CAYMAN CHEMICAL 1428 ADDITION

TAX ID# L-12-16-100-003 & -004

FINAL SITE PLAN

PITTSFIELD TOWNSHIP, MICHIGAN

ABBREVIATIONS

A	A.F.F.	ABOVE FINISH FLOOR
	AC.	ACRE
	A/C	AIR CONDITION
B	B/C	BOTTOM OF CURB
	B.F.F.	BELOW FINISH FLOOR
	BLDG.	BUILDING
C	CB	CATCH BASIN
	C.O.	CLEAN OUT
	CONC.	CONCRETE
	C.J.	CONTROL JOINT
D	DIA.	DIAMETER
	D.I.	DUCTILE IRON
E	EA.	EACH
	ELEC.	ELECTRIC
	EL./ ELEV.	ELEVATION
	EXIST./ EX.	EXISTING
F	FT.	FEET
	F.F.	FINISH FLOOR
	F.H.	FIRE HYDRANT
G	GA.	GAUGE
	GALV.	GALVANIZED
H	HT.	HEIGHT
	H.P.	HIGH POINT
	H.M.	HOLLOW METAL
	HORIZ.	HORIZONTAL
I	I.D.	INSIDE DIAMETER
	INV.	INVERT
J	JT.	JOINT
L	L.L.	LIVE LOAD
	L.P.	LOW POINT
M	MH	MANHOLE
	MAS.	MASONRY
	M.O.	MASONRY OPENING
	MAX.	MAXIMUM
	MIL.	MILLIMETER
	MIN.	MINIMUM
	MTD	MOUNTED
N	NOM.	NOMINAL
	NO.	NUMBER
O	O.C.	ON CENTER
	O.D.	OUTSIDE DIAMETER
	O.H.	OVERHEAD
	OE	OVERHEAD ELECTRIC
	OTE	OVERHEAD TELEPHONE & ELECTRIC
P	PSF	POUNDS PER SQUARE FOOT
	PSI	POUNDS PER SQUARE INCH
	PEMB	PRE-ENGINEERED METAL BUILDING
R	RAD.	RADIUS
	R.O.W.	RIGHT OF WAY
	RTU	ROOF TOP UNIT
S	SAN.	SANITARY
	SCH.	SCHEDULE
	S.P.A.	SITE PLAN APPROVAL
	SQ. FT./ S.F.	SQUARE FEET
	ST. MH	STORM MANHOLE
T	TV&S	TAPPING VALVE & SLEEVE
	T/C	TOP OF CURB
	TYP.	TYPICAL
U	UE	UNDERGROUND ELECTRICAL
	UTE	UNDERGROUND TELEPHONE & ELECTRICAL
	U.P.	UTILITY POLE
V	VERT.	VERTICAL
W	W/	WITH
	W/O	WITHOUT

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

BENCHMARKS:

#1 TOP OF NORTHERN MOST STEAMER VALVE ON HYDRANT LOCATED IN CENTER OF CONCRETE ISLAND AT REAR OF COMPLEX. ELEV=825.78 (NAVD 88 DATUM)

#2 R.R. SPIKE ON S.W. SIDE OF UTILITY POLE LOCATED AT THE N.E. CORNER OF ELLSWORTH AND STONE SCHOOL ROADS. ELEV=837.28 (NAVD 88 DATUM)

#3 ARROW ON HYDRANT IN THE ELLSWORTH RD. ROW WEST OF THE ENTRY DRIVE TO 1428 ELLSWORTH RD. – ELEVATION 824.80 (NAVD 88 DATUM)

LEGAL DESCRIPTION

PARCEL ID # L -12-16-100-003

Premises situated in the Township of Pittsfield, County of Washtenaw, and State of Michigan
A part of the Northeast 1/4 of Section 16, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, described as: Commencing at the North 1/4 corner of said Section; thence North 87°43'45" East 1671.98 feet; thence South 02°16'15" East 60 feet to the PLACE OF BEGINNING; thence North 87°43'45" East 300.00 feet; thence South 1°53'15" East 602.71 feet; thence South 87°43'45" West 300.00 feet; thence North 1°53'15" West 602.71 feet to the Place of Beginning, containing 4.15 acres more or less.

PARCEL ID # L -12-16-100-004

Warranty Deed Liber 4381, page 824
Premises situated in the Township of Pittsfield, County of Washtenaw, and State of Michigan
A part of the Northeast 1/4 of Section 16, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, described as: Commencing at the North 1/4 corner of said Section; thence North 87°43'45" East 946 feet; thence South 02°16'15" East 60 feet to the PLACE OF BEGINNING; thence North 87°43'45" East 725.59 feet; thence South 1°53'15" East 602.71 feet; thence South 87°43'45" West 721.55 feet; thence North 2°16'15" West 602.71 feet to the Place of Beginning, containing 10.01 acres more or less.

COMBINED PARCEL DESCRIPTION

Premises situated in the Township of Pittsfield, County of Washtenaw, and State of Michigan
A part of the Northeast 1/4 of Section 16, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, described as: Commencing at the North 1/4 corner of said Section; thence North 87°43'45" East 946 feet; thence South 02°16'15" East 60 feet to the PLACE OF BEGINNING; thence North 87°43'45" East 1025.59 feet; thence South 0°53'15" East 602.71 feet; thence South 87°43'45" West 1021.55 feet; thence North 2°16'15" West 602.71 feet to the Place of Beginning, containing 14.16 acres more or less.

UTILITY NOTES

PUBLIC UTILITIES

The existing utilities shown on the drawings represent the best information available as obtained from existing records and by field surveys. This information does not relieve the contractor of the responsibility to contact Miss Dig or to satisfy himself as to the accuracy of the location shown. These documents were prepared using the best information available from existing documents and records. The contractor/project manager/subcontractor/superintendent is responsible for verifying the existing conditions on the site, and shall notify the engineer of any discrepancies prior to proceeding with work.

SEWER & WATER
Utilities Department
Pittsfield Township
6201 W. Michigan Ave.
Ann Arbor, Michigan 48108
Office (734) 822-2110

TELEPHONE
AT&T
5500 South Maple Road
Ann Arbor, Michigan 48103
(734) 996-5351

ELECTRIC
DTE Energy
982 Broadway Ave.
Ann Arbor, Michigan 48105
Service Planning (734) 332-3300

GAS
DTE Energy
3150 East Michigan Avenue
Ypsilanti, Michigan 48198
(734) 485-8230

For protection of underground utilities, the contractor shall notify the Miss Dig Utility Location Service a minimum of 72 hours prior to excavation.

