902 FOR CLASS II OR CLASS III GRANULAR MATERIAL. CONTRACTOR SHALL BE SPADED OR VIBRATED SUFFICIENTLY TO ENSURE SATISFACTORY CONSOLIDATION.
- 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.
- 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.
- 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 BORDERS.
- ISOLATION JOINTS SHALL BE PLACED IN CURBING AT TANGENT POINTS IN CURB RETURNS AT INTERSECTIONS. AT BOTH SIDES OF STRUCTURES LOCATED IN THE CURB AND KINGS IN REINFORCING BARS SHALL BE CORRECTED BEFORE PLACING. 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 AT THE END OF EACH DAYS POUR AND WHEN ABUTTING PREVIOUSLY POURED CURB.
- THE CURING COMPOUND SHALL BE A WHITE PARAFIN BASE COMPOUND SELECTED FROM MDOT'S QUALIFIED PRODUCTS LIST APPLIED AT 200 SQ/FT/GAL.
- ALL CONTRACTION JOINTS IN CONCRETE CURB SECTIONS SHALL BE SEALED WITH EITHER HOT APPLIED JOINT SEALER OR COLD APPLIED JOINT SEALER.
- SLIGHTLY UNDERFILL JOINT GROOVE WITH JOINT SEALER TO PREVENT EXTRUSION OF THE SEALER. REMOVE EXCESS JOINT SEALER MATERIALS AS SOON AFTER SEALING AS POSSIBLE.
- 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 DEGREES F. AND IN A MOST CONDITION CONTINUOUSLY FOR THE PERIOD OF CURING. OR A COMBINATION OF THESE AS REQUIRED TO MAINTAIN THE TEMPERATURE OF THE CONCRETE DURING CURING SHALL BE AS UNIFORM AS POSSIBLE AND SHALL NOT EXCEED 5 DEGREES F. IN ANY ONE HOUR, NOR 50 DEGREES F. IN ANY 24 HOUR PERIOD.
- COLD WEATHER PROTECTION: WHEN THE TEMPERATURE OF THE ATMOSPHERE IS 40-DEGREES F. AND BELOW, THE CONCRETE SHALL BE PROTECTED BY HEATING, INSULATION, OR A COMBINATION OF THESE AS REQUIRED TO MAINTAIN THE TEMPERATURE OF THE CONCRETE AT OR ABOVE 50-DEGREES F. AND IN A MOST CONDITION CONTINUOUSLY FOR THE CONCRETE CURING PERIOD. COLD WEATHER PROTECTION SHALL MEET THE REQUIREMENTS OF ACI 308R "HOT WEATHER CONCRETING".
- 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 THESE AS REQUIRED TO MAINTAIN THE TEMPERATURE OF THE CONCRETE BELOW 90-DEGREE F. AND IN A MOST CONDITION CONTINUOUSLY FOR THE CONCRETE CURING PERIOD. "HOT WEATHER CONCRETING" SHALL MEET THE REQUIREMENTS OF ACI 308R "HOT WEATHER CONCRETING".
- 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.
- 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.
- ALL CEMENT USED IN SIDEWALK CONSTRUCTION SHALL BE PORTLAND CEMENT, TYPE I OR IA ASTM C-150.
- ALL NEW WALKS AND CONCRETE PAVEMENTS SHALL BE PLACED ONLY ON A PREPARED SUBGRADE, SMOOTHED AND LEVELED TO THE GRADES ESTABLISHED BY THE ENGINEER. IN AREAS WHERE THE SUBGRADE IS TO BE EXCAVATED 2-INCHES BELOW THE SIDEWALK BASE AND FILLED WITH APPROVED SAND MEETING MDOT CLASS II, SAND DESIGNATION.
- CONSTRUCT CONCRETE SURFACE COURSE ONLY WHEN GROUND TEMPERATURE IS ABOVE 35 DEGREES F. AND BASE IS DRY.
- SIDEWALKS SHALL PITCH TOWARD THE STREET OR AWAY FROM BUILDINGS WITH A MINIMUM 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 TRANSITIONS SHALL BE ACCOMPLISHED IN LENGTHS OF 10 FEET OR LESS.
- 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.
- 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 LENGTH. 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.
- 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.
- 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.
- CONTRACTION JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF THE SIDEWALK OR SIDEWALK AND PAVEMENT AND PERPENDICULAR TO THE SURFACE. 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.
- 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 PLANS.

CONCRETE CURB, SIDEWALK AND PAVEMENT SPECIFICATIONS, CONTINUED

- 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.
- ISOLATION JOINTS SHALL BE PLACED AT THE FOLLOWING LOCATION FOR SIDEWALKS AND CONCRETE PAVEMENTS:
 - AT THE BACK OF THE CURB AND FRONT EDGE OF THE SIDEWALKS AND PAVEMENT SLABS ADJACENT TO EACH DRIVEWAY APPROACH AND SERVICE WALK.
 - AT INTERVALS NOT TO EXCEED 50- FEET IN ALL PUBLIC SIDEWALKS.
 - AT THE BACK OF THE CURB WHERE THE RAMPS EXTEND FROM THE KEY FLAG TO THE PAVEMENT.
 - 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.
 - AT ANY PLACE WHERE A SIDEWALK OR CONCRETE PAVEMENT ABUTS A BUILDING OR FIXED STRUCTURE.
 - AT ANY OTHER LOCATIONS INDICATED ON THE PLAN.
- CONTRACTION JOINTS IN THE CONCRETE PAVEMENT WILL BE AS FOLLOWS:
 - TRANSVERSE JOINTS SHALL BE AT MAXIMUM 10-FOOT INTERVALS OR AS SHOWN ON PLANS AND DETAILS.
 - LONGITUDINAL JOINTS SHALL BE AT MAXIMUM 12-FOOT INTERVALS OR AS SHOWN ON PLANS AND DETAILS.
- PRIOR TO APPLYING JOINT SEALER, CLEAN JOINT GROOVE OF FOREIGN MATTER AND LOOSE PARTICLES, AND DRY SURFACE.

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.
- 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.
- THE PAINT SHALL MEET THE REQUIREMENTS OF FEDERAL SPECIFICATION TT-P-1150C(3), WITH OR WITHOUT REFLECTORIZED BEADS AS REQUIRED ON THE PLANS.
- COLOR SHALL BE AS SPECIFIED ON THE PLANS OR AS FOLLOWS:
 - TRAFFIC LANE STRIPING SHALL BE WHITE OR YELLOW REFLECTORIZED, AS SHOWN ON THE PLANS.
 - TRAFFIC MARKING AND CURB FACES SHALL BE WHITE UNLESS NOTED OTHERWISE.
 - PARKING LOT STRIPING SHALL BE WHITE, UNLESS NOTED OTHERWISE.
 - HANDICAP STALL STRIPING MEETING CURRENT ADA REQUIREMENTS SHALL BE BLUE UNLESS NOTED OTHERWISE.
- THE PAINTING SHALL BE PERFORMED ONLY WHEN THE EXISTING SURFACE IS DRY AND CLEAN, AND THE AMBIENT TEMPERATURE IS ABOVE 40-DEGREE F. AND WHEN THE WEATHER IS NOT EXCESSIVELY WINDY, DUSTY OR FOGGY AND WHEN RAIN IS NOT FORECASTED FOR AT LEAST 2 HOURS AFTER PAINT IS APPLIED.
- 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 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 FOR ATTACHMENT TO THE MECHANICAL MARKER AND SUITABLE FOR DISPENSING THE REQUIRED QUANTITY OF REFLECTIVE BEADS.
- 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.
- 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 RUIN OR WEAKEN 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 EQUIV. SOLUTION. AFTER SCRUBBING, THE SOLUTION SHALL BE RINSED OFF AND THE SURFACE DRIED PRIOR TO PAINTING.
- EXISTING MARKINGS OR STRIPES WHICH ARE TO BE ABANDONED OR REMOVED SHALL BE OBLITERATED OR OBTURED BY THE BEST METHODS SUITED FOR THE PURPOSE AND TO THE SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE.
- 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 PROCEED WITH THE STRIPING. THE CONTRACTOR IS TO INSURE THAT ALL SUBSEQUENT STRIPING MEETS THE QUALITY OF THE APPROVED SAMPLE APPLICATION.
- ON THOSE SECTIONS OF PAVEMENTS WHERE NO PREVIOUSLY APPLIED FIGURES, MARKINGS, OR STRIPES ARE AVAILABLE TO SERVE AS A GUIDE, SUITABLE LAYOUTS AND LOCAL OF PROPOSED STRIPING SHALL BE SPOTTED IN ADVANCE OF THE PAINT APPLICATION. CONTROL POINTS SHALL BE SPACED AT SUCH INTERVALS AS WILL ENSURE ACCURATE LOCATION OF ALL MARKINGS.
- THE CONTRACTOR SHALL PROVIDE AN EXPERIENCED TECHNICIAN TO SUPERVISE THE LOCATION ALIGNMENT, LAYOUT, DIMENSIONS AND APPLICATION OF THE PAINT.
- 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 REPRESENTATIVE.
- THE CURB SHALL BE MIXED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS BEFORE APPLICATION OF THE PAINT. THE PAINT SHALL BE 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 APPLIED.
- A MINIMUM OF ONE (1) WEEK SHALL ELAPSE BETWEEN APPLICATION OF THE BITUMINOUS SEAL COAT, SLURRY SEAL OR THE PLACEMENT OF THE BITUMINOUS SURFACE COURSE AND THE MARKING OF THE PAVEMENT. THE PAINT SHALL NOT BE APPLIED UNTIL THE SURFACE IS FREE FROM DISCOLORATION 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.
- 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 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 WORKMANLIKE MANNER.
- 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 NOT BROOMED SHALL PRODUCE AN AVERAGE WET FILM THICKNESS OF 0.015-INCHES.
- 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 BRUSH THE SUITABLE WARNING SIGNS, FLAGS, OR BARRICADES. PROTECTIVE SCREENS OR COVERINGS AS REQUIRED. ALL SURFACES SHALL BE PROTECTED FROM DISFIGURATION BY SPATTER, SPLASHES, SPILLAGE, DRIPP

Issued For:

11.15.2022	Site Plan Review
04.25.2023	Revision per City Comments
08.22.2023	Revision per City Comments
01.10.2024	Revisions
01.18.2024	Revisions
03.12.2024	Revisions
05.22.2024	Revisions

Project:
AUBURN ANGARA OAKS
West Auburn Road
Rochester Hills, Michigan

Project Sponsor:
Three Oaks Communities, LLC
P.O. Box 8307
Ann Arbor, MI 48107

Sheet Name:
Tree Removal and Preservation Plan North

Seal:



Drawn: JG
Checked: JG
Date: 10.2022
Scale: 1" = 30'-0"

Project Number:
22.025
Sheet Number:
L-1



TREE PROTECTION NOTE

No person may conduct any construction or development activity within the drip line of any regulated tree not approved for removal, including but not limited to land clearing, grubbing, trenching, grading, or filling, nor shall any person place solvents, building material, construction equipment, soil deposits, or other harmful materials within the drip line unless authorized by the parks and natural resources department.

During construction or development activity, persons shall not attach any device or wire to any regulated tree not approved for removal.

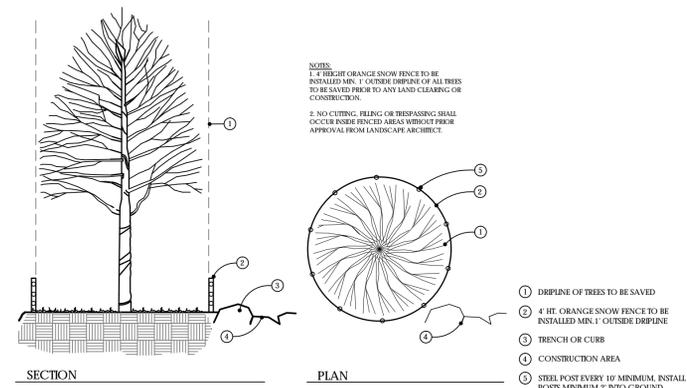
Replacement and relocated trees must be staked, fertilized, and mulched and shall be guaranteed by the tree removal permit holder to exhibit a normal growth cycle for at least one year following planting.

Any plant material that is designated to be maintained that dies or is damaged during or as a result of construction shall be replaced in kind with like species and sizes.

Tree Mitigation Calculations

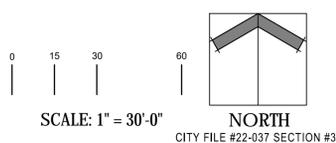
Regulated Trees Surveyed	432
Tree Exemptions	78 (building envelop (37), poor / dead (41))
Remaining Regulated Trees	354 (432-78)
Trees Required to be Saved	141 (354 x 40%)
Regulated Trees Saved	145
Percentage of Trees Saved	40.9% (145/354)
Regulated Trees Removed	246
Regulated Trees Required	246 (391-145)
Specimen Trees Removed	33 (1,197')
Specimen Trees Saved	52
Specimen Trees Credits	52 (1 - 2" tree credit per saved tree)
Specimen Trees Required	248 ((1,197' * 50% = 599' / 2 = 299 2" trees - 52 credits)
Regulated Replacements Required	246
Regulated Replacements Provided	129
Specimen Replacements Required	495'
Specimen Replacements Provided	318' (106 @ 3' - (89) 3' Deciduous, (17) 12" Evergreen)
Trees Paid Into City Tree Fund	206

*SEE SHEET L-3 FOR TREE LIST



SECTION
PLAN
TREE PROTECTION
NOT TO SCALE

NOT FOR CONSTRUCTION



MATCH LINE - SEE SHEET L-2

MATCH LINE - SEE SHEET L-1



Issued For:

- 11.15.2022 Site Plan Review
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- 08.22.2023 Revision per City Comments
- 01.10.2024 Revisions
- 01.18.2024 Revisions
- 03.12.2024 Revisions
- 05.22.2024 Revisions

Project:

AUBURN ANGARA OAKS
West Auburn Road
Rochester Hills, Michigan

Project Sponsor:

Three Oaks Communities, LLC
P.O. Box 8307
Ann Arbor, MI 48107

Sheet Name:

Tree Removal and Preservation Plan South

Seal:



Drawn: JG
Checked: JG
Date: 10.2022
Scale: 1" = 30'-0"

Project Number:

22.025

Sheet Number:

L-2

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TREE TO BE SAVED, TYP.
TREE PROTECTION FENCING, TYP.
25' NATURAL FEATURE SETBACK

EXISTING WETLAND
SEE CIVIL FOR IMPACTS

25' NATURAL FEATURE SETBACK

TREE TO BE REMOVED, TYP.

DETENTION BASIN
See Sheet L-5

25' NATURAL FEATURE SETBACK

EXISTING WETLAND
SEE CIVIL FOR IMPACTS

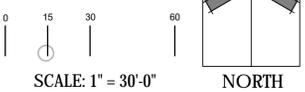
TREE TO BE REMOVED, TYP.

TREE PROTECTION FENCING, TYP.

TREE TO BE SAVED, TYP.

25' NATURAL FEATURE SETBACK AT FENCE LINE

NOT FOR CONSTRUCTION



PVT. ESMT. FOR STORM WATER SEDIMENTATION & DETENTION

TREE PROTECTION FENCING

TREE TO BE REMOVED, TYP.

CITY FILE #22-037 SECTION #32



11.15.2022	Site Plan Review
04.25.2023	Revision per City Comments
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01.10.2024	Revisions
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AUBURN ANGARA OAKS
West Aubum Road
Rochester Hills, Michigan