The improvements covered by these plans shall be done in accordance with Pittsfield Township current standard specifications and supplemental specifications.

GENERAL INFORMATION

OWNER:	Maxey LLC 1428 Ellsworth Rd. Ann Arbor, Michigan 48108
PROPERTY LOCATION:	1428 E. Ellsworth Ann Arbor, Michigan 48108
PROJECT ENGINEER:	Vanston/O'Brien, Inc. 8150 Jackson Road, Ste. A Ann Arbor, MI 48103 Ph: (734) 424-0661 Fax: (734) 424-0677
APPLICANT:	Vanston/O'Brien, Inc. 8150 Jackson Road, Ste. A Ann Arbor, MI 48103 Ph: (734) 424-0661 Fax: (734) 424-0677

SITE INFORMATION

ZONING: BD Business District
GROSS LOT AREA: 10.01 Acres (436,095 SF) & 4.15 Acres (180,809 SF) =14.16 Acres (616,904 SF)
NET LOT AREA: 14.02 Acres (610,887 SF)

BUILDING AREA:
EXISTING
62,770 SF (8700sf 2nd floor) AT 1180 E. ELLSWORTH
26,000 SF AT 1428 E. ELLSWORTH
PROPOSED
22,200 SF (42,000sf 2nd & 3rd floor) AT 1428 E. ELLSWORTH
TOTAL
110,970 SF BUILDING AREA – 161,670 SF FLOOR AREA

IMPERVIOUS AREA:
EXISTING
241,130 SF
PROPOSED
287,500 SF

	REQUIRED	EXISTING	PROPOSED
MIN. LOT AREA	1 ACRE	14.16 ACRES	14.16 ACRES
MIN. LOT WIDTH	150 ft.	725.59 ft.	725.59 ft.
MAX. LOT COVERAGE	40%	14.5%	18.2%
MAX. FLOOR AREA COVERAGE	60%	16.0%	26.5%
IMPERVIOUS AREA RATIO	60%	39.5%	47.1%
MAX. BUILDING HEIGHT	45 ft. max., 3 story	29.0 ft., 2 story	45 ft., 3 story
FRONT SETBACK	25 ft.	100 ft.	100 ft.
SIDE SETBACK	20 ft. ea.	74 ft.	74 ft.
REAR SETBACK	35 ft. min.	42 ft.	42 ft.

PARKING: 1180 E. ELLSWORTH CAYMAN FACILITY
REQUIRED: WAREHOUSE: (1) SPACE FOR EVERY 1500 SF + 1 PER EMPLOYEE MAX SHIFT
= 16,750/1500 + 6 = 17 SPACES
LAB: (1) SPACE FOR EVERY 550 SF = 46,020/550 = 84 SPACES

REQUIRED: 101 SPACES (87 spaces existing including (5)barrier-free spaces)

PARKING: 1428 E. ELLSWORTH CAYMAN FACILITY
REQUIRED: EXISTING:
LAB; 1 SPACE PER 550 SF; 23,200 SF / 550 = 42; AND
WAREHOUSE; 1 SPACE PER 1500 SF + 1 PER EMPLOYEE MAX SHIFT;
2,800 SF / 1500 + 0 = 2 SPACES

PROPOSED:
LAB: (1) SPACE FOR EVERY 550 SF = 60,080/550 = 109 SPACES

REQUIRED: 153 SPACES (20 existing spaces remain including (2)barrier-free spaces)

TOTAL PARKING REQUIRED:
MECHANICAL MEZZANINES: 12,820 SF = 0 SPACES
WAREHOUSE: (1) SPACE FOR EVERY 1500 SF + 1 PER EMPLOYEE MAX SHIFT
= 19,550/1500 + 6 = 19 SPACES
LAB: (1) SPACE FOR EVERY 550 SF = 129,300/550 = 235 SPACES

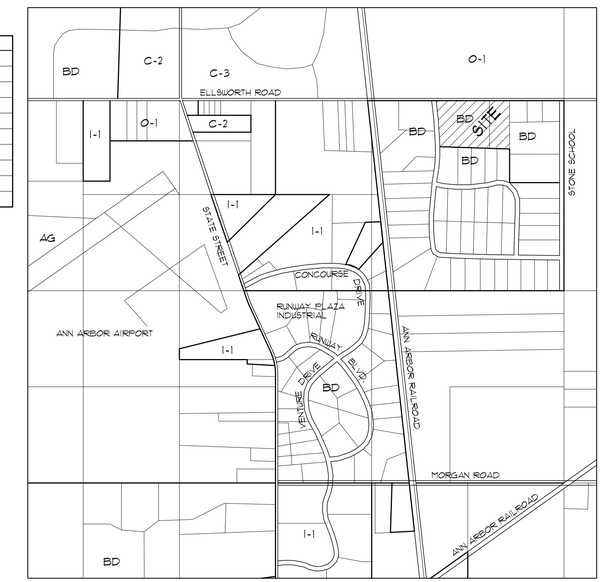
PROPOSED: 107 EXISTING SPACES & 147 NEW SPACES, INCLUDING (8)BARRIER FREE SPACES

MdA: Matherton sandy loam, 0 to 4% slopes
MfA: Metamora sandy loam, 0 to 4% slopes
NaB: Nappanee silty clay loam, 2 to 6% slopes
Sb: Sebewa loam

SOILS MAP
SCALE: 1" = 200' (+/-)

GENERAL NOTES:

1. All site work shall meet all applicable codes, laws, and regulations, including ADA Accessibility Guidelines (ADAAG) and Michigan Barrier-Free Design Requirements for all walkways and accessible paths.
2. Provide signs per Michigan Barrier-Free Requirements at all handicapped spaces.
3. The Contractor shall call Miss Dig utility location service at least 72 hours prior to any excavation.



VICINITY MAP
SCALE: 1" = 1000'

DRAWING INDEX:

C-1	TITLE SHEET
C-2	EX. CONDITIONS & DEMOLITION PLAN
C-3	SITE PLAN
C-4	GRADING PLAN
C-5	DRAINAGE PLAN
C-6	DRAINAGE CALCULATIONS
C-7	LANDSCAPE PLAN
C-8	LIGHTING PLAN
C-9	FIRE ACCESS PLAN
C-10	DETAIL SHEET
C-11	SIDEWALK PLAN
C-12	BUILDING FLOOR PLANS
C-13	BUILDING FLOOR PLANS
C-14	BUILDING ELEVATIONS

CSPA 18-18 Cayman Chemical

Revised Final Site Plan Submittal

REC: 2019-04-22

STATE OF MICHIGAN GREGORY HEIM ENGINEER No. 56447 LICENSED PROFESSIONAL ENGINEER

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Road, Ste. A Tel: (734) 424-0661
Ann Arbor, MI 48103 Fax: (734) 424-0677
e-mail: design@vanston.com ◆ www.vanston.com

CAYMAN CHEMICAL 1428 ADDITION
1428 E. Ellsworth Road
Pittsfield Township, Michigan

THIS MATERIAL, INCLUDING IDEAS, DRAWINGS AND DESIGN, IS OWNED BY AND IS THE EXCLUSIVE PROPERTY OF VANSTON/O'BRIEN, INC. AND CANNOT BE REPRODUCED OR REUSED IN ANY MANNER WITHOUT THE PRIOR CONSENT OF VANSTON/O'BRIEN, INC.

ISSUED FOR:	DATE:
SITE PLAN	10-15-18
REVISED	10-30-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	2-28-19
REVISED	4-14-19

DRAWN BY: GAH/CLN
JOB NO.: –

TITLE SHEET
CAYMAN CHEMICAL
1428 ADDITION
CSPA#18-18
SHEET NO.
C-1

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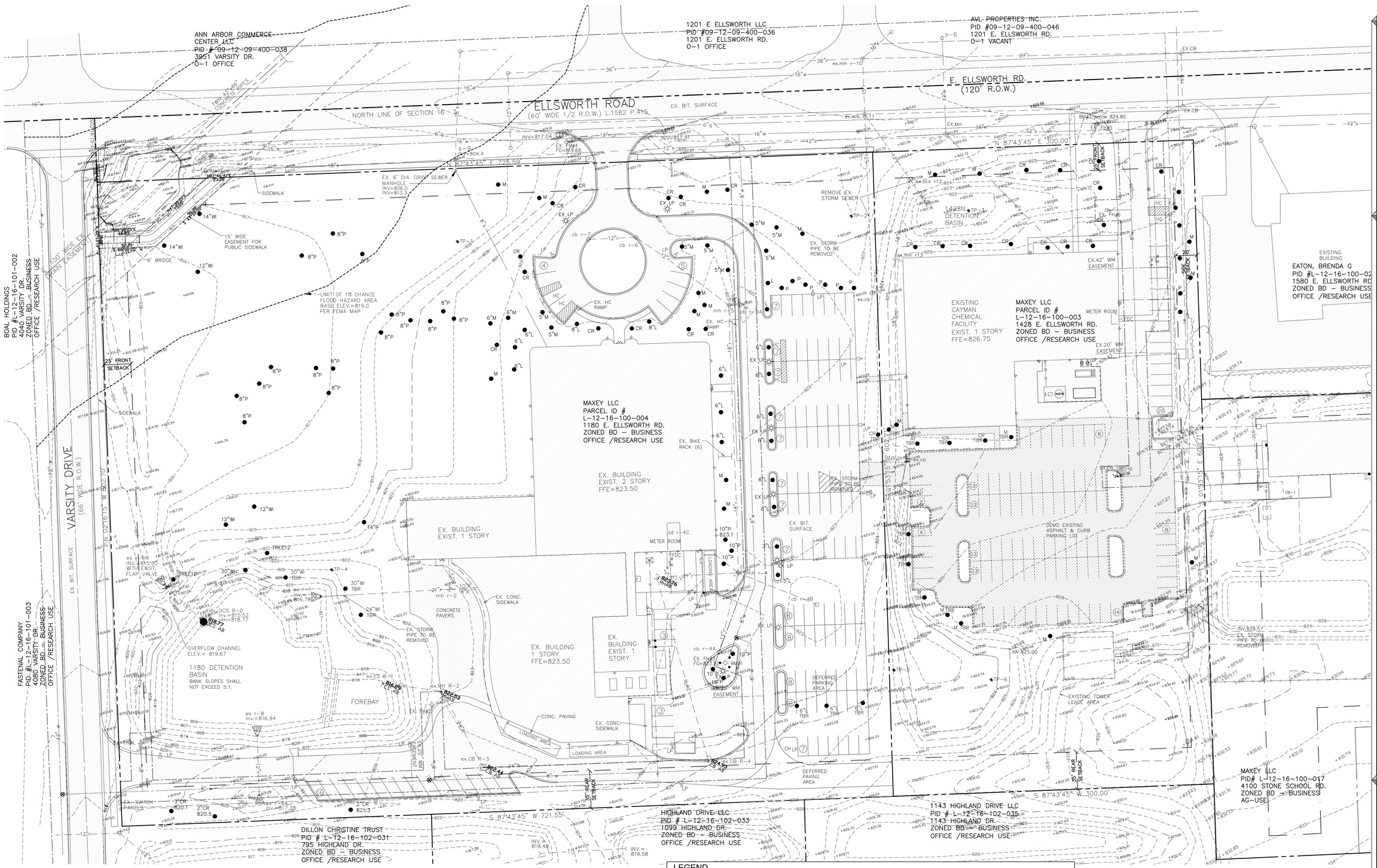

Natural Features:
The site features a county drain at the northwest corner of the site which serves as the ultimate outlet for the existing detention basins on site. These basins are located in the southwest corner and the northeast corner combined with a south east basin. each basin shall be modified for the proposed development.
The site, in general, sloped down from east to west with elevations ranging from approximately 836 ft to 814 ft. Six test pits were excavated using an excavator with a 2 ft wide bucket. Test pit locations are shown on the attached location plan, Figure No. 1. Test pits were extended to depths ranging from 4 to 8 ft below the existing grade.
In general, the test pits encountered 8 to 24 inches of silty or clayey topsoil. Beneath the surficial material, Test Pits TP–1 and TP–3 to TP–6 generally encountered a mix of clay and sandy soils with silt or clay. Test Pits TP–2 encountered predominantly clayey soils.
Ground water was encountered in Test Pits TP–3, TP–4 and TP–6 at depths of 2.3 to 6.3 ft below the ground surface.
Infiltration tests were performed within Test Pits TP–4 and TP–5 using the double ring method outlined in the Washtenaw County Water Resource Commissioner's Procedures and Design Criteria for Storm Water Management. Infiltration testing was not performed in the remaining test pits due to the generally clayey nature of the encountered soil and due to the saturated nature of encountered sandy soil.