Three Oaks Communities, LLC
P.O. Box 8307
Ann Arbor, MI 48107

Tree List

Drawn: JG
Checked: JG
Date: 10.2022
Scale: No Scale

22.025

L-3

Tag No.	DBH (in.)	Common Name	Botanical Name	Condition	Specimen	Remove	Exempt	Tag No.	DBH (in.)	Common Name	Botanical Name	Condition	Specimen	Remove	Exempt	Tag No.	DBH (in.)	Common Name	Botanical Name	Condition	Specimen	Remove	Exempt	Tag No.	DBH (in.)	Common Name	Botanical Name	Condition	Specimen	Remove	Exempt
617	8	Norway Maple	<i>Acer platanoides</i>	Good		X		731	DEAD							960	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1106	46	Cottonwood	<i>Populus deltoides</i>	Good		X	
618	11	Norway Maple	<i>Acer platanoides</i>	Good		X		732	9	Black Cherry	<i>Prunus serotina</i>	Good		X		961	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1107	12	Red Maple	<i>Acer rubrum</i>	Good		X	
619	10	Norway Maple	<i>Acer platanoides</i>	Good		X		733	7	Black Cherry	<i>Prunus serotina</i>	Good		X		962	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1108	10	Cottonwood	<i>Populus deltoides</i>	Good		X	
620	15	Norway Maple	<i>Acer platanoides</i>	Good		X		734	9	Black Cherry	<i>Prunus serotina</i>	Poor		X		963	10,11	Black Cherry	<i>Prunus serotina</i>	Good		X		1109	24	Cottonwood	<i>Populus deltoides</i>	Good		X	
621	7	Norway Maple	<i>Acer platanoides</i>	Good		X		735	13	Buckhorn	<i>Rhamnus cathartica</i>	Good		X		964	14	Black Cherry	<i>Prunus serotina</i>	Good		X		1110	22	Cottonwood	<i>Populus deltoides</i>	Good		X	
622	10	Boxelder	<i>Acer negundo</i>	Poor		X	X	736	9	Black Cherry	<i>Prunus serotina</i>	Good		X		965	7	Black Cherry	<i>Prunus serotina</i>	Good		X		1111	19	Cottonwood	<i>Populus deltoides</i>	Good		X	
623	26	Boxelder	<i>Acer negundo</i>	Poor	X	X	X	737	18	Silver Maple	<i>Acer saccharinum</i>	Good		X		966	17	Black Cherry	<i>Prunus serotina</i>	Good		X		1112	21	Cottonwood	<i>Populus deltoides</i>	Good		X	
624	18	Norway Maple	<i>Acer platanoides</i>	Good		X		738	33	Black Cherry	<i>Prunus serotina</i>	Good	X	X		967	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1113	22	Cottonwood	<i>Populus deltoides</i>	Good		X	
625	74	Silver Maple	<i>Acer saccharinum</i>	Poor	X	X	X	739	9	Boxelder	<i>Acer negundo</i>	Good		X		968	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1114	58	Cottonwood	<i>Populus deltoides</i>	Good		X	
626	56	Silver Maple	<i>Acer saccharinum</i>	Fair	X	X		740	14	Boxelder	<i>Acer negundo</i>	Poor		X		969	19	Black Cherry	<i>Prunus serotina</i>	Good		X		1115	8	Elm	<i>Ulmus americana</i>	Good		X	
627	21	Norway Maple	<i>Acer platanoides</i>	Good		X		741	8	Boxelder	<i>Acer negundo</i>	Poor		X		970	18	Black Cherry	<i>Prunus serotina</i>	Good		X		1116	9	Black Cherry	<i>Prunus serotina</i>	Good		X	
628	88	Elm	<i>Ulmus americana</i>	Fair	X	X	X	742	9	Boxelder	<i>Acer negundo</i>	Poor		X	X	971	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1117	10	Black Cherry	<i>Prunus serotina</i>	Good		X	
629	82	Silver Maple	<i>Acer saccharinum</i>	Fair	X	X		743	9	Red Maple	<i>Acer rubrum</i>	Good		X		972	18	Black Cherry	<i>Prunus serotina</i>	Good		X		1118	DEAD						
630	66	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		744	9	Black Cherry	<i>Prunus serotina</i>	Good		X		973	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1119	8	Red Cedar	<i>Juniperus virginiana</i>	Good		X	
631	48	Elm	<i>Ulmus americana</i>	Poor	X	X	X	745	DEAD						974	7	Black Cherry	<i>Prunus serotina</i>	Good		X	X	1120	9	Elm	<i>Ulmus americana</i>	Good		X		
632	68	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		746	14	Norway Maple	<i>Acer platanoides</i>	Good		X		975	8	Black Walnut	<i>Juglans nigra</i>	Good		X		1121	10	Elm	<i>Ulmus americana</i>	Good		X	
633	DEAD							747	18	Black Cherry	<i>Prunus serotina</i>	Poor	X	X	X	976	7	Black Cherry	<i>Prunus serotina</i>	Good		X		1122	DEAD						
634	54	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		748	12	Black Cherry	<i>Prunus serotina</i>	Good		X		977	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1123	11	Elm	<i>Ulmus americana</i>	Good		X	
635	42	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		749	13	Black Cherry	<i>Prunus serotina</i>	Good		X		978	14	Black Cherry	<i>Prunus serotina</i>	Good		X		1124	10	Elm	<i>Ulmus americana</i>	Good		X	
636	12	Norway Maple	<i>Acer platanoides</i>	Poor		X		750	10	Black Cherry	<i>Prunus serotina</i>	Good		X		979	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1125	9	Red Maple	<i>Acer rubrum</i>	Good		X	
637	12	Norway Maple	<i>Acer platanoides</i>	Good		X		751	16	Black Cherry	<i>Prunus serotina</i>	Good		X		980	21	Black Cherry	<i>Prunus serotina</i>	Good		X		1126	8,4	Red Maple	<i>Acer rubrum</i>	Good		X	
638	84	Silver Maple	<i>Acer saccharinum</i>	Fair	X	X		752	8	Boxelder	<i>Acer negundo</i>	Poor		X	X	981	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1127	19	Red Maple	<i>Acer rubrum</i>	Good		X	
639	60	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		753	9	Black Cherry	<i>Prunus serotina</i>	Good		X		982	17	Black Cherry	<i>Prunus serotina</i>	Good		X		1128	15	Red Maple	<i>Acer rubrum</i>	Good		X	
640	108	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		754	7	Red Maple	<i>Acer rubrum</i>	Good		X		983	8	Black Cherry	<i>Prunus serotina</i>	Good		X		1129	8	Cottonwood	<i>Populus deltoides</i>	Good		X	
641	10	Blue Spruce	<i>Picea pungens</i>	Good		X		755	7	Black Cherry	<i>Prunus serotina</i>	Good		X		984	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1130	10	Cottonwood	<i>Populus deltoides</i>	Good		X	
642	8	Blue Spruce	<i>Picea pungens</i>	Fair		X		756	9,7	Silver Maple	<i>Acer saccharinum</i>	Good		X		985	7	Black Cherry	<i>Prunus serotina</i>	Good		X		1131	9	Black Cherry	<i>Prunus serotina</i>	Good		X	
643	15	Scotch Pine	<i>Pinus sylvestris</i>	Good		X		757	22	Black Cherry	<i>Prunus serotina</i>	Poor	X	X	X	986	14	Black Cherry	<i>Prunus serotina</i>	Good		X		1132	8	Elm	<i>Ulmus americana</i>	Good		X	
644	7	Scotch Pine	<i>Pinus sylvestris</i>	Good		X		758	8	Black Cherry	<i>Prunus serotina</i>	Poor		X	X	987	8	Black Cherry	<i>Prunus serotina</i>	Good		X		1133	DFAD						
645	12	Red Oak	<i>Quercus rubra</i>	Good		X		759	14	Black Cherry	<i>Prunus serotina</i>	Poor		X	X	988	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1134	5	Elm	<i>Ulmus americana</i>	Good		X	X
646	38	Elm	<i>Ulmus americana</i>	Poor	X	X		760	19	Silver Maple	<i>Acer saccharinum</i>	Good		X		989	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1135	8	Black Cherry	<i>Prunus serotina</i>	Good		X	
647	9,9,10,10	Apple	<i>Malus sp.</i>	Good		X		761	7	Elm	<i>Ulmus americana</i>	Good		X		990	16	Black Cherry	<i>Prunus serotina</i>	Good		X		1136	16	Elm	<i>Ulmus americana</i>	Good		X	
648	30	Silver Maple	<i>Acer saccharinum</i>	Poor	X	X	X	762	26	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		991	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1137	16	Elm	<i>Ulmus americana</i>	Good		X	
649	6	Silver Maple	<i>Acer saccharinum</i>	Good		X		763	8	Elm	<i>Ulmus americana</i>	Good		X		992	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1138	10	Elm	<i>Ulmus americana</i>	Poor		X	
650	16	Silver Maple	<i>Acer saccharinum</i>	Good		X		764	33	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		993	DFAD							1139	26	Silver Maple	<i>Acer saccharinum</i>	Good		X	
651	7,6	Silver Maple	<i>Acer saccharinum</i>	Good		X		765	6	Elm	<i>Ulmus americana</i>	Good		X		994	28	Black Cherry	<i>Prunus serotina</i>	Good		X	X	1140	20	Silver Maple	<i>Acer saccharinum</i>	Good		X	
652	6,12,12	Silver Maple	<i>Acer saccharinum</i>	Good		X		766	32	Red Maple	<i>Acer rubrum</i>	Good	X	X		995	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1141	21	Silver Maple	<i>Acer saccharinum</i>	Good		X	
653	7	Norway Maple	<i>Acer platanoides</i>	Poor		X	X	767	11	Silver Maple	<i>Acer saccharinum</i>	Good		X		996	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1142	20	Silver Maple	<i>Acer saccharinum</i>	Good		X	
654	9	Elm	<i>Ulmus americana</i>	Good		X		768	18	Black Cherry	<i>Prunus serotina</i>	Good	X	X		997	12	Black Cherry	<i>Prunus serotina</i>	Good		X		1143	14	Silver Maple	<i>Acer saccharinum</i>	Good		X	
655	9	Elm	<i>Ulmus americana</i>	Poor		X	X	769	9	Silver Maple	<i>Acer saccharinum</i>	Good		X		998	10	Black Cherry	<i>Prunus serotina</i>	Good		X		1144	14	Silver Maple	<i>Acer saccharinum</i>	Good		X	
656	22,15,15,20	Silver Maple	<i>Acer saccharinum</i>	Poor	X	X	X	770	13	Silver Maple	<i>Acer saccharinum</i>	Good		X		999	24	Cottonwood	<i>Populus deltoides</i>	Good		X		1145	7	Black Cherry	<i>Prunus serotina</i>	Fair		X	
657	23,18	Silver Maple	<i>Acer saccharinum</i>	Good		X		771	14	Black Cherry	<i>Prunus serotina</i>	Good		X		1000	11	Black Cherry	<i>Prunus serotina</i>	Good		X		1146	13	Silver Maple	<i>Acer saccharinum</i>	Good		X	
658	12,26,29	Silver Maple	<i>Acer saccharinum</i>	Good	X	X		772	7	Red Maple	<i>Acer rubrum</i>	Good		X		1001	9	Black Cherry	<i>Prunus serotina</i>	Good		X		1147	28	Silver Maple	<i>Acer saccharinum</i>	Good		X	
659	18	Norway Maple	<i>Acer platanoides</i>	Good		X		773	14	Black Cherry	<i>Prunus serotina</i>	Good		X		1002	12	Black Cherry	<i>Prunus serotina</i>	Good		X									

Issued For:

11.15.2022	Site Plan Review
04.25.2023	Revision per City comments
08.22.2023	Revision per City comments
01.10.2024	Revisions
01.18.2024	Revisions
03.12.2024	Revisions
05.22.2024	Revisions

Project:

AUBURN ANGARA OAKS
West Auburn Road
Rochester Hills, Michigan

Project Sponsor:

Three Oaks Communities, LLC
P.O. Box 8307
Ann Arbor, MI 48107

Sheet Name:

Landscape Plan North

NOT FOR CONSTRUCTION

Seal:



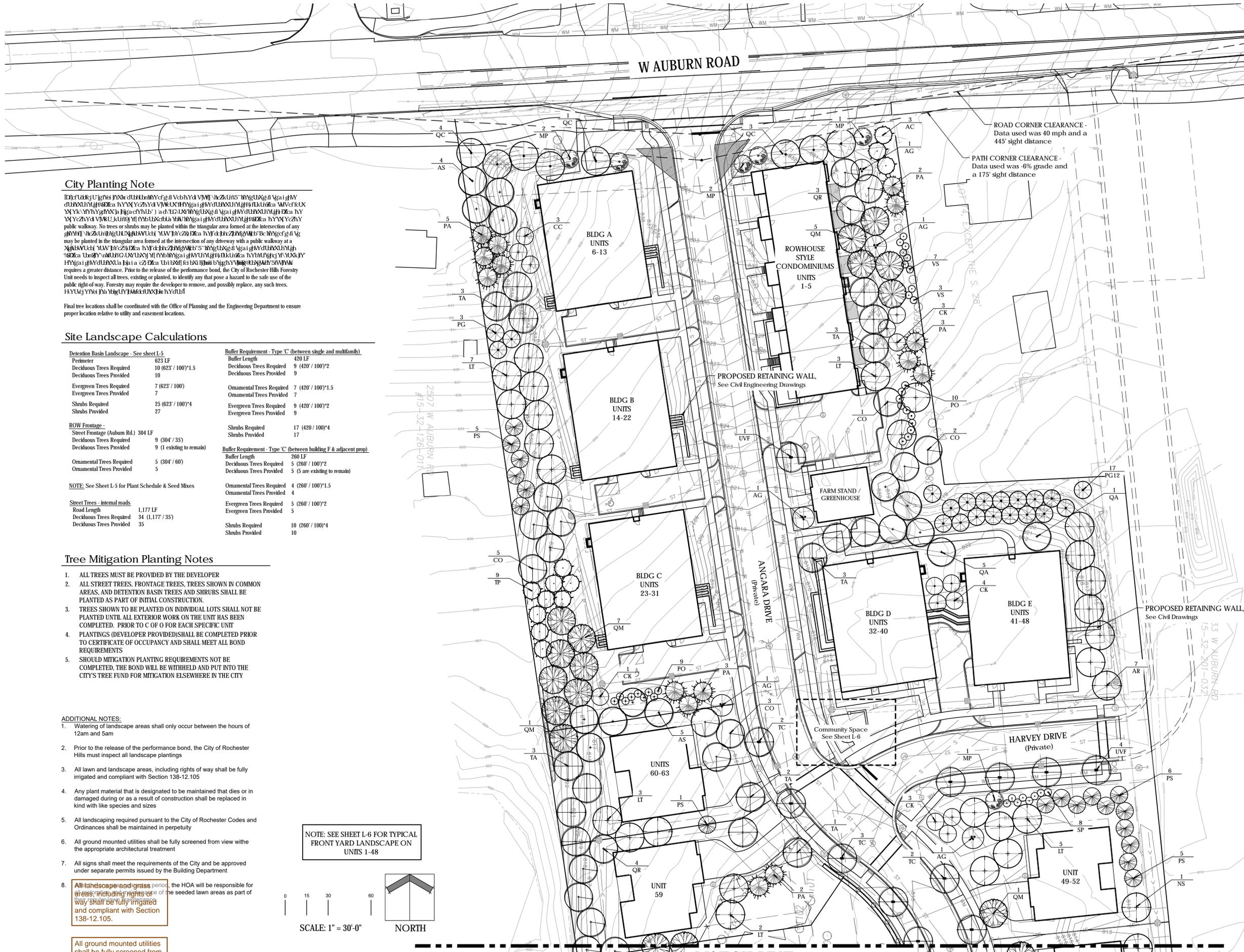
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Date: 10.2022
Scale: 1" = 30'-0"

Project Number:

22.025

Sheet Number:

L-4



City Planting Note

Publicly owned trees shall be maintained by the City of Rochester Hills. The City of Rochester Hills Forestry Unit needs to inspect all trees, existing or planted, to identify any that pose a hazard to the safe use of the public right-of-way. Forestry may require the developer to remove, and possibly replace, any such trees. Final tree locations shall be coordinated with the Office of Planning and the Engineering Department to ensure proper location relative to utility and easement locations.

Site Landscape Calculations

Detention Basin Landscape - See sheet L-5		Buffer Requirement - Type 'C' (between single and multifamily)	
Perimeter	623 LF	Buffer Length	420 LF
Deciduous Trees Required	10 (623 / 100)*1.5	Deciduous Trees Required	9 (420 / 100)*2
Deciduous Trees Provided	10	Deciduous Trees Provided	9
Evergreen Trees Required	7 (623 / 100)	Ornamental Trees Required	7 (420 / 100)*1.5
Evergreen Trees Provided	7	Ornamental Trees Provided	7
Shrubs Required	25 (623 / 100)*4	Evergreen Trees Required	9 (420 / 100)*2
Shrubs Provided	27	Evergreen Trees Provided	9
ROW Frontage -		Shrubs Required	
Street Frontage (Auburn Rd.)	304 LF	Shrubs Provided	17 (420 / 100)*4
Deciduous Trees Required	9 (304 / 35)	Buffer Requirement - Type 'C' (between building F & adjacent prop)	
Deciduous Trees Provided	9 (1 existing to remain)	Buffer Length	260 LF
Ornamental Trees Required	5 (304 / 60)	Deciduous Trees Required	5 (260 / 100)*2
Ornamental Trees Provided	5	Deciduous Trees Provided	5 (5 are existing to remain)
NOTE: See Sheet L-5 for Plant Schedule & Seed Mixes		Ornamental Trees Required	4 (260 / 100)*1.5
Street Trees - internal roads		Ornamental Trees Provided	4
Road Length	1,177 LF	Evergreen Trees Required	5 (260 / 100)*2
Deciduous Trees Required	34 (1,177 / 35)	Evergreen Trees Provided	5
Deciduous Trees Provided	35	Shrubs Required	10 (260 / 100)*4
		Shrubs Provided	10

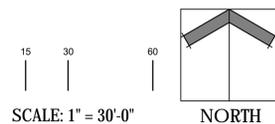
Tree Mitigation Planting Notes

- ALL TREES MUST BE PROVIDED BY THE DEVELOPER
- ALL STREET TREES, FRONTAGE TREES, TREES SHOWN IN COMMON AREAS, AND DETENTION BASIN TREES AND SHRUBS SHALL BE PLANTED AS PART OF INITIAL CONSTRUCTION.
- TREES SHOWN TO BE PLANTED ON INDIVIDUAL LOTS SHALL NOT BE PLANTED UNTIL ALL EXTERIOR WORK ON THE UNIT HAS BEEN COMPLETED. PRIOR TO C OF O FOR EACH SPECIFIC UNIT
- PLANTINGS (DEVELOPER PROVIDED) SHALL BE COMPLETED PRIOR TO CERTIFICATE OF OCCUPANCY AND SHALL MEET ALL BOND REQUIREMENTS
- SHOULD MITIGATION PLANTING REQUIREMENTS NOT BE COMPLETED, THE BOND WILL BE WITHHELD AND PUT INTO THE CITY'S TREE FUND FOR MITIGATION ELSEWHERE IN THE CITY

ADDITIONAL NOTES:

- Watering of landscape areas shall only occur between the hours of 12am and 5am
- Prior to the release of the performance bond, the City of Rochester Hills must inspect all landscape plantings
- All lawn and landscape areas, including rights of way shall be fully irrigated and compliant with Section 138-12.105
- Any plant material that is designated to be maintained that dies or is damaged during or as a result of construction shall be replaced in kind with like species and sizes
- All landscaping required pursuant to the City of Rochester Codes and Ordinances shall be maintained in perpetuity
- All ground mounted utilities shall be fully screened from view with the appropriate architectural treatment
- All signs shall meet the requirements of the City and be approved under separate permits issued by the Building Department
- All landscape and grass areas, including rights of way shall be fully irrigated and compliant with Section 138-12.105.

NOTE: SEE SHEET L-6 FOR TYPICAL FRONT YARD LANDSCAPE ON UNITS 1-48



All ground mounted utilities shall be fully screened from view.

Issued For:	Revisions
04.25.2023	Revision per City comments
08.22.2023	Revision per City comments
01.10.2024	Revisions
01.18.2024	Revisions
03.12.2024	Revisions
05.22.2024	Revisions

Project:
AUBURN ANGARA OAKS
West Auburn Road
Rochester Hills, Michigan

Project Sponsor:
Three Oaks Communities, LLC
P.O. Box 8307
Ann Arbor, MI 48107

Sheet Name:
Enlargements & Landscape Details

NOT FOR CONSTRUCTION

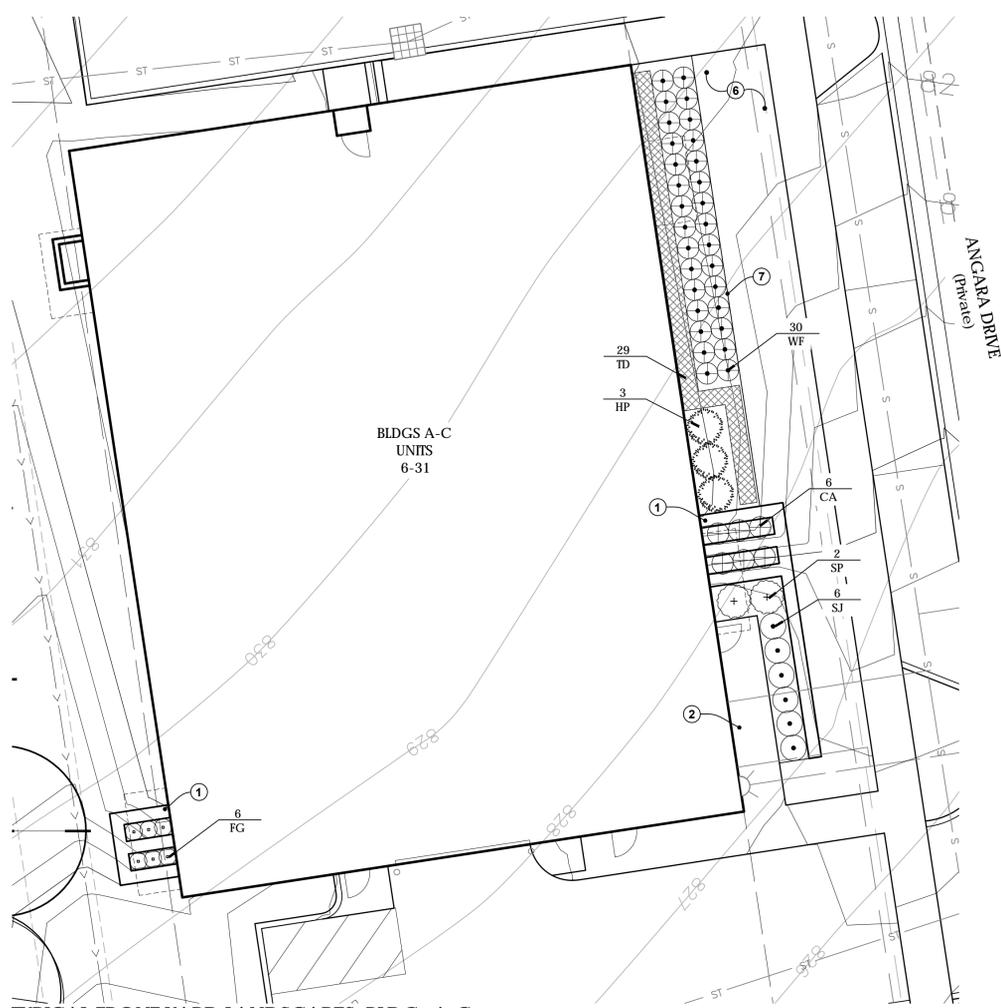
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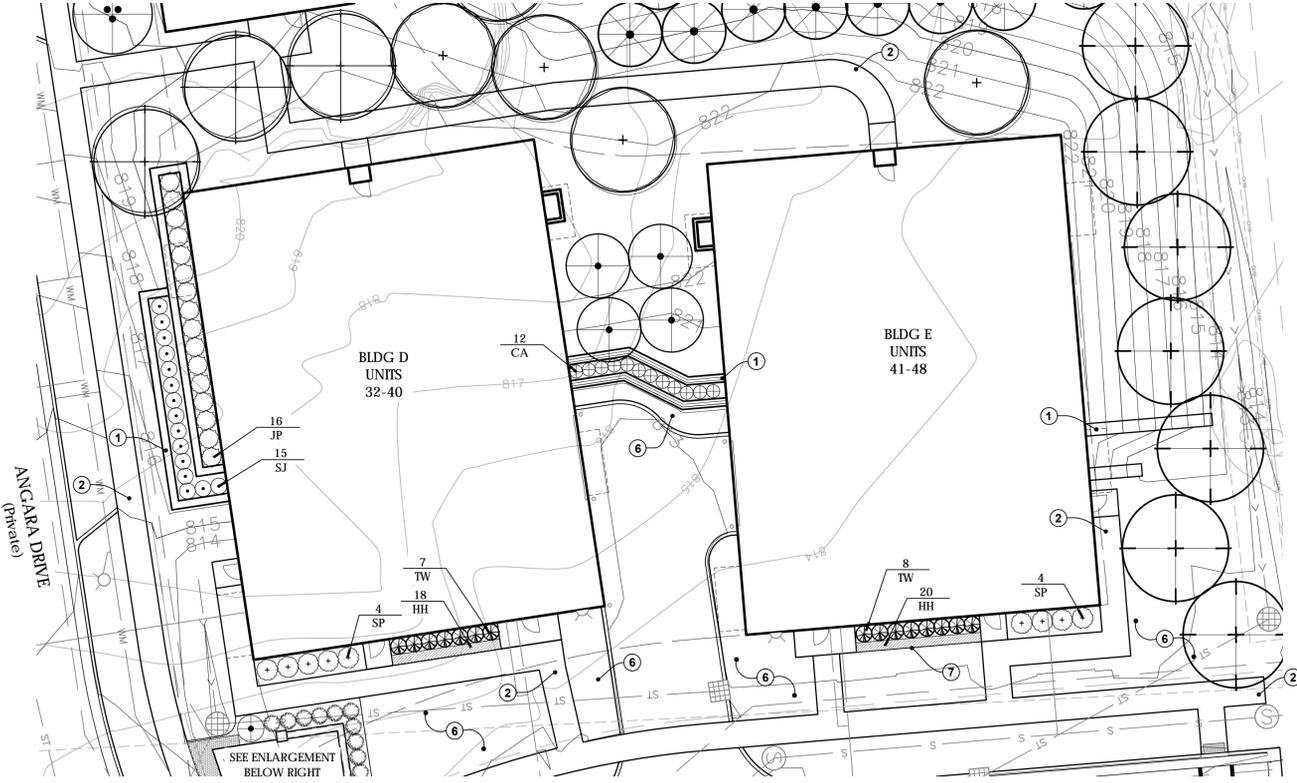
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Date: 10.2022
Scale: AS NOTED

Project Number:
22.025

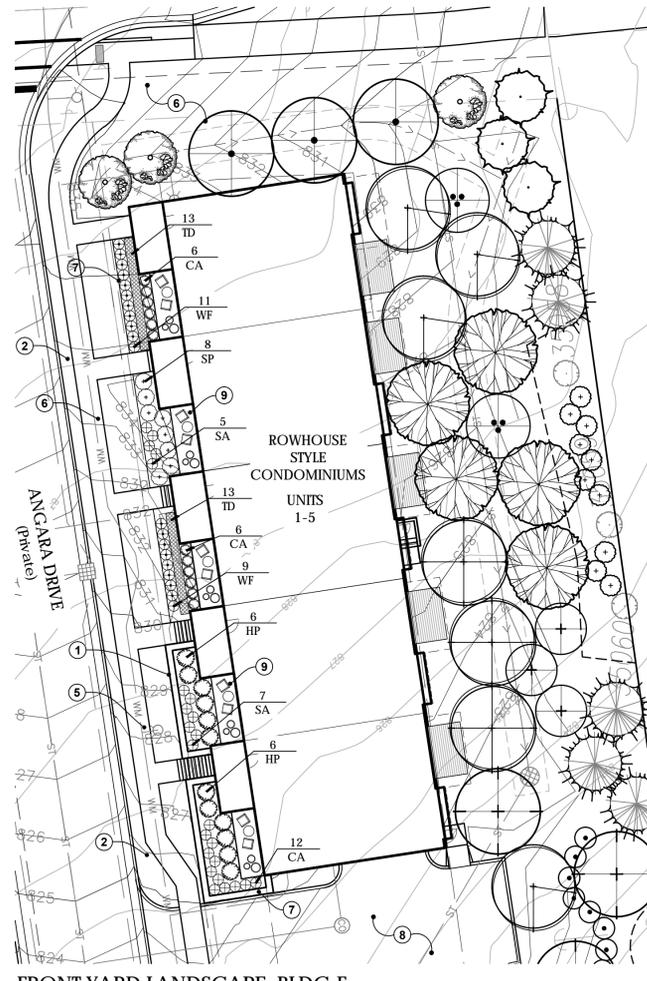
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L-6



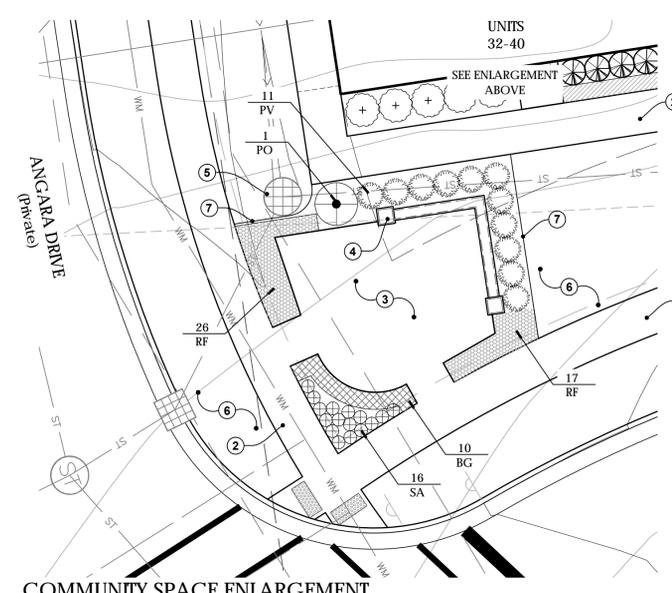
TYPICAL FRONT YARD LANDSCAPES: BLDGs A-C
SCALE: 1" = 10'-0"



LANDSCAPE ENLARGEMENT: BLDGs D & E
SCALE: 1/16" = 1'-0"

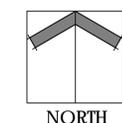


FRONT YARD LANDSCAPE: BLDG F



COMMUNITY SPACE ENLARGEMENT
SCALE: 1" = 10'-0"

- NOTE KEY:**
- ① RETAINING WALL. SEE CIVIL DRAWINGS
 - ② CONCRETE SIDEWALK, TYPICAL
 - ③ PROPOSED CONCRETE PATIO / PUBLIC OUTDOOR SEATING AND GATHERING SPACE
 - ④ PROPOSED 18" HT. PRECAST CONCRETE BLOCK SEAT WALL AND PIERS. UNILOCK BRUSSELS BLOCK OR EQUAL
 - ⑤ PROPOSED UTILITY. PROTECT AS REQUIRED DURING CONSTRUCTION
 - ⑥ SODDED LAWN OVER MINIMUM 4" DEPTH TOPSOIL TO LIMITS OF DISTURBANCE
 - ⑦ METAL EDGING BETWEEN LAWN AND LANDSCAPE BED
 - ⑧ PROPOSED ASPHALT PARKING LOT
 - ⑨ CONCRETE SLAB - POTTED PLANTINGS AND FURNITURE BY OWNER



NORTH
NOTE: SEE SHEET L-5 FOR PLANT SCHEDULE

MULTISTEM TREE PLANTING
NOT TO SCALE

- REMOVE ALL TAGS, STRING, PLASTICS, AND ANY OTHER MATERIALS WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING.
- COVER PLANTING W/ 2" DOUBLE SHREDED HARDWOOD BARK MULCH. MINIMUM 6 DIA. LEAVE 2" CIRCLE OF BARE SOIL AROUND BASE OF THE TRUNK.
- REMOVE ALL NON BIODEGRADABLE MATERIALS FROM THE ROOTBALL. FOLD DOWN ALL BELT AND REMOVE WIRE BASKET FROM THE TOP 1/3 OF THE ROOTBALL.
- PLANT MIX
- TREE PIT TO BE THREE TIMES WIDTH OF ROOTBALL
- 4" TOPSOIL SAUCER

SHRUB PLANTING
NOT TO SCALE

- SEE PLAN FOR SPACING
- SHRUBS. SEE PLANT SCHEDULE
- IF DEPTH DOUBLE SHREDED HARDWOOD MULCH. TYPICAL
- REMOVE ALL NON BIODEGRADABLE MATERIALS FROM THE ROOTBALL. FOLD DOWN ALL BELT AND REMOVE WIRE BASKET FROM THE TOP 1/3 OF THE ROOTBALL.
- SHOULDER CUT OR METAL EDGE. SEE PLAN
- EXCAVATE EXISTING SOIL TO 1" DEPTH. REPLACE WITH PLANT MIX
- SCARY TO 4" DEPTH AND RECOMPACT
- UNDISTURBED SUBGRADE
- MINIMUM 6" BETWEEN ROOTBALL AND EDGE OF PLANTING PIT

DECIDUOUS TREE PLANTING
NOT TO SCALE

- REMOVE SECONDARY LEADERS. DO NOT PRUNE REMAINING LEADER OR BRANCH TOPS. PRUNE ALL DEAD AND BROKEN BRANCHES.
- REMOVE ALL TAGS, STRING, PLASTICS, AND ANY OTHER MATERIALS WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING.
- STAKE TREES JUST BELOW FIRST BRANCH BY 2.5" WITH BLUE LINE FABRIC STRAPS ONLY. ABOVE OR APPROXIMATELY EQUAL TO TREE TO STAKE OPPOSITE FROM EACH OTHER AND ALLOW FOR SOME "SLACKING" DO NOT USE WIRE OR ROPE THROUGH A HOLE. REMOVE AFTER ONE YEAR.
- DO NOT FIT HARDWOOD STAKES OR EQUIVALENT DURING 4" OF CENTER OF ROOTBALL. REMOVE AFTER ONE YEAR.
- COVER PLANTING W/ 2" DOUBLE SHREDED HARDWOOD BARK MULCH. MINIMUM 6 DIA. LEAVE 2" CIRCLE OF BARE SOIL AROUND THE BASE OF THE TRUNK.
- REMOVE ALL NON BIODEGRADABLE MATERIALS FROM THE ROOTBALL. FOLD DOWN ALL BELT AND REMOVE WIRE BASKET FROM THE TOP 1/3 OF THE ROOTBALL.
- PLANT MIX
- TREE PIT TO BE 3 TIMES WIDTH OF ROOTBALL
- 4" TOPSOIL SAUCER

NOTE: TREE SHALL BEAR SAME RELATION TO FRONT GRADE AS PER PERMITS AND/OR CITY REQUIREMENTS. ALL PLANTING SHALL BE DONE TO GRADE. IF ORDERED BY LANDSCAPE ARCHITECT FOR HEAVY CUTS FOR ARMS.

EVERGREEN TREE PLANTING
NOT TO SCALE

- REMOVE ALL TAGS, STRING, PLASTICS, AND ANY OTHER MATERIALS WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING.
- STAKE TREES WITH 2" WITH BLUE LINE FABRIC STRAPS ONLY. ABOVE OR APPROXIMATELY EQUAL TO TREE TO STAKE OPPOSITE FROM EACH OTHER AND ALLOW FOR SOME "SLACKING" DO NOT USE WIRE OR ROPE THROUGH A HOLE. REMOVE AFTER ONE YEAR.
- DO NOT FIT HARDWOOD STAKES OR EQUIVALENT DURING 4" OF CENTER OF ROOTBALL. REMOVE AFTER ONE YEAR.
- COVER PLANTING W/ 2" SHREDED HARDWOOD BARK MULCH. MINIMUM 6 DIA. LEAVE 2" CIRCLE OF BARE SOIL AROUND THE BASE OF THE TRUNK.
- REMOVE ALL NON BIODEGRADABLE MATERIALS FROM THE ROOTBALL. FOLD DOWN ALL BELT AND REMOVE WIRE BASKET FROM THE TOP 1/3 OF THE ROOTBALL.
- PLANT MIX
- TREE PIT TO BE 3 TIMES WIDTH OF ROOTBALL
- 4" TOPSOIL SAUCER



AUBURN ANGARA OAKS
CHARLEVOIX CONDOMINIUMS
RENDERING

Accessibility notes

- MBC Section 1101.2, 1109.1 - Per ICC A117.1, door-opening force. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority. The force for pushing or pulling open doors other than fire doors shall be as follows:
 - Interior hinged door: 5.0 pounds (22.2n) maximum
 - Interior sliding or folding doors: 5.0 pounds (22.2n) maximum
 - Exterior hinged, sliding or folding door: 10 pounds (44.4 n) maximum.
 - Exception: interior or exterior automatic doors complying with Section 404.3 of ICC A117.1. These forces do not apply to the forces required to retract latch bolts or disengage other devices that hold the door in a closed position.
- Section 1111 - International Symbol Of Accessibility. Where the international symbol of accessibility is required, it shall be proportioned complying with ICC A117.1 figure 703.6.3.1. All interior and exterior signs depicting the international symbol of accessibility shall be white on a blue background. Signs indicating each accessible parking space shall be mounted per Section 502.7.
- All dwelling units are designed to be compliant with Type "B" standards per ICC A117.1 Section 1004. See Unit Plans, and Sheet AS 11 for specifics.
- All non-dwelling unit areas are designed to be compliant with the general full accessibility standard per ICC A117.1.

Accessible elevator

- For the elevator, the following is required:
 - A two way communication system shall be provided at the elevator landing on each accessible floor that is one or more stories above or below the story of exit discharge complying with Sections 100.9.8.1 and 1009.8.2. General Contractor to coordinate this system with alarm service provider. Note - this system is NOT generally provided by the Elevator Supplier/Installer.
 - This elevator is NOT required to be an Accessible Means of Egress per Section 1009.2.1.
 - This elevator shall be provided with Emergency Signs per the requirements of Section 3002.3.
 - The elevator is NOT required to be sized to accommodate a 24"x84" stretcher, per criteria given in Section 3002.4.
 - The elevator is NOT required to be identified by an international symbol for emergency medical services (Star of Life) per criteria given in Section 3002.4.

Wood Trusses

- The Truss Manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design drawing.
- The truss placement diagram shall be provided as part of the truss submittal package. The truss placement diagram shall be coordinated by the truss manufacturer.
- Truss/joint shop drawing submittal shall be coordinated with and shall show all bathtub, shower & toilet drains and all mechanical shafts. Adjust joist spacing and/or add joists & headers to clear plumbing & mechanical. See similar note on Structural. Coordinate specific drain requirements with General Contractor.