LEGEND

PROPERTY LINE	EXISTING WALL MOUNTED LIGHT FIXTURE
SETBACK	NEW BUILDING MOUNTED LIGHTING
EASEMENT	NEW POLE-MOUNTED LIGHT
PROPOSED STORM	EX.UP EXISTING UTILITY POLE
PROPOSED WATER	EX.MH EXISTING MANHOLE
PROPOSED UNDERGROUND ELECTRIC & TELEPHONE	EX.CO EXISTING CLEAN OUT
PROPOSED GAS	CB R–1 NEW CATCH BASIN
PROPOSED SANITARY	EX. FH EXISTING FIRE HYDRANT
EXISTING STORM	NEW FH #3 NEW FIRE HYDRANT
EXISTING WATER	× 660.90 EXISTING ELEVATION
EXISTING TELEPHONE	884.00 PROPOSED ELEVATION
EXISTING ELECTRIC	
EXISTING UNDERGROUND CABLE	
EXISTING GAS	
EXISTING SANITARY	
EXISTING CENTERLINE OF DITCH	
(914) EXISTING CONTOUR	
914 PROPOSED CONTOUR	
LINE OF SILT FENCE	

EXISTING BUILDING	
EXISTING GRAVEL SURFACE	
EXISTING ASPHALT PAVING	
PROPOSED BUILDING	
PROPOSED ASPHALT PAVING	
PROPOSED CONCRETE	
PROPOSED HEAVY DUTY ASPHALT PAVING	

EX. CONDITIONS & DEMOLITION PLAN

SCALE: 1" = 40'-0"

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

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REVISED	4–15–19

DRAWN BY: GAH/R.S.
JOB NO.: ---

EX. CONDITIONS & DEMO PLAN

SHEET NO.

C–2

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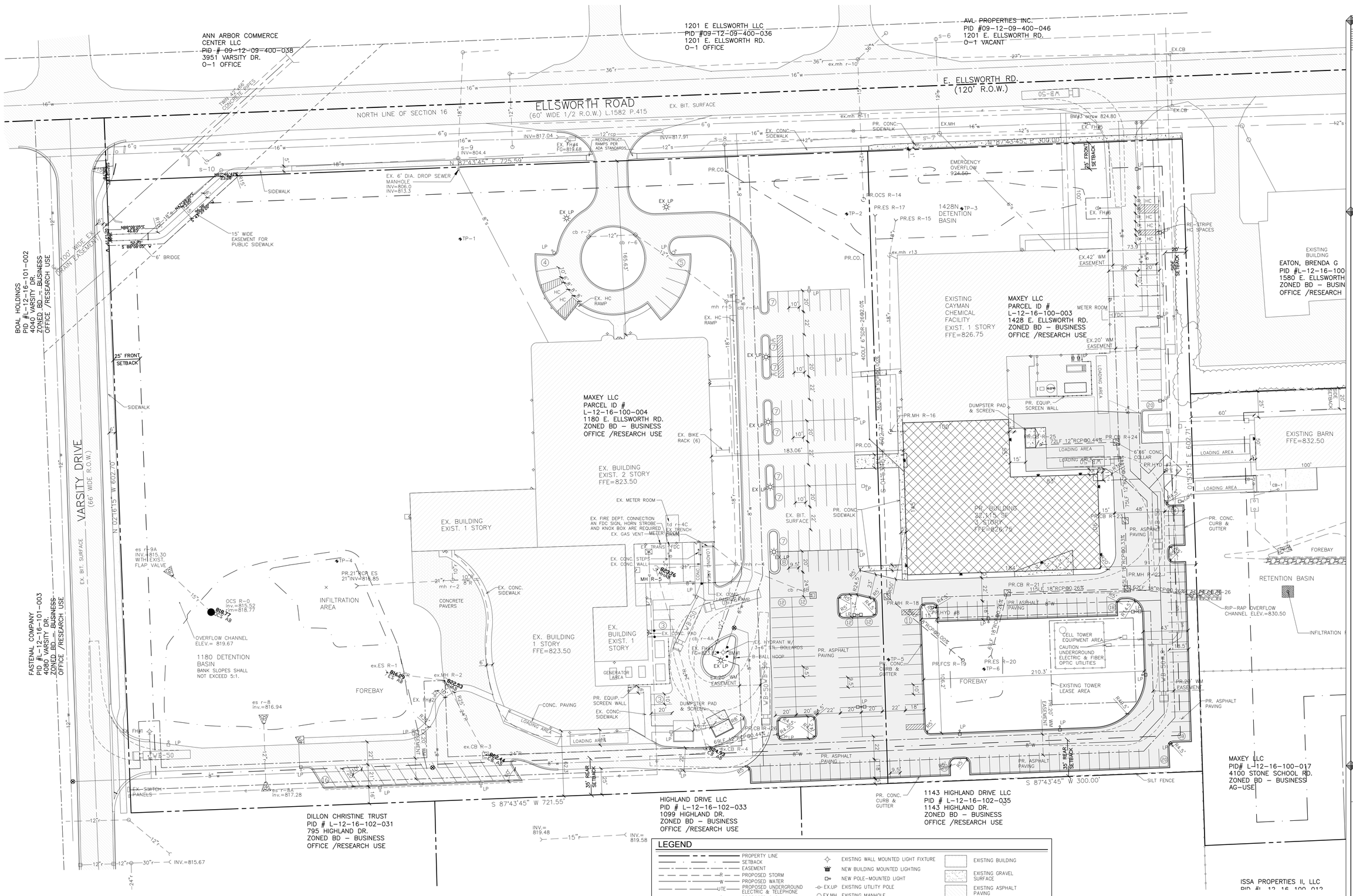

SITE PLAN

SCALE: 1" = 40'-0"

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Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
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e-mail: design@vanston.com • www.vanston.com
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JOB NO.: ---

SITE PLAN

SHEET NO.