Fire protection system

- At a minimum all buildings to have an NFPA 13 ("NOT" 13R) approved automatic monitored sprinkler system complying with MBC Section 903.3.1.1.
- All units, corridors, patios, balconies, decks, enclosed areas and stair areas to be sprinkled. All areas of the Lobby, Fitness Center, and all other common and utility spaces are to be sprinkled.
- Refer also to the requirements of the 2015 Michigan Building Code, and City of Ann Arbor and State of Michigan Codes and Ordinances.
- Provide emergency responder radio system per MBC Section 915. Refer also to project note on this sheet.

Consultant information

- Refer to Civil, Temporary Earth Retention System/Shoring, and Landscape drawings for the location and design of all retaining walls, if any (exclusive of actual building foundations) on the site.
- Refer to Civil Engineer's drawings for all grading, finish floor elevations, site dimensional control, drainage and utility work for the entire site.
- Refer to the Landscape Architect's and/or Civil Engineer's drawings for accessible routes connecting common site elements and public ways in accordance with ICC-A117.1-2009 and ADA requirements.
- Refer to Landscape Architect's and/or Civil Engineer's drawings for all existing trees and plant material to remain and all new trees and plant material to be added.
- Refer to Landscape Architect's and/or Civil Engineer's and MEP site plan drawings for the location, design and coordination of all exterior site lighting.
- Refer to Civil Engineer's drawings for all off-site work.
- Refer to Structural Engineer's drawings for all structural work.
- Refer to MEP Engineer's drawings for all MEP work.
- Coordinate all utilities that connect between Building and Site to ensure no gaps in scope of work between trades and/or subcontractors.
- Mechanical, Electrical, Plumbing, and Fire Suppression Drawings and Specifications to be submitted as Deferred Submittals per MBC Section 107.3.4.1

Building Codes included by reference from 2015 Michigan Building Code (MBC)

All work shall be performed in accordance with the requirements of the 2015 Michigan Building Code, all referenced codes and standards, and any additional amendments/requirements set forth by the City of Ann Arbor, Michigan including all applicable federal codes and laws.

Applicable codes:

- 2015 Michigan Building Code -- and as listed in MBC Chapter 35 Referenced Standards:
- 2015 Michigan Mechanical Code
- 2017 NEC with all relevant State Amendments
- 2015 Michigan Plumbing Code
- 2015 International Fuel Gas Code (IFGC)
- 2015 International Fire Code (IFC)
- 2015 Michigan Uniform Energy Code Rules - part 10 with ANS/ASHRAE/IESNA standard 90.1-1999
- 2009 ICC A117.1 & Michigan Barrier Free Design Law of Public Act 1 of 1966 as amended
- NFPA 13, 2013 Standard for the Installation of Sprinkler Systems
- NFPA 72 2013 Fire Alarm Code

Project Notes:

- The minimum separation between building exterior walls is based on Section 705.5, Table 705.8 and Table 602.
 - Per Section 705.2.2, projections from walls of Type V construction shall be of any approved material.
- Net floor area per unit is defined as the interior area in the dwelling units measured between the unit side finish faces of the stud walls forming the perimeter of the unit.
 - Provide a supervised NFPA 13 fire sprinkler system compliant w/ Section 903.3.1.1. Provide audible sprinkler flow alarms on the exterior and interior per code and the local fire department. Supervision and alarms to meet Section 903.4, 903.4.1 and 903.4.2.
- Sprinkler systems shall be monitored by an approved supervising station per Section 901.6.1 and 903.4.
- Fire sprinkler drawings submitted by the Design-Build Fire Suppression Subcontractor shall be first submitted to the Owner for Review and Approval, then to the City for approval. The City approved set shall then be sent to the Owner & Architect prior to installing system.
- All building usable space including sleeping units, corridors, exterior stairs, interior stairs, electrical closets, utility room area to be sprinkled with a NFPA 13 sprinkler system compliant w/ Section 903.3.1.1. Refer to Section 903.2.8, 903.2.10, 903.3.1.1. Insulate pipes as required.
- Sprinkler pipes are not allowed in furr downs.
- Required smoke alarms shall be interconnected with the fire alarm system in accordance with NFPA 72.
 - Required smoke alarms are to receive primary power from the building wiring.
 - A fire/smoke alarm system is required per Section 907.2.9 and shall be monitored per Section 907.6.6.
- A two way communication system shall be provided at the elevator landing on each accessible floor that is one or more stories above or below the story of exit discharge, complying with Sections 1009.8.1 and 1007.8.2. (presumed to be connected to monitored alarm system Service Provider). See note at Accessible Elevator Notes.
- In R-2 occupancies, manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.1 and the occupant notification appliances will automatically activate throughout the notification zones upon sprinkler water flow per Section 907.2.9.1 exception #2 (use group R-2).
- Per Section 907.5.2.2 emergency voice/alarm communication systems required by code shall be designed and installed per NFPA 72.
- Per Section 907.5.2.3 in Group R-2 occupancies required to have a fire alarm system, all dwelling units shall be provided with the capability to support visible alarm notification devices in accordance with Chapter 10 of ICC/A117.1.
- In Group R occupancies provide carbon monoxide alarms per Section 915.1.
- Fire Department Connections (FDC) shall be provided in accordance with Section 912. The Fire Department Connection shall be located within 50'-0" of the fire lane or public street. Refer to Site Plan. FDCs shall meet the requirements of Section 912, shall be visible from the street, accessible to the fire department, provide a minimum 36"x36"x78" high clearance and have signage per Section 912.5.
- A fire hydrant must be located within a minimum of 100' from the FDC.
- A fire hydrant must be located within 750' from all points in the first floor of the building.
- The 200' fire hose lay rule is to any point on the 1st floor of a building from a fire lane or public street.
- Fire extinguishers - Section 906.1. Exception allows the provision of (1) type I-A/I0-B/C fire extinguisher per dwelling unit at R-2 occupancy, and no others required at 1st and 2nd floors.
 - For S occupancies, type 2-A/I0-B/C portable fire extinguishers are to be provided per Section 906, and Table 906.3(1). Locate so that a fire extinguisher is 1,500 s.f. X 2-A = 3,000 s.f. Cabinets shall be recessed in the wall and not extend more than 4" into the corridor or room. Coordinate locations and quantities with local fire marshal.
- Fire extinguisher signage per Section 914.2.
- Emergency responder radio coverage shall be provided in all new buildings per Section 916, in accordance with Section 510 of the International Fire Code.
- Section 1020.4. Exception #2 allows for a dead end corridor of 50 feet when the building is equipped with NFPA 13 sprinkler system compliant with Section 903.3.1.1 throughout.
- R-2 use is not required to provide emergency escape and rescue openings if building is equipped with an automatic sprinkler system per Section 1030.1, exception #1.
- All interior finishes shall meet the requirements of Chapter 8 and Table 803.11. Sprinkled buildings of R-2 occupancy require minimum Class C finishes.
- All floor/ceiling and roof/ceiling assemblies and all wall assemblies shall be constructed as required to meet the requirements of the assemblies shown on Sheet A6.1, Wall & Floor Type Legend & Details. Coordinate crew and nail size and spacing requirements between these assemblies and the structural drawings. The more stringent shall be used.
- See "Notes" for all Fire Resistance Rated Assemblies" on A6.1 for additional information.
- All holes, gaps, cracks and openings are required to be sealed w/ city approved fire stopping material.
- Maximum allowable dryer vent duct run is 35' with 2.5 feet deducted for each 45 degree bend and 5 feet deducted for each 90 degree bend. Coordinate longer runs with the building official, the dryer manufacturer and the MEP Engineer. Provide dryer vent signage as required by building official.
- Parapets are required at all exterior walls unless they meet one of the exceptions of Section 705.11.
- Per Section 704.2, structural columns that are required to be fire resistant rated shall be protected/encased for the full height of the column.
- Structural steel, other than columns, supporting more than two floors, or one floor and one roof is required to be individually protected per Section 704.3.
- Exterior walls shall meet the requirements of Section 705.
- Fire Barriers shall meet the requirements of Section 707. Fire Barriers shall extend to the underside of the deck of the floor or roof above.
- Fire partitions shall meet the requirements of Section 708. Fire Partitions shall extend to the underside of the deck of the floor or roof above, OR to the underside of the fire rated floor/ceiling or roof/ceiling assembly above.
- Shaft enclosure walls shall meet the requirements of Section 713.
- Elevator shafts shall meet Section 713 and chapter 30. Enclosed elevator lobbies are NOT required where building is sprinkled with a NFPA 13 sprinkler system compliant w/ Section 903.3.1.1, per Section 713.14.1 Exception #4
- Penetrations of the fire rated assemblies shall meet the requirements of Section 714 and Section 715.
- Fireblocking is to meet the requirements of Section 718.2 and draftstopping is to meet the requirements of Section 718.3.
- Draftstopping is not required in the horizontal spaces between units where building is sprinkled with a NFPA 13 sprinkler system compliant w/ Section 903.3.1.1, per Section 718.3.2 Exception #1
- Draftstopping is not required in the attic/concealed roof space where building is sprinkled with a NFPA 13 sprinkler system compliant w/ Section 903.3.1.1, per Section 718.4.2 Exemption #2.
- Doors in fire rated walls shall meet the requirements of Section 716.5.
- Windows/glazing in fire rated walls shall meet the requirements of Table 716.5.
 - Door and window glazing in 1 hour rated fire partitions shall be minimum 20 minute rated.
 - Door and window glazing in 1 hour rated fire partitions shall be minimum 45 minute rated.
 - Door and window glazing in 1 hour rated fire barriers shall be minimum 60 minute rated.
- In interior 1-hour rated fire barrier and fire partition walls, openings of all types are limited to 25% of the length of the wall and are also limited to a maximum 25% of the wall. Per Section 716.6.7.2 and Section 707.6. Refer Section 707.6 for maximum window sizes. Refer to Table 716.6.
- Glazing is not allowed in walls with a fire resistance rating greater than 1-hour per Section 716.6.7.
- Number of Exits (in a building with NFPA 13 sprinkler systems) for each use, shall be (2), for any use exceeding the common path of egress travel as follows per Table 1006.2.1: Group R-2 = 125', Group S = 100'.
- Structural observation shall be provided by Structural Engineer during construction in accordance with Sections 1702 and 1704.6.
- Special Inspections shall be provided per Section 1705. See Structural for a list of inspections required.
- Where provided, Fire Pump rooms shall have protection per Section 913.2.1. Fire pumps shall be located in rooms that are separated from all other assemblies constructed in accordance with Section 707 & 711. Exception 1 allows 1 hour ratings with an NFPA 13 sprinkler.
- Section 1011.12 Roof Access: Access required unless roof is a minimum 4:12slope. Minimum slope provided is 4.75:12.
- Section 3002.4 Elevator Car to Accommodate Ambulance Stretcher: Not required in buildings less than four stories above grade.
- Section 1203.1 Buildings shall be provided with natural ventilation in accordance with Section 1203.4 or mechanical ventilation in accordance with the International Mechanical Code.
- Section 1204.1 Equipment and systems. Interior spaces intended for human occupancy shall be provided with an active or passive space-heating system capable of maintaining a minimum indoor temperature of 68° F at a point 3 feet above the floor on the design heating day. Exception #1 Interior spaces where the primary purpose is not associated with human comfort.
- Section 1208.2 Minimum ceiling heights: Occupiable spaces and habitable spaces shall have a ceiling height of not less than 7'-6". Bathrooms, toilet rooms, kitchen, storage rooms and laundry rooms shall have a ceiling height of not less than 7'-0". Corridors within dwelling units shall have a ceiling height of not less than 7'-0".
- Section 1709.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1709.5.1 or 1709.5.2. Refer to exception in this Section.
- Section 1405.3 Vapor retarders: Class I and II vapor retarders shall be provided on the interior side of frame walls in Climate Zones 5. Exceptions:
 - Below grade portions of any walls.
 - Construction where moisture or its freezing will not damage the materials.
- Michigan Mechanical Code Section 501.3.1 location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located in the following distances:
 - For garages: for other product-conveying outlets: 10 feet from property lines 3 feet from exterior walls and roofs; 10' from operable openings into buildings; 10 feet above adjoining grade.
 - For units: for environment air exhaust other than enclosed parking and transformer vault exhaust; 3 feet from property lines, 3 feet from operable openings into buildings for all occupancies other than Group U and 10 feet from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious.

General Notes

- All work shall comply with all current and applicable Federal, State, and Local Codes, Regulations and Ordinances. This includes, but is not limited to, the list of Reference Standards in the Code Summary. Code section references refer to Michigan Building Code unless noted otherwise.
- The "General Conditions of the Contract for Construction" AIA document A201, most current edition, governs this work, unless otherwise noted.
- Items affecting all trades are placed throughout the set of documents. The contractor shall be responsible for the coordination of all work of all trades regardless of where said item is shown in the documents.
- Any discrepancies, omissions, or ambiguities discovered in the drawing set shall be brought to the attention of the architect for resolution.
- Submit all Shop Drawings (including, but not necessarily limited to, Trusses, Wall Panels, and Structural Steel) to the Architect for review prior to fabrication.
- Floor Truss layout drawings MUST indicate location of all plumbing fixtures for coordination, to avoid field conflicts. General Contractor is responsible for coordination between floor framing and location of all floor penetrations.
- No procedure, products, or processes shall be permitted to be used in this project which are prohibited by law or may cause a harmful effect to the natural environment or to the health of any person on or off the site during construction and/or occupancy of the project.
- The General Contractor shall fully familiarize him/herself with all site conditions & constraints prior to submitting proposals for work. No increases to the contract sum will be awarded for items/issues with which the contractor could have familiarized him/herself prior to bid.
- General Contractor is responsible for verification of final quantities, areas, dimensions, and coordination of discrepancies between the Drawings and Field Conditions.
- No substitutions for specified materials or equipment shall be allowed except as provided for on the drawings.
- All Subcontractors are to submit documentation for all rated or tested components and/ or systems to be installed, to architect, owner and building officials.
- The General Contractor shall maintain a current and complete record set of construction documents on site during all phases of construction for the use of all trades, and shall provide all subcontractors with current construction documents as required. The contractor shall neatly and correctly document all deviations from the contract documents on the record set.
- All work is to be done in a professional manner by professionals skilled in their respective trades. Work is to be guaranteed against defects and poor workmanship for at least one year from the date of completion of the project.
- Each trade is responsible for their own cleanup unless otherwise indicated by general contractor. Failure to clean up may result in a back-charge.
- General Contractor is responsible for protecting common site elements including but not necessarily limited to: existing landscaping, sidewalks, driveways, curbs, site lighting, and utilities, from damage which may occur from construction, demolition, etc., as well as to protect the public using such elements during the period of construction. Damage to new and existing materials, finishes, structures, and equipment shall be repaired or replaced to the satisfaction of the owner and building officials.
- All Dimensions are to the Face of Framing and Exterior Face of Sheathing, or Face of Masonry, unless noted otherwise. All angles are 90 degrees unless noted otherwise.
- Wall framing member sizes, gypsum board thickness and rating (normal, or Type 'X', or Type 'C'), and thermal or acoustical insulation per wall type legend.
- Fire rated assemblies vary in permitted materials. Particular care should be used to ensure that each is constructed with materials exactly as listed to the testing agency.
- Provide, install, and remove any and all bracing required to insure the stability of the structure until the permanent support/ framing is in place.
- Window and Hinged Patio Door designations refer to nominal feet and inches (i.e. 3053 = 3'-0"x5'-3"). Tempered Glass to be used where required by Code. Andersen 400 series windows & patio doors are used as the Basis of Design. Additional manufacturers may be submitted as a voluntary bid alternate, for possible acceptance by Architect.
- Window Supplier to verify Code compliance (i.e. current Michigan Energy Code, Accessibility, Emergency Egress, Tempered Glass, etc.) prior to purchase and shipment of windows. Provide Architect & General Contractor with a schedule of rough openings and window size, clear openings of egress and accessible windows & patio doors, and code compliance certificate.
- Door Supplier to provide Architect & General Contractor with a schedule of rough openings and door sizes.
- All Window and Door Headers: See Structural Drawings.
- Any products or materials explicitly called out may NOT be substituted without express authorization of the Architect.
- Use Protecto Wrap Triple Guard Energy Sill Sealer between Foundation and Mud Sill. Contact phone # (800) 759-9172. Note that face of sheathing is flush with face of Foundation.
- At all sloped roofs: Grace 'Ice & Water Shield' or approved alternate at all Valleys and Eaves, extend 'Ice & Water Shield' a minimum of 2'-0" inside from the Interior Face of the Exterior Wall.
- All details, sections, and notes shown on drawings are intended to be typical and shall apply to similar situations elsewhere unless noted otherwise.
- Coordinate the size, location, fire rating, firestopping/sealant, weather & moisture sealants and construction of all wall, floor, and roof openings; stair details; penetrations for ducts, dampers, vents, conduits, wiring, pipes; and any other required openings on Architectural, Mechanical, Electrical, Plumbing, and Fire Suppression Drawings.
- All lumber in contact with masonry or concrete shall be pressure treated 'yellow pine' rated for ground contact.
- Stud spaces used as Return Air Ducts to be spray-painted black behind all Register Covers.
- All signage required at elevator, stair access, stair floor level landings, and elsewhere required by Code or the Building Official, shall comply with Section 1023.9.1, and ICC A17.1 Section 504.9. General sign criteria is given in ICC A17.1 Section 703.3 Raised Characters & 7.3.4 Braille
- All design, engineering, coordination and documentation for Mechanical, Electrical, and Plumbing is the responsibility of the respective design-build contractor(s). Each contractor shall be responsible for coordinating Architectural design issues and items with the Architect. The Architect is not responsible for coordination between Mechanical, Electrical, and Plumbing Contractors.
- Final Mechanical, Electrical, Plumbing, and Fire Suppression Drawings may be included in a deferred submittal as stipulated Section 107.3.4.1 of the 2015 Michigan Building Code.

Project Address:

Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building.
3046 Anagra Drive
Rochester Hills, Michigan 48309

Description of Work:

Proposed new 9 unit, residential apartment (condominium) building.