C-3

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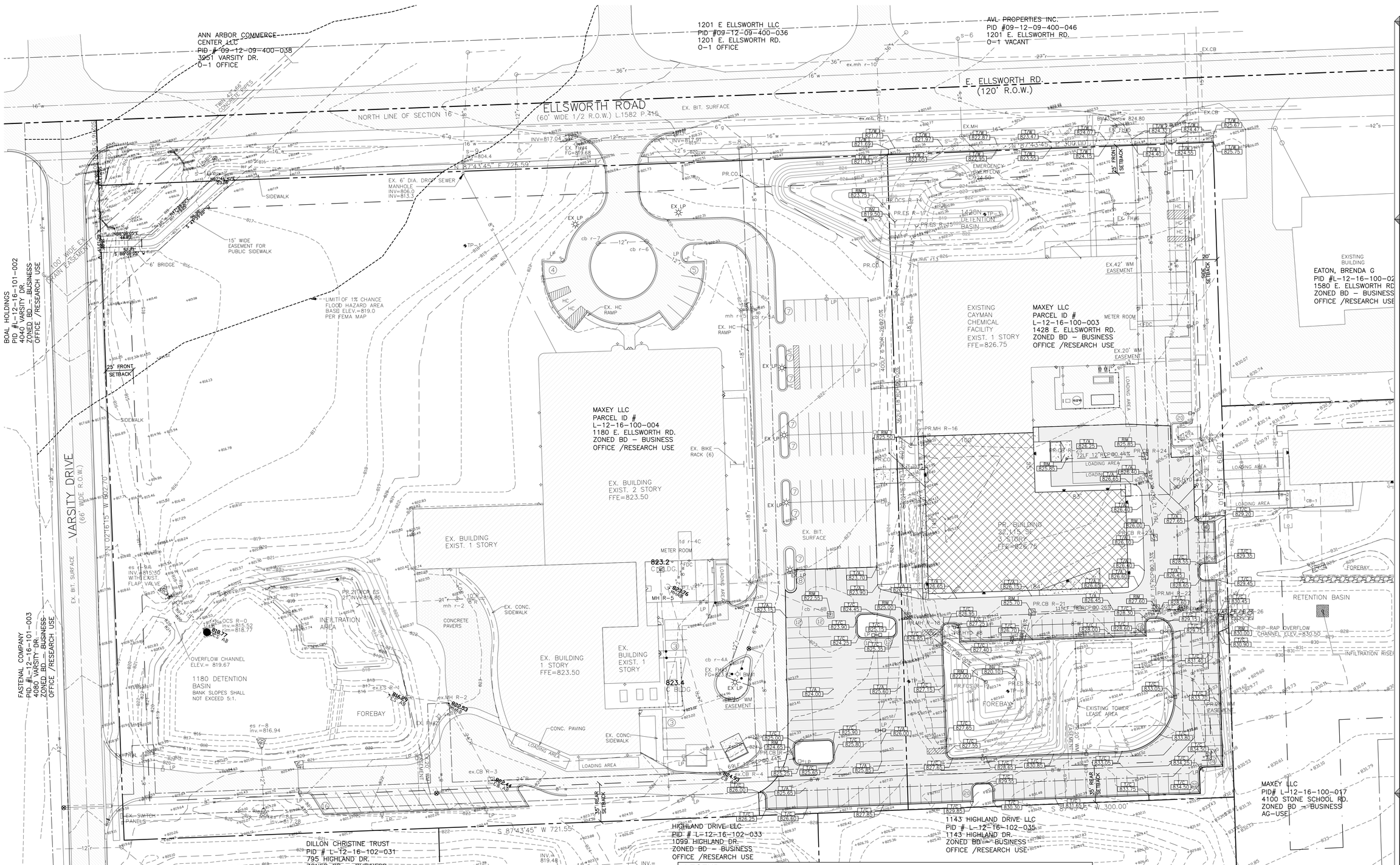

LEGEND

- PROPERTY LINE
- SETBACK
- EASEMENT
- PROPOSED STORM
- PROPOSED WATER
- PROPOSED UNDERGROUND ELECTRIC & TELEPHONE
- PROPOSED GAS
- PROPOSED SANITARY
- EXISTING STORM
- EXISTING WATER
- EXISTING TELEPHONE
- EXISTING ELECTRIC
- EXISTING UNDERGROUND CABLE
- EXISTING GAS
- EXISTING SANITARY
- EXISTING CENTERLINE OF DITCH
- (914) EXISTING CONTOUR
- 914 PROPOSED CONTOUR
- LINE OF SILT FENCE
- EXISTING WALL MOUNTED LIGHT FIXTURE
- NEW BUILDING MOUNTED LIGHTING
- NEW POLE-MOUNTED LIGHT
- EX.UP EXISTING UTILITY POLE
- EX.MH EXISTING MANHOLE
- EX.CO EXISTING CLEAN OUT
- CB R-1 NEW CATCH BASIN
- EX. FH EXISTING FIRE HYDRANT
- NEW FH #3 NEW FIRE HYDRANT
- x 660.90 EXISTING ELEVATION
- 834.30 PROPOSED ELEVATION
- EXISTING BUILDING
- EXISTING GRAVEL SURFACE
- EXISTING ASPHALT PAVING
- PROPOSED BUILDING
- PROPOSED ASPHALT PAVING
- PROPOSED CONCRETE
- PROPOSED HEAVY DUTY ASPHALT PAVING

GRADING PLAN

SCALE: 1" = 40'-0"

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DRAWN BY: GAH/R.S.
JOB NO.: ---

GRADING PLAN

SHEET NO.

C-4

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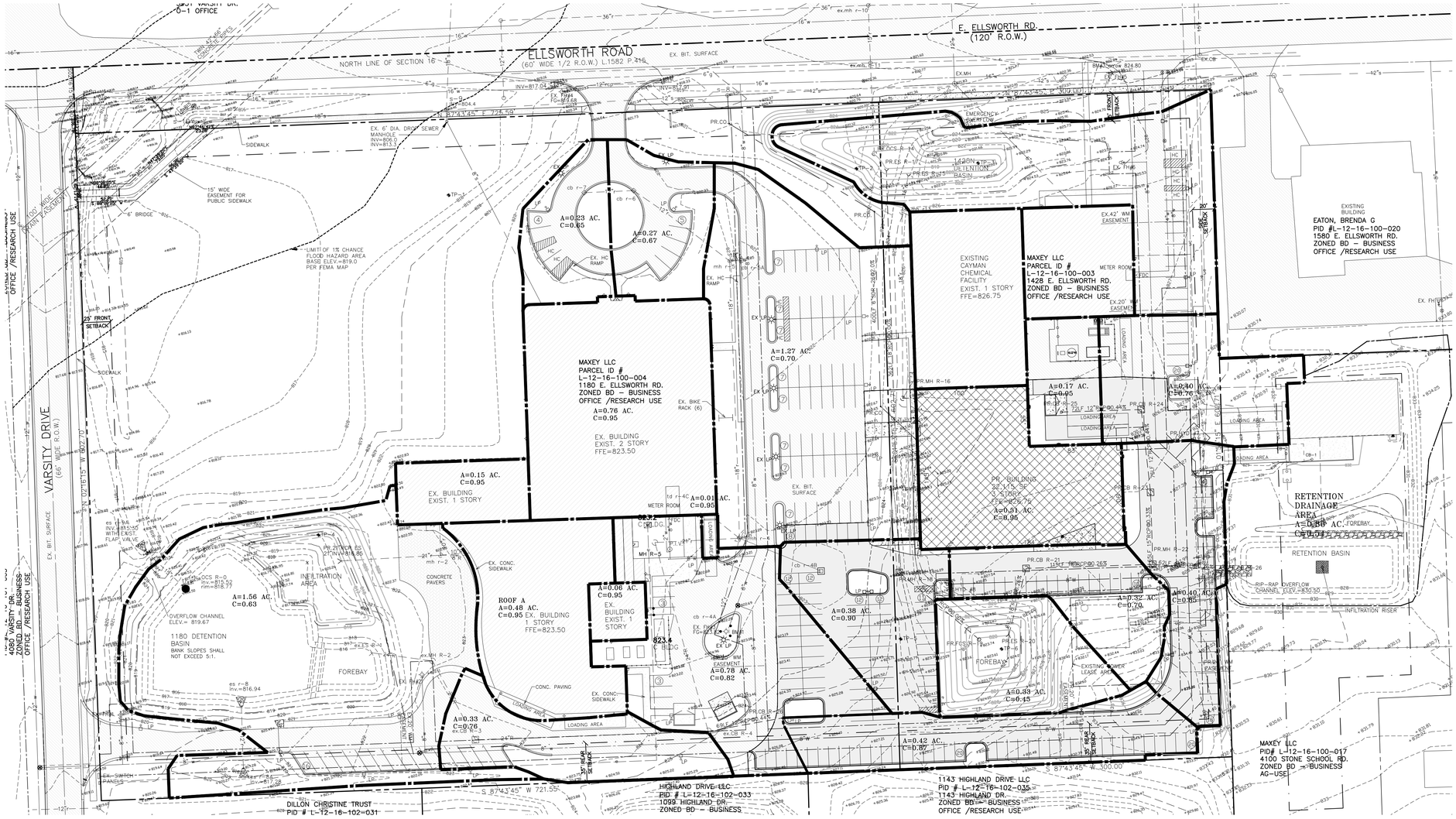


DRAINAGE PLAN

SCALE: 1" = 50'-0"

SOIL EROSION CONTROL SEQUENCE:

1. Install all perimeter erosion and sedimentation control measures.
2. Install storm drainage system, including rip-rap and parking lot inlet filter.
3. Rough grade site, stock pile top soil in location approved by owner and engineer.
4. Construct sanitary sewer, watermain.
5. Maintain Erosion and Sedimentation control measures, as required.
6. Bring pavement areas to sub-base grade and install concrete curb and gutter.
7. Install all utilities (Phone, Gas and Electric).
8. Install pavement complete, repair or replace inlet filter as required.
9. Finish grade, redistribute top soil, see and mulch in all distributed areas.
10. Remove all temporary soil erosion and sedimentation control measures.
11. Complete construction of building.

MAINTENANCE PLAN BUDGET:

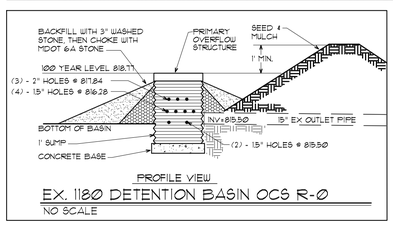
Annual inspection for sedimentation accumulation	$ 100.00
Removal of sediment accumulation every 5 years as needed	$ 500.00
Inspect for floatables and debris annually and after major storms	$ 100.00
Removal of floatablesand debris annually and after major storms	$ 150.00
Inspect system for erosion annually and after major storms	$ 100.00
Reestablish permanent vegetation of eroded slopes as needed	$ 350.00
Replacement of gravel jackets every 3-5 years as needed	$ 100.00
Mowing 0-2 times per year	$ 400.00
Inspect structural elements during wet weather and compare to as built plans every 2 years.	$ 150.00
Make structural adjustments or replacements as determined by inspection as needed	$ 400.00
Have Professional Engineer carry out emergency inspections upon indentification of severe problems.	$ 200.00
TOTAL ANNUAL BUDGET:	$ 2,350.00

STORM WATER NARRATIVE

On-site storm water systems for the 1180 parcel were designed and constructed per the standards in place in 2012. The on-site storm system for the 1428 parcel were designed per the standards in place in 1994. The redevelopment of this site shall incorporate upgrades to the detention basins in accordance with current design standards for the redevelopment area of 3.41 acres. The detention basin for 1180 shall be expanded for an additional 6,234 cubic feet of volume including 5,968 cubic feet of infiltration. The outlet structure shall not be modified as the changes are negligible. The detention basin for 1428 shall be modified to include an additional 21,617 cubic feet of volume for a total detention volume of 34,026 cubic feet, including a forebay for the proposed new storm sewer system. The proposed outlet shall be a 3 stage outlet. The proposed storm system shall allow for runoff from the adjacent parcel including overflow from the retention basin.