Building Planning:

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
ASHRAE 90.1 (2013)	NFPA 13 - Fire Sprinkler Systems (2013)
Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

CHAPTER 3 Occupancy/Use:

Residential (Primary use - dwelling units/ accessory spaces)	Use Group	R-2
Storage (Low-hazard storage / parking garage)	Use Group	S-2

CHAPTER 5

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

Automatic Sprinkler System: NFPA 13 compliant with Section 903.3.1.1 (note **NOT** NFPA13R 903.3.1.2)

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 (full NFPA-13) compliant sprinkler system)

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

ALLOWABLE HEIGHT: Sprinkler system equipped*

Use Group:	Height (Feet)	Height (Stories)
S-2 (Parking garage) @ Type 5B constr'n	60 feet	3 Stories
R-2 (Permanent dwelling) @ Type 5B constr'n	60 feet	3 stories
ACTUAL building height in Feet/Stories	29'-11"	2 Stories

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

ALLOWABLE BUILDING AREA (per story):

Use Group:	Allowable Area per Story (SF)	Actual per Story
S-2 (Parking garage) - Type 5B constr'n*	40,500	5,588
R-2 (Permanent dwelling) - Type 5B constr'n*	21,000	5,708 max see below

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

Floor (Use Groups):	Max. Allowed (sf)	Provided (sf)
Basement (Garage) Level: (S-2)	40,500	5,588
First Floor: (R-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

CHAPTER 7 Fire Resistive Construction (Tables 601 & 508.4, & Chapter 4, 5, 7, 10)

Type 5-B	Req'd	Provided	UL Listings & Notes
Structural	0 hr., 0 hr.	0 hr.	n/a
Protection	0 hr., 0 hr.	0 hr.	n/a
Per Table 601	0 hr., 0 hr.	0 hr.	n/a
Non-Bearing - Exterior	0 hr., 0 hr.	0 hr.	n/a
Non-Bearing - Interior	0 hr., 0 hr.	0 hr.	n/a
Floor Construction	0 hr., 0 hr.	0 hr.	n/a
Roof Construction	0 hr., 0 hr.	0 hr.	n/a

Use & Exit	Req'd	Provided	UL Listings & Notes
Elevator Shaft Construction	1 hr., 2 hr.	1 hr.	UL U905
Stair Enclosure Construction	1 hr., 1 hr.	1 hr.	UL R305
Per Sect. 420, 508.4, 708, 713, 1019.3, 1020, 1023	1 hr., 1 hr.	1 hr.	UL L563
Corridor Wall Construction	0.5 hr., 1 hr.	1 hr.	UL U340
Dwelling Unit Separation	1 hr., 1 hr.	1 hr.	UL U305 dbi stud

(see A6.1 for wall & floor assemblies)

*Per 711.2.4.3 if equipped with NFPA 13, horizontal separation between dwelling units requires 1/2 hour min. rating. Provided 1 hour rating.

Exterior Rating based on Fire Separation Distance per Table 602

Separation of multiple buildings on site per Sect. 503.1.2, 602	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
North	10' or more	0 hr.	n/a
East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a

CHAPTER 9 Fire Protection Systems

	Yes	X	No
(903) Automatic Sprinkler System Fully Sprinkled	Yes	X	No
NFPA 13 or 13R	Yes	X	No
(905) Standpipe System *	Yes	X	No
(907) Alarm System	Yes	X	No
Smoke Control System	Yes	No	X
Fire Control Room	Yes	No	X

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

CHAPTER 10 Means of Egress

Occupant Load	Floor Area	Allowable Occ/ sf	Occ. Load	Use Group	Tot.occ. + area/Use
Lower Level:					
Parking, incl bike stor & Trash		1/200 s.f.	27	S-2	27 occ.
Elec./Utility Room	44 s.f.	1/300 s.f.	1	Acces'y	1 occ.
Water Meter/Fire Sprinkler	115 s.f.	1/300 s.f.	1	Acces'y	1 occ.
Stair	104 s.f.	1/200 s.f.	1	Acces'y	1 occ.
	5,588 s.f.				Accessory = 3 occ.
Lower Level Occupant Load:					30

Occupant Load	Floor Area	Allowable Occ/ sf	Occ. Load	Use Group	
First Floor:					
Dwelling Units	5,700 s.f.	1/200 s.f.	29	R-2	= 29 occ.
Second Floor:					
Dwelling Units	5,708 s.f.	1/200 s.f.	29	R-2	= 29 occ.
					Residential = 58 occ.
Residential Floors Occupant Load:					58
TOTAL BUILDING OCCUPANT LOAD:					88

Min. required egress width per Sect. 1005.1

- Total egress/door width req'd:**
- At EXTERIOR STAIRWAY doors, convergence of basement traffic + traffic from floors above = 88 total
 - 88 * 0.2' = 17.6' / 2 = 18' each (minimum)
 - PROVIDED: 32' min. clear per door (per icc a117.1) at all stairs & building entries (using nominal 36" doors).

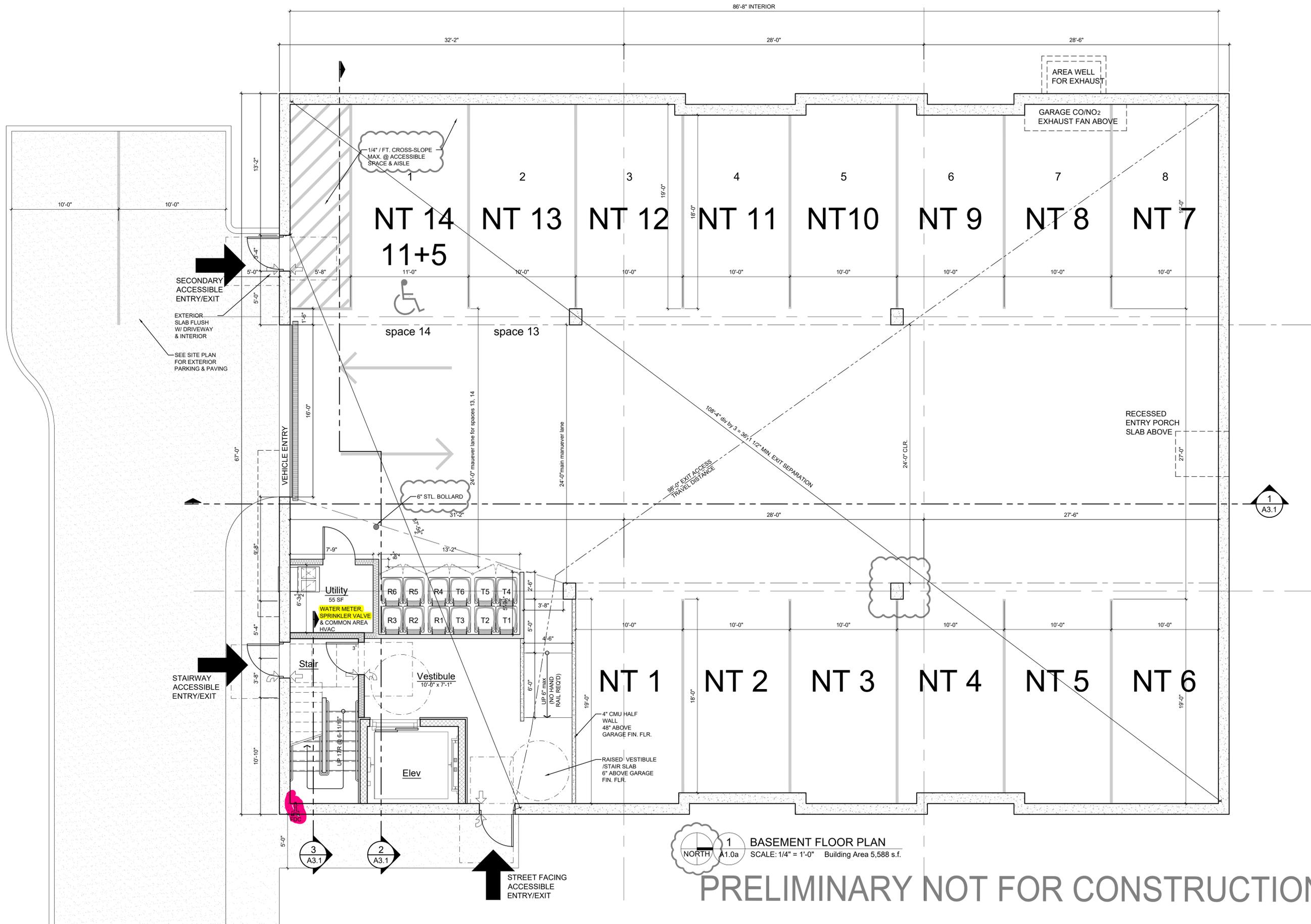
- Total stair with req'd:**
- 1ST FLOOR, 2ND FLOOR stair width: 29 x 3 = 8.7 / 2 exits = 4.4" each (minimum)
 - PROVIDED: 36" clear per stair (per section 1011.2 exception 1: 36" min. for occ. load less than 50)

Required number of exits per Sect. 1006.2 & 1006.3

Per Dwelling Unit: One exit required per Table 1006.2.1

Per Story: 2nd Floor - One exit per Table 1006.3.2(1)
1st Floor - Two exits per Table 1006.3.1
Basement - Two exits per Table 1006.3.1

Required exit separation per Sect. 1007.1.1 Exception 1:



1 NORTH 1.0a BASEMENT FLOOR PLAN SCALE: 1/4" = 1'-0" Building Area 5,588 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

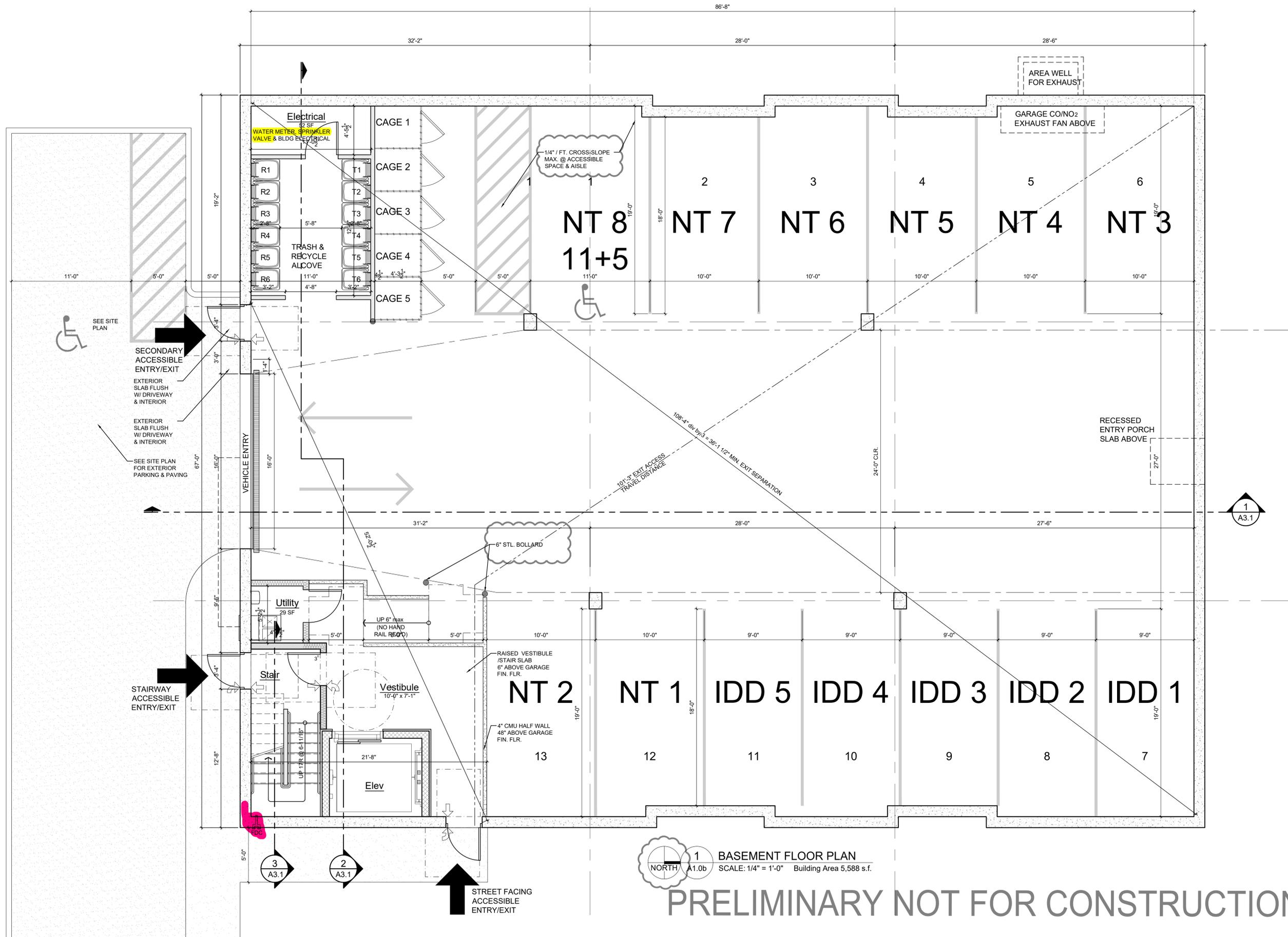
City Review	07.21.23
Revised	01.22.24

Basement Plan
 Bldg A

JBMA Project No.
 222051

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A1.0a



1 NORTH 1.0b BASEMENT FLOOR PLAN SCALE: 1/4" = 1'-0" Building Area 5,588 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

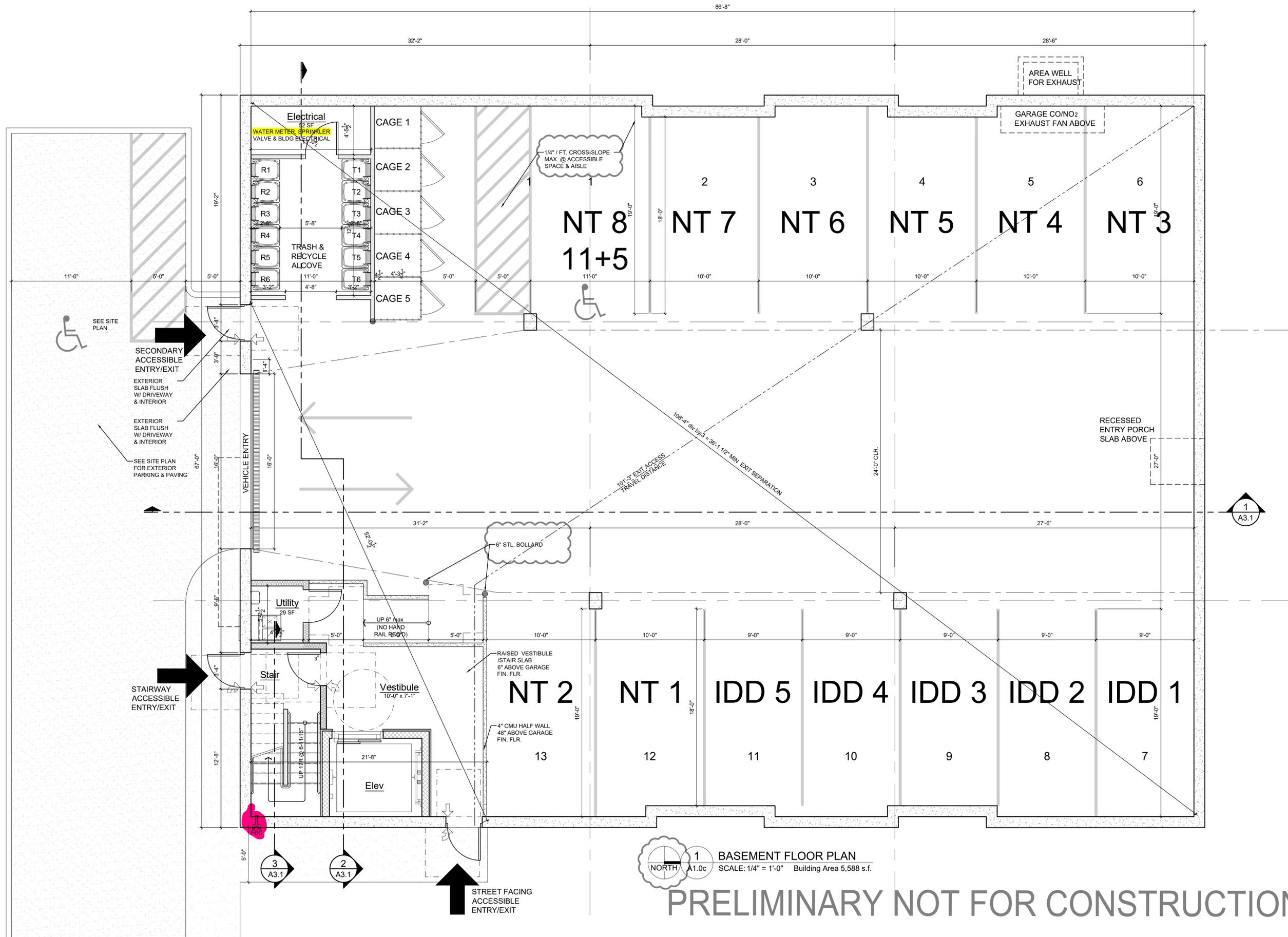
City Review	07.21.23
Revised	01.22.24

Basement Plan
 Bldg B

JBMA Project No.
 222051

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1 BASEMENT FLOOR PLAN
 SCALE: 1/4" = 1'-0" Building Area 5,588 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

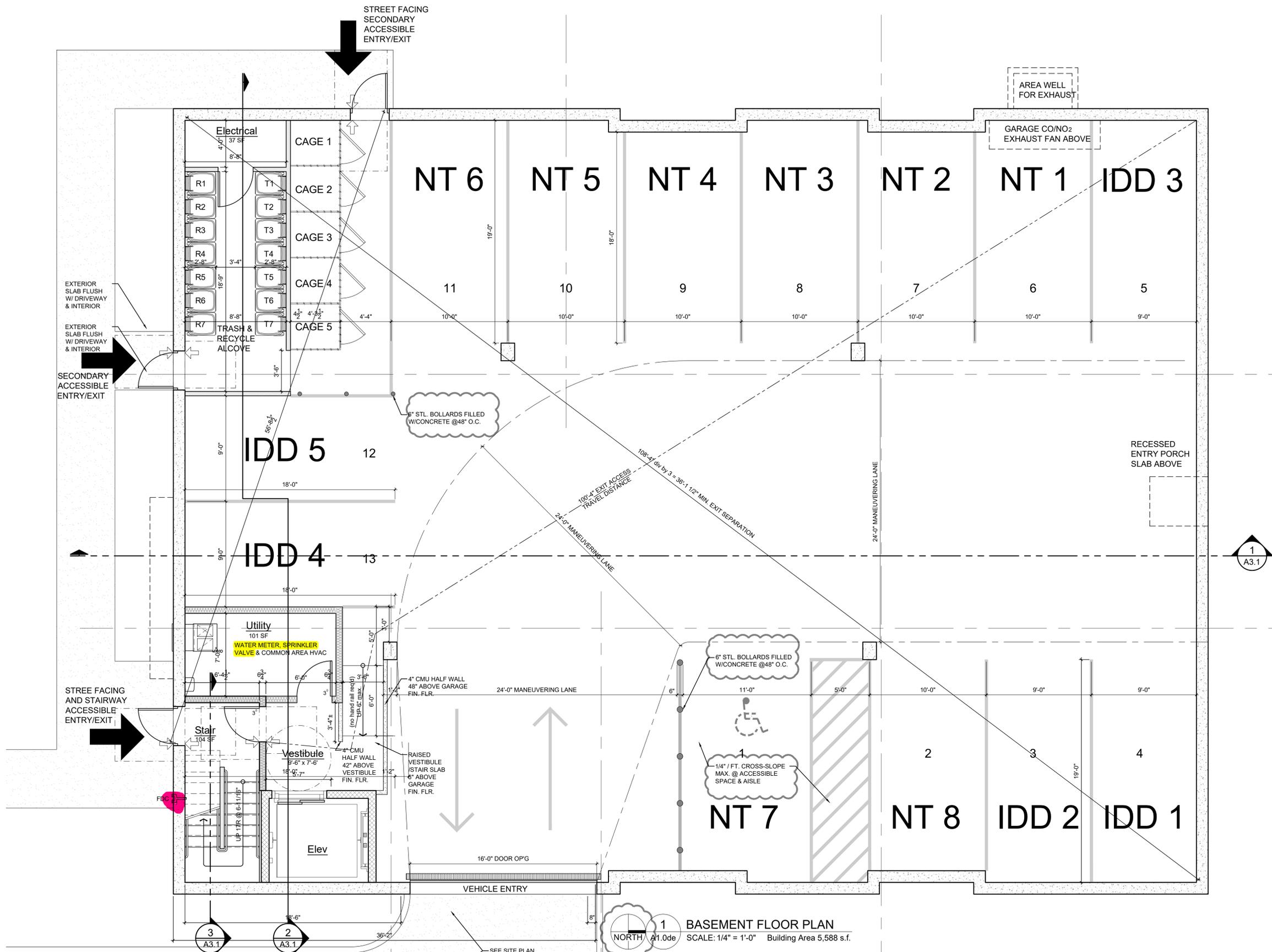
City Review	07.21.23
Revised	01.22.24

Basement Plan
 Bldg C

JBMA Project No.
 222051

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A1.0c



1 NORTH A1.0de SCALE: 1/4" = 1'-0" Building Area 5,588 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

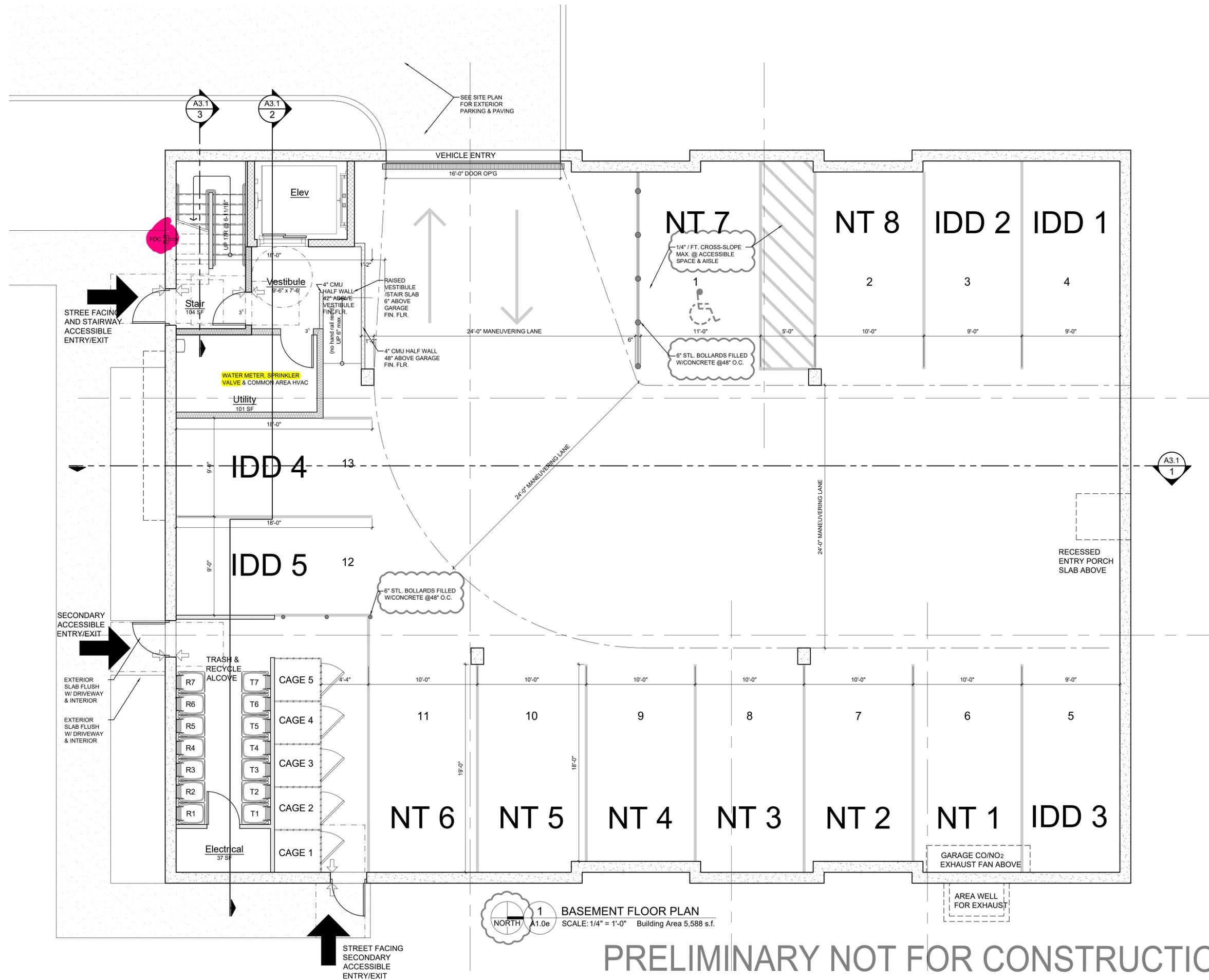
City Review	07.21.23
Revised	01.22.24

Basement Plan
 Bldg D

JBMA Project No.
 222051

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A1.0d



PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Basement Plan

Bldg E

JBMA Project No.

222051

© 2022

A1.0e

Code Analysis summary, tagged to Planning Review comments. See Architectural sheet T1.2 for complete information.

Project Address:
 Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building
 3046 Anagra Drive
 Rochester Hills, Michigan 48309

Description of Work:
 Proposed new 9 unit, residential apartment (condominium) building.

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
ASHRAE 90.1 (2013)	NFPA 13 - Fire Sprinkler Systems (2013)
Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

Use Group: Residential (Primary use - dwelling units/ accessory spaces) Use Group **R-2**
 Storage (Low-hazard storage / parking garage) Use Group **S-2**

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 [full NFPA-13] compliant sprinkler system)

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

Use Group:	Height (Feet)	Height (Stories)	Sprinkler system equipped*
S-2 (Parking garage) @ Type 5B constr'n	60 feet	3 stories	
R-2 (Permanent dwelling) @ Type 5B constr'n	60 feet	3 stories	
ACTUAL building height in Feet/Stories	29'-11"	2 Stories	

*NFPA 13 complying with Section 903.3.1.1 (and NOT NFPA13R 903.3.1.2) ALLOWABLE BUILDING AREA (per story):

Floor (Use Groups):	Max. Allowed* (sf)	Provided (sf)
Basement (Garage) Level: (S-2)	40,500	5,588
First Floor: (S-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

*NFPA 13 complying with Section 903.3.1.1 (and NOT NFPA13R 903.3.1.2)

CHAPTER 9 Fire Protection Systems

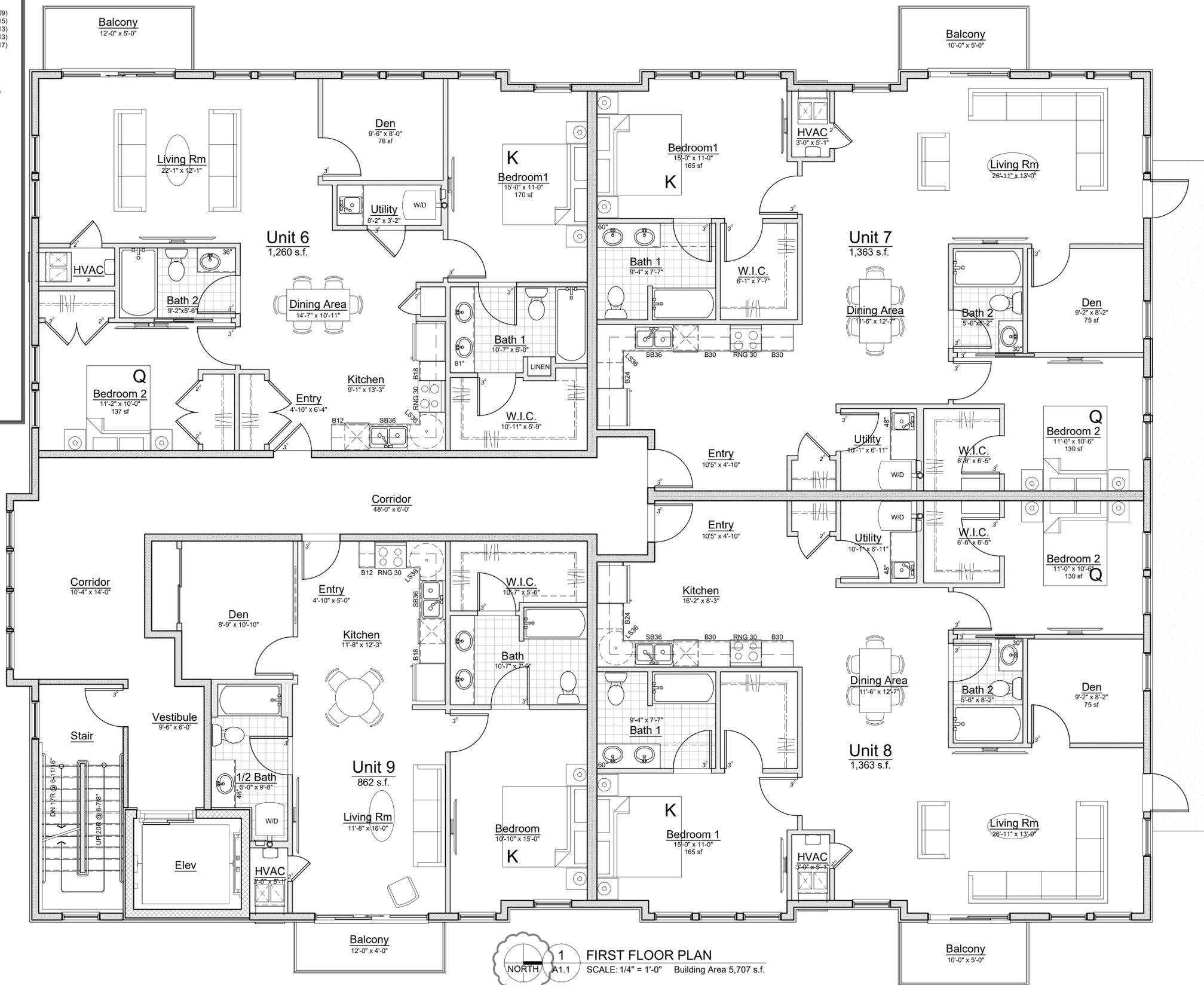
	Yes	X	No	—
(903) Automatic Sprinkler System Fully Sprinkled	Yes	X	No	—
NFPA 13 or 13R	13	X	13R	
(905) Standpipe System *	Yes	No	X	
(907) Alarm System	Yes	X	No	
Smoke Control System	Yes	No	X	
Fire Control Room	Yes	—	No	X

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

Separation of multiple buildings on site per Sect. 503.1.2, 602

Exterior Rating based on Fire Separation Distance per Table 602

	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
North	10' or more	0 hr.	n/a
East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a



1 FIRST FLOOR PLAN
 NORTH SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

J BRADLEY MOORE & ASSOCIATES, INC.
 Three Oaks Communities
 Charlevoix
 Auburn Angara Oaks
 First Floor Plan
 Bldg A

City Review	07.21.23
Revised	01.22.24

First Floor Plan
 Bldg A

JBMA Project No.
 222051
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A1.1a

PRELIMINARY NOT FOR CONSTRUCTION

4844 Jackson Road #150 • Ann Arbor, MI 48103 • (734) 930-1500

Code Analysis summary, tagged to Planning Review comments. See Architectural sheet T1.2 for complete information.

Project Address:
 Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building
 3046 Anagra Drive
 Rochester Hills, Michigan 48309
Description of Work:
 Proposed new 9 unit, residential apartment (condominium) building.

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
ASHRAE 90.1 (2013)	NFPA 13 - Fire Sprinkler Systems (2013)
Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

Residential (Primary use - dwelling units/ accessory spaces) Use Group **R-2**
 Storage (Low-hazard storage / parking garage) Use Group **S-2**

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 (full NFPA-13) compliant sprinkler system)

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

Use Group:	Height (Feet)	Height (Stories)	Sprinkler system equipped*
S-2 (Parking garage) @ Type 5B constr'n	60 feet	3 stories	
R-2 (Permanent dwelling) @ Type 5B constr'n	60 feet	3 stories	
ACTUAL building height in Feet/Stories	29'-11"	2 Stories	

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2) BUILDING AREA (per story):

Floor (Use Groups):	Max. Allowed* (sf)	Provided (sf)
Basement (Garage) Level: (S-2)	40,500	5,588
First Floor: (S-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

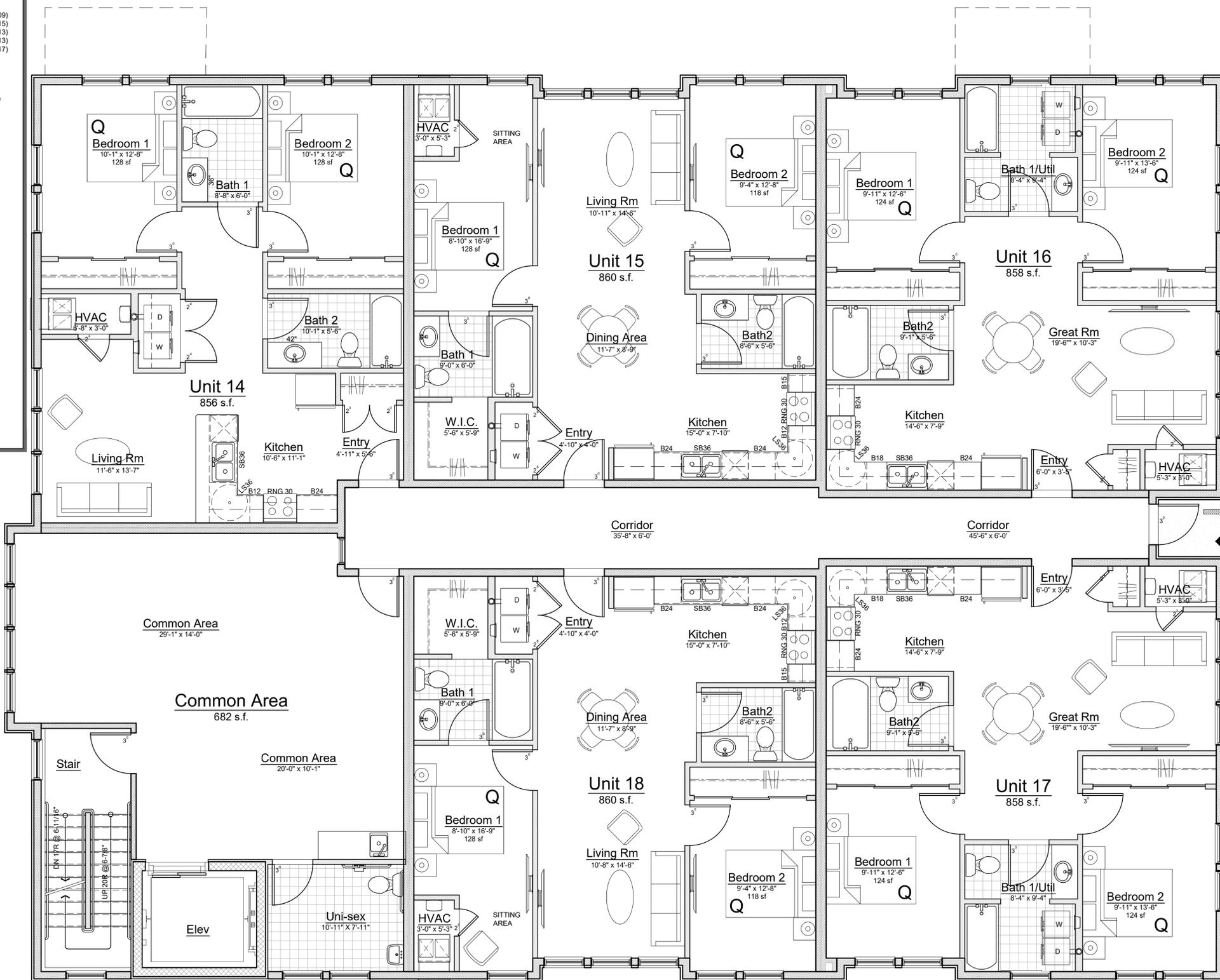
CHAPTER 9 Fire Protection Systems

	Yes	No	UL Listing and Notes
(903) Automatic Sprinkler System Fully Sprinkled	X		13R
NFPA 13 or 13R	X		
(905) Standpipe System *		X	
(907) Alarm System	X		
Smoke Control System		X	
Fire Control Room		X	

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

Separation of multiple buildings on site per Sect. 503.1.2, 602

Exterior Rating based on Fire Separation Distance per Table 602			
	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
North	10' or more	0 hr.	n/a
East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a



1 FIRST FLOOR PLAN
 NORTH A1.1 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

Three Oaks Communities
 Charlevoix
 Auburn Angara Oaks
 First Floor Plan
 Bldg B

City Review	07.21.23
Revised	01.22.24

First Floor Plan
 Bldg B

JBMA Project No.
 222051

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 A1.1b

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 4844 Jackson Road #150 • Ann Arbor, MI 48103 • (734) 930-1500

Code Analysis summary, tagged to Planning Review comments. See Architectural sheet T1.2 for complete information.