STORM SEWER DESIGN COMPUTATIONS

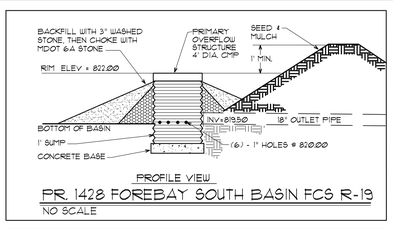
FROM	TO	ACRES A	AREA IMPERV 0.95	AREA PERV 0.45	RUNOFF COEFF C	EQUIV. AREA A * C	ADD'L AREA A*C	CUMM. AREA A*C	INTEN-SITY I	TIME OF CONC. TC	RUNOFF (CFS) Q	PIPE LENGTH (LF)	PIPE DIA. (IN)	ACTUAL MANNING'S SLOPE USED	MANNING COEFF. n	VELOCITY PIPE FLOWING FULL CAPACITY	VELOCITY >3(FT/S)	TIME (MIN)	RUNOFF VELOCITY (FT/S)	HYDRAULIC GRADIENT SLOPE %	HG ELEV UPPER END	HG ELEV LOWER END	RIM ELEV UPPER END	INVERT UPPER END	INVERT LOWER END	RIM-INV	RIM-HG >cover	PIPE COVER SPRINGLINE >3.5	FLOW THRU CASTING	STRUCTURE DIA FT
R-25	R-24	0.174	0.174	0.000	0.95	0.166		0.166	3.89	20.00	0.64	72	12	0.44%	0.013	2.37	3.02	0.40	0.8	0.03%	822.32	822.30	825.85	821.82	821.50	4.03	3.53	3.53	0.64	2
R-24	R-23	0.404	0.253	0.152	0.76	0.308		0.474	3.85	20.40	1.83	75	12	0.44%	0.013	2.37	3.02	0.41	2.3	0.26%	822.17	821.97	825.85	821.50	821.17	4.35	3.68	3.85	1.19	4
R-23	R-22	0.404	0.324	0.080	0.85	0.344		0.818	3.82	20.81	3.12	65	15	0.33%	0.013	3.72	3.03	0.36	2.5	0.23%	821.91	821.76	826.00	820.97	820.76	5.03	4.09	4.33	1.31	4
R-22	R-21	0.000	0.000	0.000	0.00	0.000	0.466	1.283	3.79	21.17	4.86	115	18	0.26%	0.013	5.37	3.04	0.63	2.8	0.21%	821.72	821.47	827.60	820.56	820.26	7.04	5.88	6.22	0.00	4
R-21	R-20	0.316	0.161	0.155	0.70	0.223		1.506	3.74	21.80	5.63	61	18	0.26%	0.013	5.37	3.04	0.33	3.2	0.29%	821.47	821.30	825.70	820.26	820.10	5.44	4.23	4.69	0.83	4
R-26	R-21	0.859	0.158	0.701	0.54	0.466		0.466	3.74	21.80	1.74	62	18	0.26%	0.013	5.37	3.04	0.34	1.0	0.03%	821.78	821.76	830.00	820.72	820.56	9.28	8.22	8.53	1.74	4
R-19	R-18	0.335	0.000	0.335	0.45	0.1506	1.506	1.656	3.18	30.00	5.27	94	18	0.00%	0.013	0.00	0.00	0.53	3.0	0.25%	821.82	821.59	827.00	819.50	819.50	7.50	5.18	6.75	0.48	4
R-18	R-17	0.000	0.000	0.000	0.00	0.000		1.656	3.15	30.53	5.22	362	18	0.00%	0.013	0.00	0.00	2.04	3.0	0.25%	821.59	820.70	825.00	819.50	819.50	5.50	3.41	4.75	0.00	4
R-27	CBR-4	0.415	0.349	0.066	0.87	0.361		0.361	3.54	24.47	1.28	69	12	0.44%	0.013	2.37	3.02	0.38	1.6	0.13%	820.69	820.60	824.65	820.10	819.80	4.55	3.96	4.05	1.28	4



PROFILE VIEW

EX. 1180 DETENTION BASIN OCS R-0

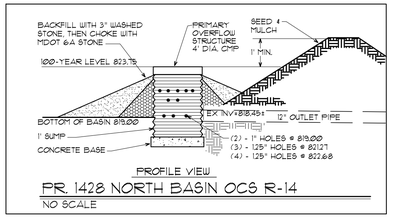
NO SCALE



PROFILE VIEW

PR. 1428 FOREBAY SOUTH BASIN FCS R-19

NO SCALE



PROFILE VIEW

PR. 1428 NORTH BASIN OCS R-14

NO SCALE

MAINTENANCE TASKS AND SCHEDULE DURING CONSTRUCTION:

CONTRACTOR'S RESPONSIBILITY TASKS	STORM DRAINAGE SYSTEM	CATCH BASIN SLOPES	CATCH BASIN INLET CASTINGS	CHANNELS	OUTFLOW CONTROL STRUCTURES	RIP-RAP	FILTRATION BASIN	INFILTRATION/DETENTION BASINS	WETLANDS	EMERGENCY OVERFLOW	SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION	X	X		X	X		X	X			WEEKLY
REMOVAL OF SEDIMENT ACCUMULATION	X	X		X	X		X	X			AS NEEDED (SEE NOTE) & PRIOR TO TURNOVER
INSPECT FOR FLOATABLES AND DEBRIS			X	X	X		X	X			QUATERLY
CLEANING FOR FLOATABLES AND DEBRIS			X	X	X		X	X			QUATERLY & AT TURNOVER
INSPECT FOR EROSION				X	X		X	X			WEEKLY
REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES				X			X	X			AS NEEDED (SEE NOTE) & PRIOR TO TURNOVER
REPLACEMENT OF GRAVEL JOINTS						X					AS NEEDED (SEE NOTE)
MOWING				X	X	X	X	X			0 TO 2 TIMES PER YEAR
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY PROFESSIONAL ENGINEER REPORTING TO THE OWNER)				X	X		X	X			ANNUALLY & AT TURNOVER
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED	X	X	X	X	X	X	X	X	X	X	AS NEEDED (SEE NOTE)

NOTE: "AS NEEDED" MEANS WHEN SEDIMENT HAS ACCUMULATED TO A MAXIMUM OF ONE FOOT DEPTH OR THE JACKET HAS BEEN CLOGGED WITH SEDIMENT DUE TO CONSTRUCTION ACTIVITIES. NO CHEMICALS SHALL BE USED WITHIN INFILTRATION BASINS EXCEPT FOR INVASIVE SPECIES MAY BE TREATED BY A CERTIFIED APPLICATOR.