Project Address:
 Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building
 3046 Anagra Drive
 Rochester Hills, Michigan 48309
Description of Work:
 Proposed new 9 unit, residential apartment (condominium) building.

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
ASHRAE 90.1 (2013)	NFPA 13 - Fire Sprinkler Systems (2013)
Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

Residential (Primary use - dwelling units/ accessory spaces) Use Group **R-2**
 Storage (Low-hazard storage / parking garage) Use Group **S-2**

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 [full NFPA-13] compliant sprinkler system)

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

Use Group:	Height (Feet)	Height (Stories)	Sprinkler system equipped*
S-2 (Parking garage) @ Type 5B constr'n	60 feet	3 stories	
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ACTUAL building height in Feet/Stories	29'-11"	2 Stories	

*NFPA 13 complying with Section 903.3.1.1 (and NOT NFPA13R 903.3.1.2) BUILDING AREA (per story):

Floor (Use Groups):	Max. Allowed* (sf)	Provided (sf)
Basement (Garage) Level: (S-2)	40,500	5,588
First Floor: (S-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

*NFPA 13 complying with Section 903.3.1.1 (and NOT NFPA13R 903.3.1.2)

CHAPTER 9 Fire Protection Systems

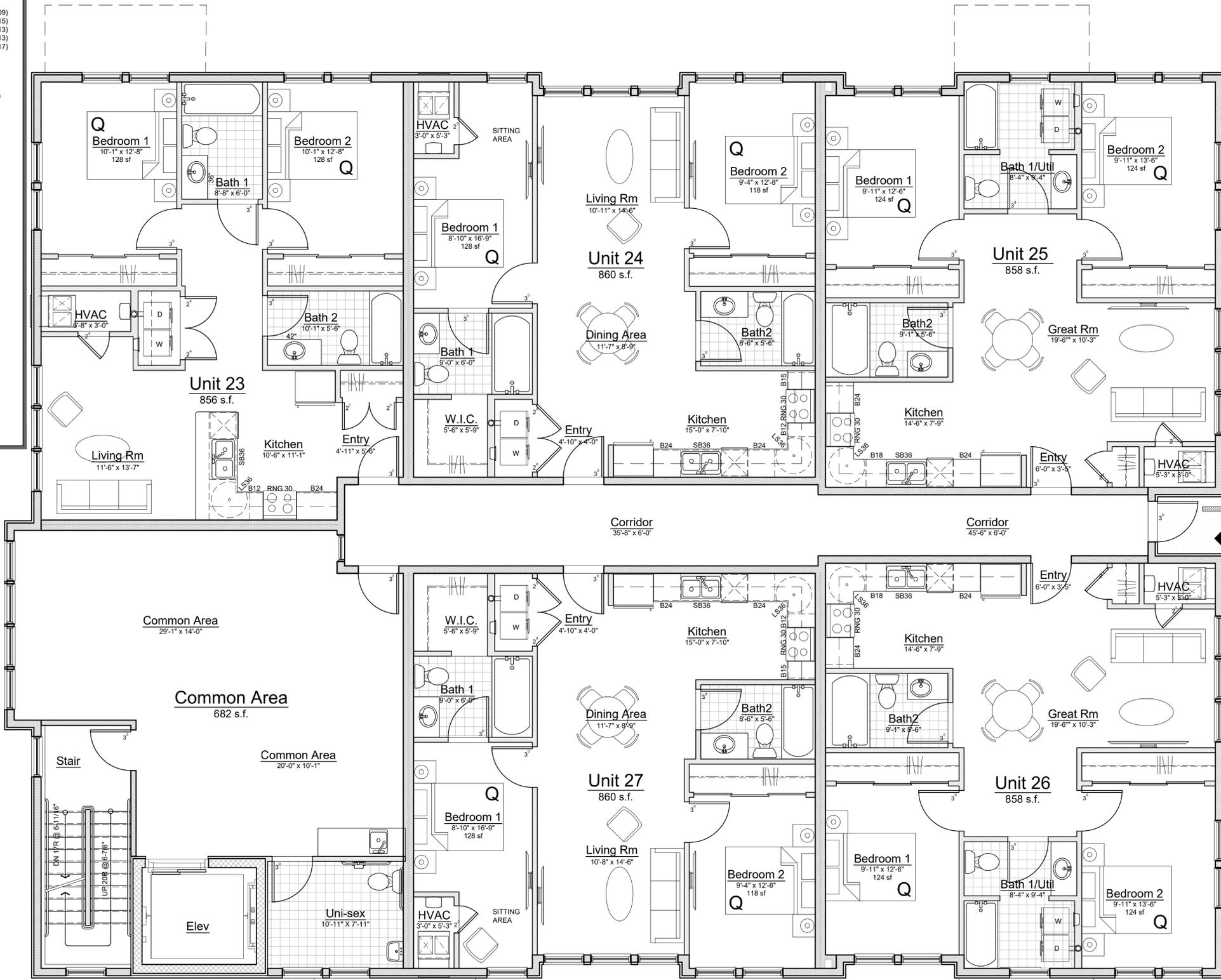
	Yes	X	No	—
(903) Automatic Sprinkler System Fully Sprinkled	Yes	X	No	—
NFPA 13 or 13R	Yes	X	No	—
(905) Standpipe System *	Yes	X	No	—
(907) Alarm System	Yes	X	No	—
Smoke Control System	Yes	X	No	—
Fire Control Room	Yes	X	No	—

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

Separation of multiple buildings on site per Sect. 503.1.2, 602

Exterior Rating based on Fire Separation Distance per Table 602

	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
North	10' or more	0 hr.	n/a
East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a



7" MAX STEP
 SECONDARY ACCESSIBLE ENTRY/EXIT STREET FACING @ BLDG A ONLY

1 FIRST FLOOR PLAN
 NORTH A1.1 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

Three Oaks Communities
 Charlevoix
 Auburn Angara Oaks
 First Floor Plan
 Bldg C

City Review	07.21.23
Revised	01.22.24

First Floor Plan
 Bldg C

JBMA Project No.
 222051

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A1.1c

Code Analysis summary, tagged to Planning Review comments. See Architectural sheet T1.2 for complete information.

Project Address:
 Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building
 3046 Anagra Drive
 Rochester Hills, Michigan 48309
Description of Work:
 Proposed new 9 unit, residential apartment (condominium) building.

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
ASHRAE 90.1 (2013)	NFPA 13 - Fire Sprinkler Systems (2013)
Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

Residential (Primary use - dwelling units/ accessory spaces) Use Group **R-2**
 Storage (Low-hazard storage / parking garage) Use Group **S-2**

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 (full NFPA-13) compliant sprinkler system)

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

Use Group:	Sprinkler system equipped*	
	Height (Feet)	Height (Stories)
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ACTUAL building height in Feet/Stories	29'-11"	2 Stories

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

Floor (Use Groups):	Max. Allowed* (sf)	Provided (sf)
Basement (Garage) Level: (S-2)	40,500	5,588
First Floor: (S-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

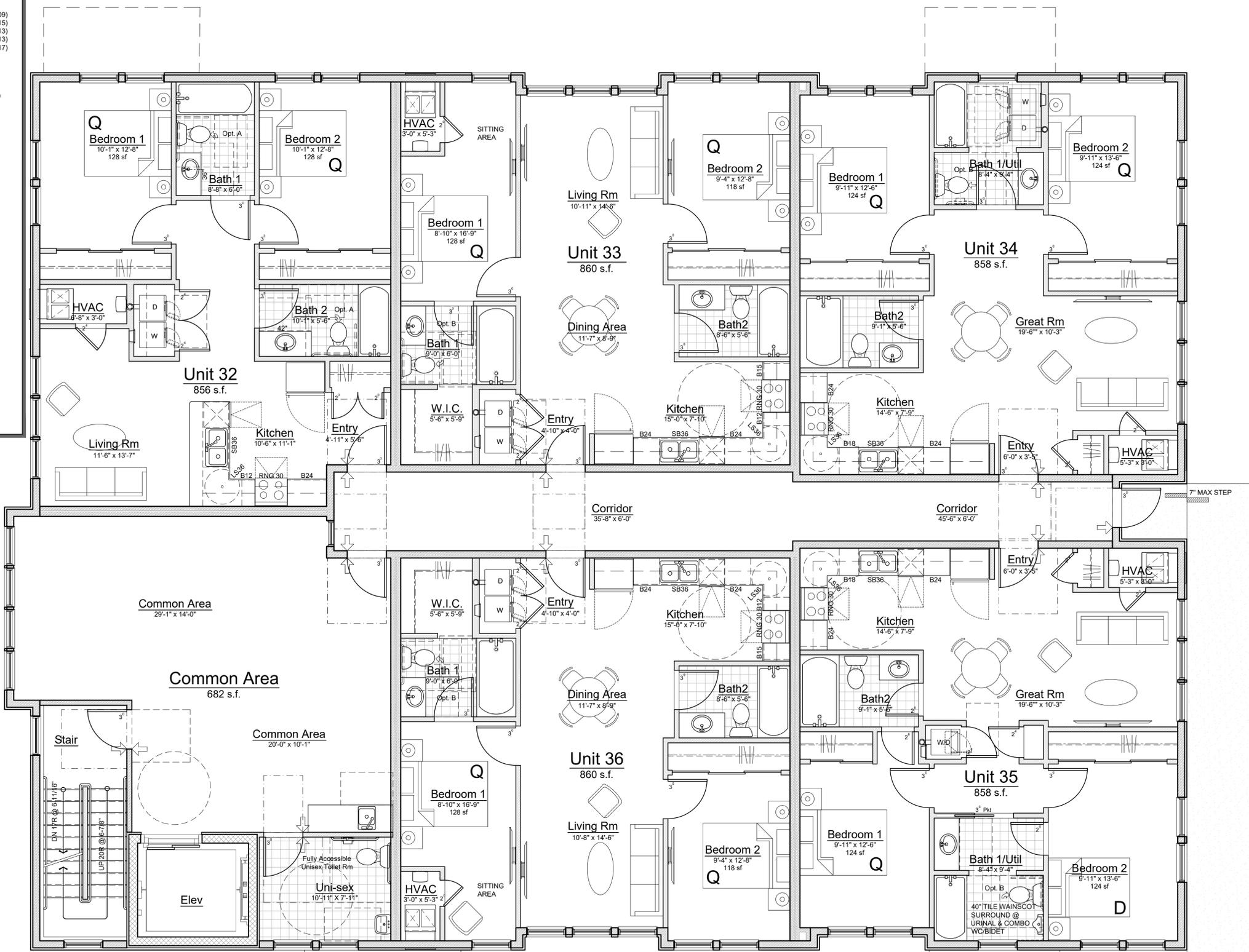
CHAPTER 9 Fire Protection Systems

	Yes	X	No	—
(903) Automatic Sprinkler System Fully Sprinkled	Yes	X	No	—
NFPA 13 or 13R	Yes	X	No	—
(905) Standpipe System *	Yes	X	No	—
(907) Alarm System	Yes	X	No	—
Smoke Control System	Yes	X	No	—
Fire Control Room	Yes	X	No	—

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

Separation of multiple buildings on site per Sect. 503.1.2, 602

Exterior Rating based on Fire Separation Distance per Table 602			
	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
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East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a



1 FIRST FLOOR PLAN
 NORTH SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

Three Oaks Communities
 Charlevoix
 Auburn Angara Oaks
 First Floor Plan
 Bldg D

City Review	07.21.23
Revised	09.26.23

First Floor Plan

Bldg D

JBMA Project No.
 222051

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A1.1d

J BRADLEY MOORE & ASSOCIATES, INC.
 4844 Jackson Road #150 • Ann Arbor, MI 48103 • (734) 930-1500

Code Analysis summary, tagged to Planning Review comments. See Architectural sheet T1.2 for complete information.

Project Address:
 Auburn Anagra Oaks Development - Charlevoix Model Multi-Family Building
 3046 Anagra Drive
 Rochester Hills, Michigan 48309
Description of Work:
 Proposed new 9 unit, residential apartment (condominium) building.

Reference Standards:

Michigan Building Code (2015)	ICC/ANSI A117.1 and Michigan Barrier Free Design Law (2009)
International Energy Code (2015)	International Fire Code (2015)
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Michigan Mechanical Code (2015)	NFPA 72 - Fire Alarm Code (2013)
Michigan Plumbing Code (2018)	Michigan Electrical Code (IEC + Part 8 State amendments) (2017)

Residential (Primary use - dwelling units/ accessory spaces) Use Group **R-2**
 Storage (Low-hazard storage / parking garage) Use Group **S-2**

Separated Mixed Use: Per Sect. 508.4, requires min. 1 hour fire separation between S and R uses (in building w/ 903.3.1.1 [full NFPA-13] compliant sprinkler system)

Type of Construction: 5B - (2) stories above grade w/ (1) story below grade garage

ALLOWABLE HEIGHT and BUILDING AREAS (per TABLES 504.3, 504.4 & 506.2):

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First Floor: (S-2)	21,000	5,700
Second Floor: (R-2)	21,000	5,708
TOTAL ACTUAL BLDG. AREA		16,996

*NFPA 13 complying with Section 903.3.1.1 (and **NOT** NFPA13R 903.3.1.2)

CHAPTER 9 Fire Protection Systems

	Yes	X	No	---
(903) Automatic Sprinkler System Fully Sprinkled	Yes	X	No	---
NFPA 13 or 13R	13	X	13R	---
(905) Standpipe System *	Yes	No	X	---
(907) Alarm System	Yes	X	No	---
Smoke Control System	Yes	No	X	---
Fire Control Room	Yes	No	X	---

* highest floor is 21'-4" = less than 30' above lowest fire vehicle access

Separation of multiple buildings on site per Sect. 503.1.2, 602

Exterior Rating based on Fire Separation Distance per Table 602

	Fire Sep'n Dist. (ft)	Req'd Rating	UL Listing and Notes
North	10' or more	0 hr.	n/a
East	10' or more	0 hr.	n/a
South	10' or more	0 hr.	n/a
West	10' or more	0 hr.	n/a



1 FIRST FLOOR PLAN
 NORTH A1.1 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

Three Oaks Communities
 Charlevoix
 Auburn Anagra Oaks
 First Floor Plan
 Bldg E

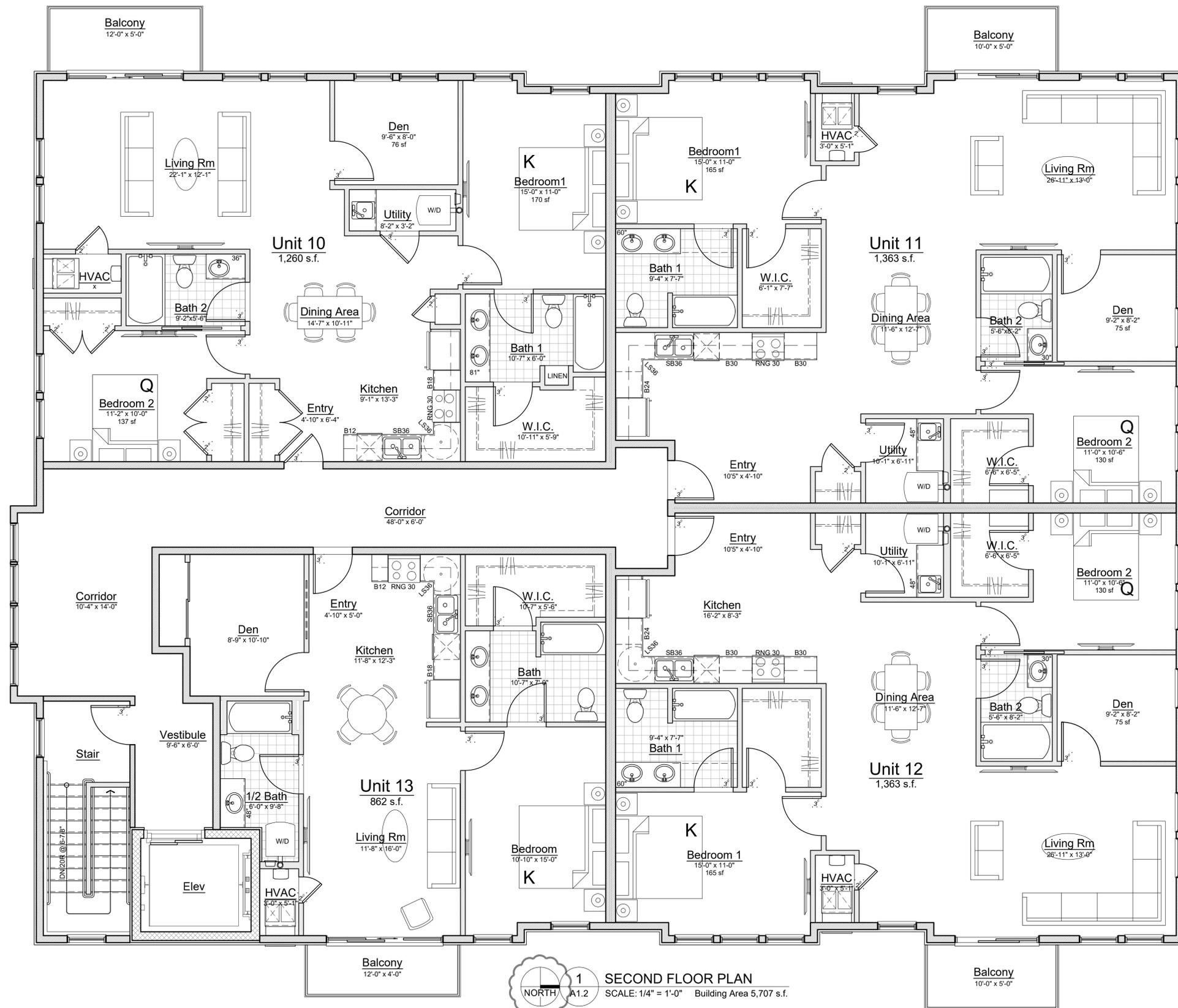
City Review	07.21.23
Revised	01.22.24

First Floor Plan
 Bldg E

JBMA Project No.
222051
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A1.1e

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1 SECOND FLOOR PLAN
 NORTH A1.2 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

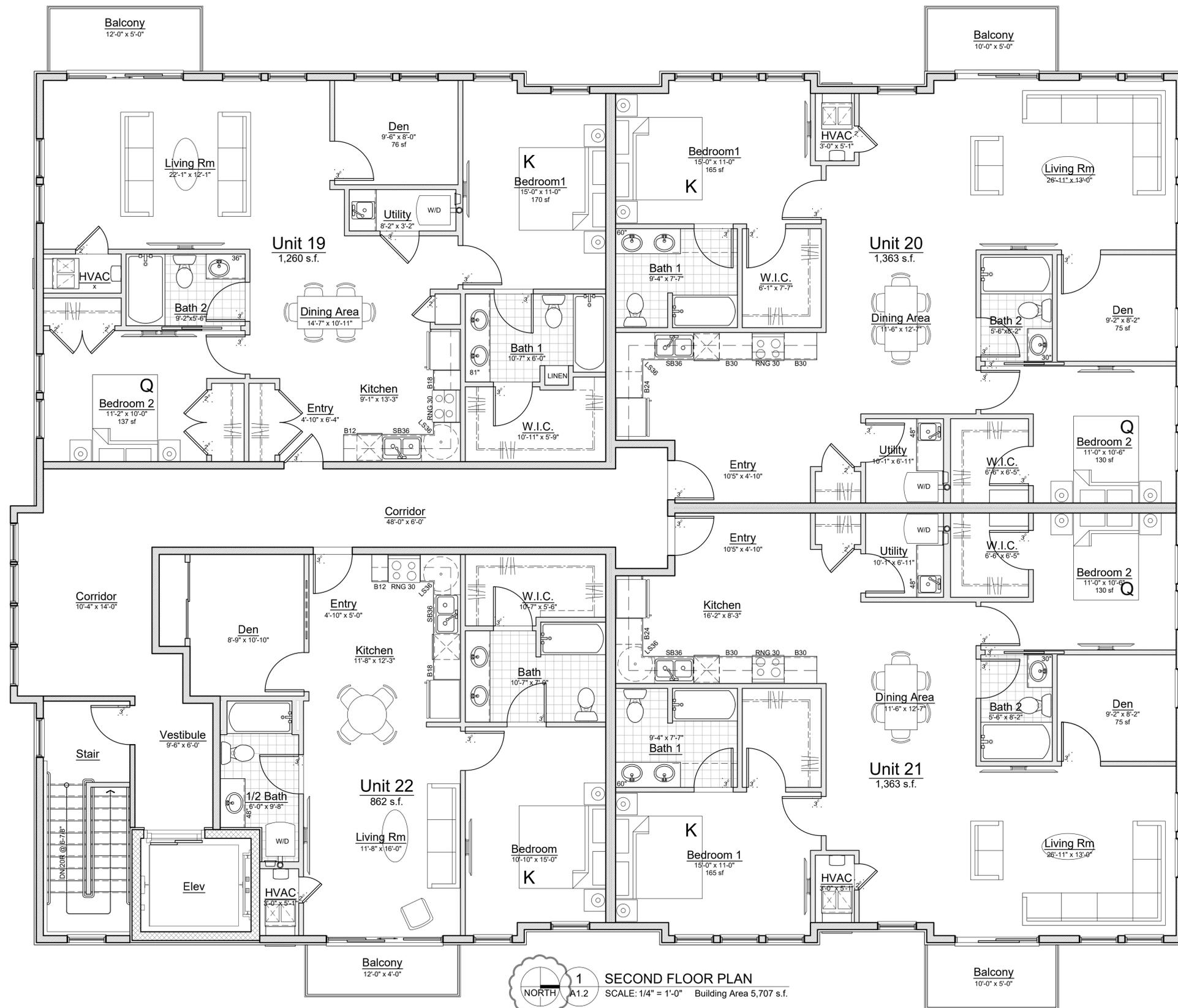
PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Second Floor
 Bldg A

JBMA Project No.
 222051
 © 2022

A1.2a



1 SECOND FLOOR PLAN
 NORTH A1.2 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

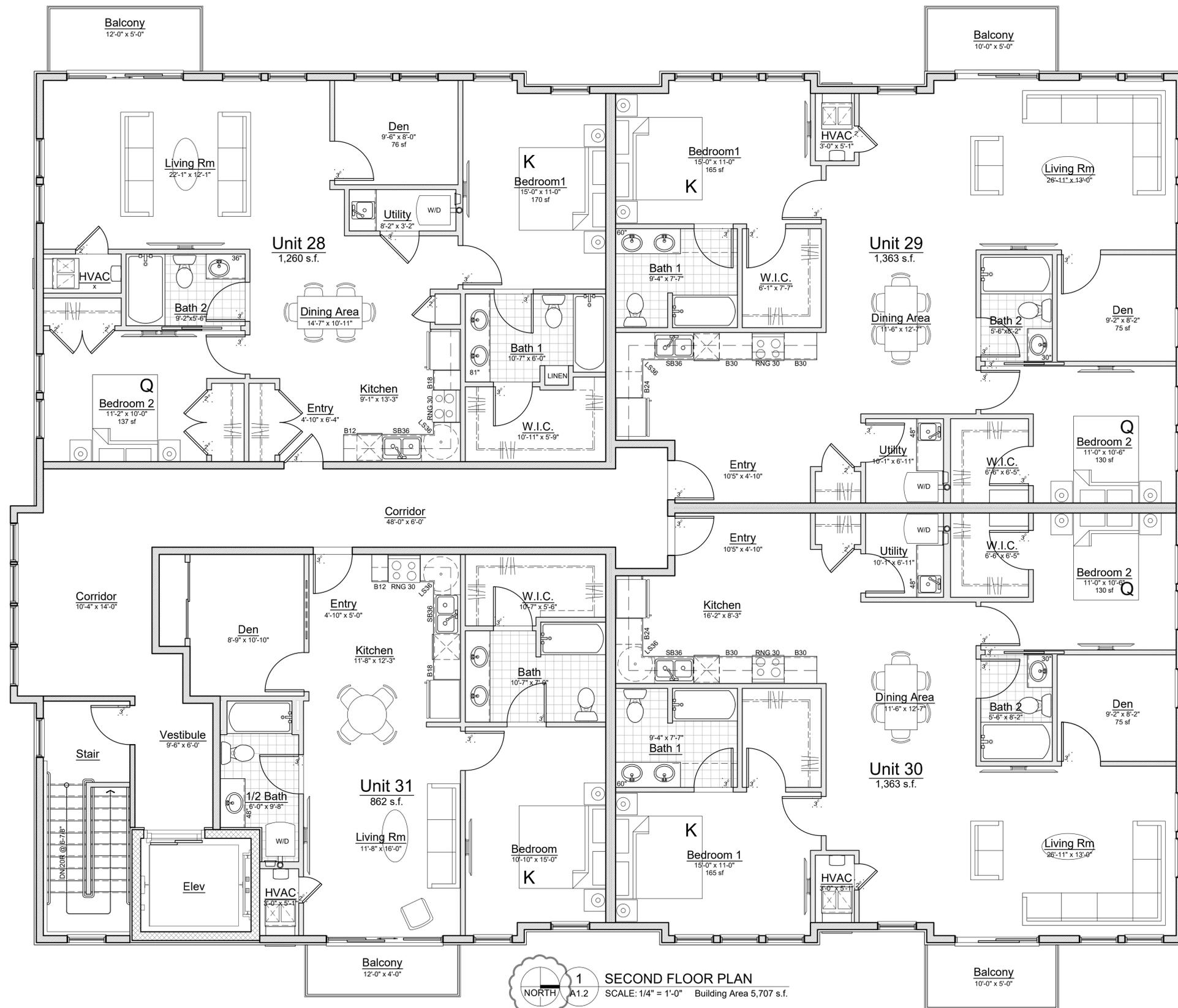
PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Second Floor
 Bldg B

JBMA Project No.
 222051
 © 2022

A1.2 b



1 SECOND FLOOR PLAN
 NORTH A1.2 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

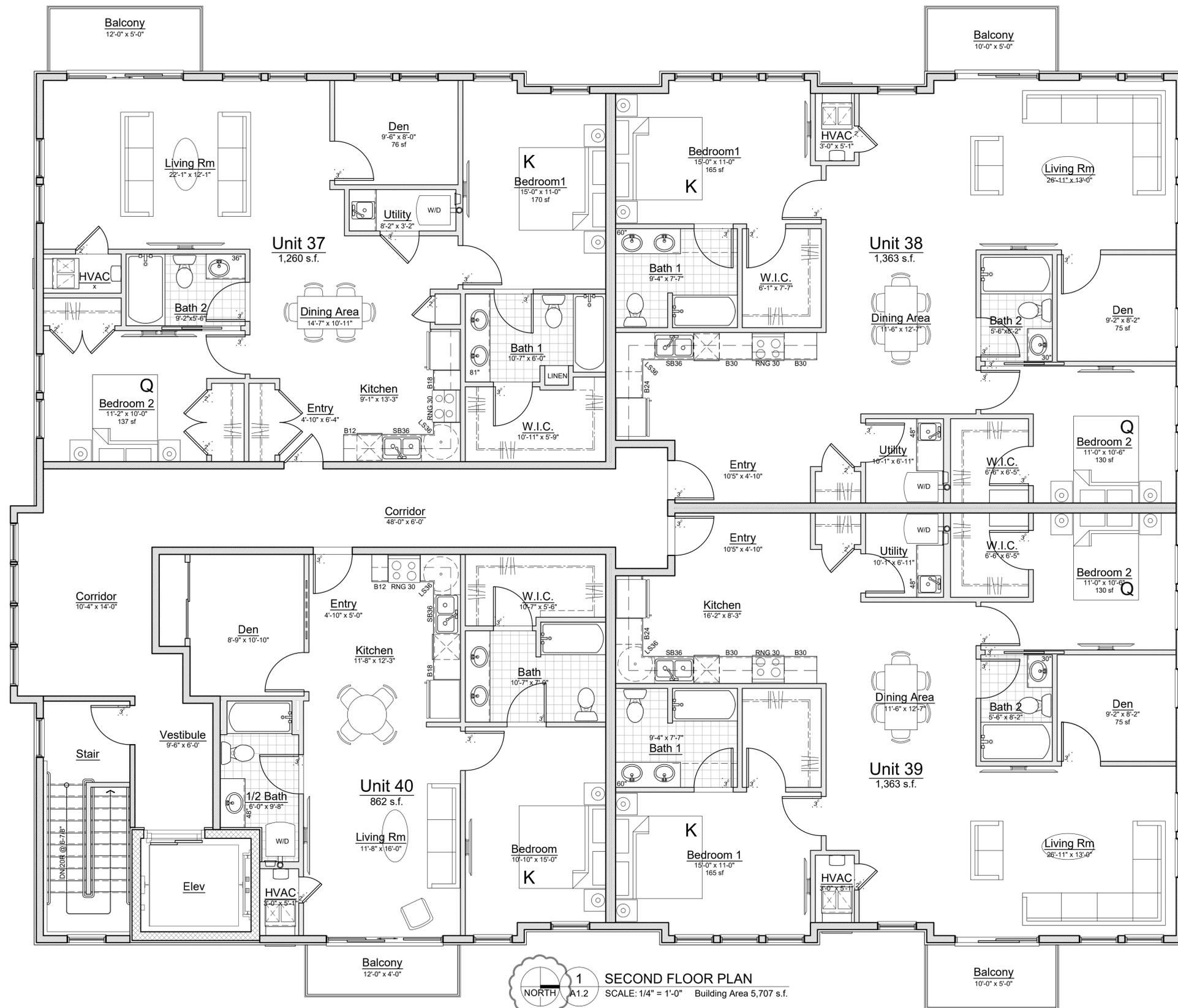
PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Second Floor
 Bldg C

JBMA Project No.
 222051
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A1.2 c



1 SECOND FLOOR PLAN
 NORTH A1.2 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Second Floor
 Bldg D

JBMA Project No.
 222051
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A1.2d



1 SECOND FLOOR PLAN
 NORTH A1.2 SCALE: 1/4" = 1'-0" Building Area 5,707 s.f.

PRELIMINARY NOT FOR CONSTRUCTION

City Review	07.21.23
Revised	01.22.24

Second Floor
 Bldg E

JBMA Project No.
 222051
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A1.2e



Level	Wall sf	Glazing sf	Total sf	Transparent %
1st	794	249	1043	24%
2nd	494	165	679	27%

2 story Total wall % 2 story
196.5 lf. 311.4 lf. 63.1%
The percentage of 2 story exterior wall of the building (63.1%) is more than 50%, therefore the building is considered a 2 story building per City of Rochester Hills Zoning Code definitions of story, including basements.

- 2nd Flr Ceiling EL. 8' nominal
- 1st Flr Win Hd. EL. 6'-8" a.f.f.
- Second Floor A EL. 848'-11 1/8"
- Second Floor B EL. 849'-11"
- Second Floor C EL. 833'-11 1/8"
- 1st Flr Ceiling EL. 10' nominal
- 1st Flr Win Hd. EL. 7'-0" a.f.f.
- Finish 1st Floor A Building 'A' -2.60' EL. 839'-7 1/4"
- Finish 1st Floor B Building 'B' -1.51' EL. 831'-7 1/8"
- Finish 1st Floor C Building 'C' -2.26' EL. 824'-7 1/4"
- Basmt Win Hd. EL. 7'-0" a.f.f.
- Garage Slab A EL. 829'-9 1/8"
- Garage Slab B EL. 821'-9"
- Garage Slab C EL. 814'-9 1/4"

Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevation
Building A - East (street) Facade

City Review 07.21.23

Elevation
East (Street)
Bldg A

JBMA Project No.

222051

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A2.1a

PRELIMINARY NOT FOR CONSTRUCTION



Transparency by floor

Level	Wall sf	Glazing sf	Total sf	Transparent
1st	734	309	1043	30%
2nd	494	165	679	27%

2 story Total wall % 2 story
 196.5 lf. 311.4 lf. 63.1%
 The percentage of 2 story exterior wall of the building (63.1%) is more than 50%, therefore the building is considered a 2 story building per City of Rochester Hills Zoning Code definitions of story, including basements.

Three Oaks Communities
 Charlevoix
 Auburn Flats
 Exterior Elevation
 Buildings B, C - East (street) Facade

Garage Slab A EL. 829'-9 1/8"	City Review	07.21.23
Garage Slab B EL. 821'-9"		
Garage Slab C EL. 814'-9 1/4"		

Elevation
 East (Street)
 Bldgs B, C

JBMA Project No.
 222051

© 2022
 A2.1bc

PRELIMINARY NOT FOR CONSTRUCTION



Transparency by floor				
Level	Wall sf	Glazing sf	Total sf	Transparent
1st	734	309	1043	30 %
2nd	494	165	679	27 %

CHARLEVOIX - AUBURN
 GARAGE ELEVATION
 BUILDING D - EAST FACADE
 SCALE 1/4" = 1'-0"

Three Oaks Communities
 Charlevoix
 Auburn Flats
 Exterior Elevation
 Building D - East (Garage) Facade

City Review 07.21.23

Elevation
 East (Garage)
 Bldg D

JBMA Project No.

222051

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PRELIMINARY NOT FOR CONSTRUCTION

A2.1d



CHARLEVOIX - AUBURN
 GARAGE ELEVATION
 BUILDING E - WEST FACADE
 SCALE 1/4" = 1'-0"

Three Oaks Communities
 Charlevoix
 Auburn Flats
 Exterior Elevation
 Building E - West (Garage) Facade

City Review 07.21.23

Elevation
 West (Garage)
 Bldg E

JBMA Project No.

222051

© 2022

PRELIMINARY NOT FOR CONSTRUCTION

A2.1e

Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevation
Building A - West (Rear) Facade



City Review 07.21.23

Elevation
West (Rear)
Bldg A

JBMA Project No.

222051

© 2022

A2.2a

PRELIMINARY NOT FOR CONSTRUCTION



Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevation
Buildings B, C - West (Rear) Facade

City Review 07.21.23

Elevation
West (Rear)
Bldgs B, C

JBMA Project No.

222051

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A2.2bc

PRELIMINARY NOT FOR CONSTRUCTION



CHARLEVOIX - AUBURN
STREET LONG SIDE ELEVATION
BUILDING D - WEST FACADE
SCALE 1/4" = 1'-0"

PRELIMINARY NOT FOR CONSTRUCTION



CHARLEVOIX - AUBURN
 REAR ELEVATION
 BUILDING E - EAST FACADE
 SCALE 1/4" = 1'-0"

Three Oaks Communities
 Charlevoix
 Auburn Angara Oaks
 Exterior Elevation
 Building E - East (Rear) Facade

City Review	07.21.23
Revised	01.22.24

Elevation
 East (Rear)
 Bldg E

JBMA Project No.

222051

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PRELIMINARY NOT FOR CONSTRUCTION

A2.2e



Level	Wall sf	Glazing sf	Total sf	Transparent %
1st	589	200	789	25%
2nd	375	138	513	27%

Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevation
Building A - North (End) Facade

City Review	07.21.23

Elevation
North (End)
Bldg A

JBMA Project No.
222051

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A2.3a

PRELIMINARY NOT FOR CONSTRUCTION



Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevation
Buildings B, C - North (End) Facade

City Review 07.21.23

Elevation
North (End)
Bldgs B, C

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222051

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A2.3bc

PRELIMINARY NOT FOR CONSTRUCTION



Level	Wall sf	Glazing sf	Total sf	Transparent
1st	592	197	789	25%
2nd	375	138	513	27%

CHARLEVOIX - AUBURN
 END ELEVATION
 BUILDING D - NORTH FACADE
 SCALE 1/4" = 1'-0"

Three Oaks Communities
 Charlevoix
 Auburn Flats
 Exterior Elevation
 Building D - North (End) Facade

City Review 07.21.23

Elevation
 North (End)
 Bldg D

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PRELIMINARY NOT FOR CONSTRUCTION

A2.3d



CHARLEVOIX - AUBURN
END ELEVATION
BUILDING E - NORTH FACADE
SCALE 1/4" = 1'-0"

Three Oaks Communities
Charlevoix
Auburn Flats
Exterior Elevatin
Building E - North (End) Facade

City Review 07.21.23

Elevations
North (End)
Bldg E

JBMA Project No.

222051

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PRELIMINARY NOT FOR CONSTRUCTION

A2.3e