PERMENANT MAINTENANCE TASKS AND SCHEDULE:

OWNER:
MAXEY LLC
1180 E Ellsworth Rd.
Ann Arbor, MI 48108
Contact: Sal Pellerito

OWNER ABOVE IS RESPONSIBLE FOR THE CONTINUED MAINTENANCE OF ALL PERMANENT BEST MEASURES THAT REMAIN AFTER PROJECT COMPLETION.

OWNER'S RESPONSIBILITY TASKS	STREETS	STORM DRAINAGE SYSTEM	CATCH BASIN SLOPES	CATCH BASIN INLET CASTINGS	OUTFLOW CONTROL STRUCTURES	RIP-RAP	FILTRATION BASIN	INFILTRATION/DETENTION BASINS	WETLANDS	EMERGENCY OVERFLOW	SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION		X	X		X	X	X	X			ANNUALLY
REMOVAL OF SEDIMENT ACCUMULATION		X	X		X	X	X	X			EVERY 5-10 YEARS AS NEEDED (SEE NOTE)
INSPECT FOR FLOATABLES AND DEBRIS		X	X	X	X	X	X	X			ANNUALLY
CLEANING FOR FLOATABLES AND DEBRIS		X	X	X	X	X	X	X			ANNUALLY
INSPECT FOR EROSION					X	X	X	X			AS NEEDED (SEE NOTE)
REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES					X		X	X			EVERY 3-5 YEARS AS NEEDED (SEE NOTE)
REPLACEMENT OF GRAVEL JOINTS						X					SEMI-ANNUALLY
MOWING					X			X	X		0 TO 2 TIMES PER YEAR
INSPECT FOR PROPER FUNCTION								X	X		FOLLOWING STORMS OF 1 INCH OR MORE
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY PROFESSIONAL ENGINEER REPORTING TO THE OWNER)		X	X	X	X	X	X	X	X	X	ANNUALLY
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED BY ANNUAL WET WEATHER INSPECTION		X	X	X	X	X	X	X	X	X	AS NEEDED (SEE NOTE)
KEEP RECORDS OF ALL INSPECTIONS AND MAINTENANCE ACTIVITIES AND REPORT TO OWNER		X	X	X	X	X	X	X	X	X	ANNUALLY
KEEP RECORDS OF ALL COSTS FOR INSPECTIONS, MAINTENANCE AND REPAIRS. REPORT TO OWNER		X	X	X	X	X	X	X	X	X	ANNUALLY
REVIEW COST EFFECTIVENESS OF THE PREVENTATIVE MAINTENANCE PROGRAM AND MAKE ADJUSTMENTS AS NEEDED		X	X	X	X	X	X	X	X	X	ANNUALLY
OWNER TO HAVE A PROFESSIONAL ENGINEER CARRY OUT EMERGENCY INSPECTIONS UPON IDENTIFICATION OF SEVERE PROBLEMS.		X	X	X	X	X	X	X	X	X	AS NEEDED (SEE NOTE)

NOTE: "AS NEEDED" MEANS WHEN SEDIMENT HAS ACCUMULATED TO A MAXIMUM OF ONE FOOT DEPTH OR THE JACKET HAS BEEN CLOGGED WITH SEDIMENT DUE TO CONSTRUCTION ACTIVITIES. NO CHEMICALS SHALL BE USED WITHIN INFILTRATION BASINS EXCEPT FOR INVASIVE SPECIES MAY BE TREATED BY A CERTIFIED APPLICATOR.

RESPONSIBILITY AND MAINTAINENCE

A. DURING CONSTRUCTION, IT IS THE DEVELOPER'S RESPONSIBILITY TO PERFORM THE MAINTAINENCE.
B. FOLLOWING CONSTRUCTION IT WILL BE THE RESPONSIBILITY OF THE OWNER TO PERFORM MAINTENANCE.
C. ROUTINE MAINTENANCE SHALL BE COMPLETED WITHIN 45 DAYS OF RECEIPT OF WRITTEN NOTIFICATION THAT ACTION IS REQUIRED, UNLESS OTHER ACCEPTABLE ARRAIGNMENTS ARE MADE WITH THE TOWNSHIP/CITY OR COUNTY COMMISIONER. EMERGENCY MAINTENANCE SHALL BE PERFORMED IMMEDIATELY UPON RECEIPT OF WRITTEN NOTICE. SHOULD THE OWNER FAIL TO ACT WITHIN THESE TIME FRAMES, THE TOWNSHIP/CITY OR COUNTY MAY PERFORM THE NEEDED MAINTENANCE AND ASSESS THE COSTS AGAINST THE OWNER.

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

CAYMAN CHEMICAL 1428 ADDITION

1428 E. Ellsworth Road
Pittsfield Township, Michigan

THIS MATERIAL, INCLUDING IDEAS, DRAWINGS AND DESIGN, IS OWNED BY AND IS THE EXCLUSIVE PROPERTY OF VANSTON/O'BRIEN, INC. AND CANNOT BE REPRODUCED OR REUSED IN ANY MANNER WITHOUT THE PRIOR CONSENT OF VANSTON/O'BRIEN, INC.

ISSUED FOR:	DATE:
SITE PLAN	10-15-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	2-28-19
REVISED	3-26-19
REVISED	3-29-19
REVISED	4-15-19

DRAWN BY: GAH/R.S.
JOB NO.: ---

DRAINAGE PLAN

SHEET NO.

C-5

P:\Cayman 1428\AUTOCAD\3Site\C-6-CALCREV1.dwg, 4/17/2019 1:05:14 PM

EXISTING DRAINAGE CALCULATION REDEVELOPMENT AREA TRIBUTARY TO 1180 BASIN

	ACRES		ON-SITE	
Impervious Area (0.95)	0.58	C=	0.64	
Pervious Area (0.25)	0.48	A=	1.10	ACRES
Impervious Area (1.0)	0.03			
ALLOWABLE RELEASE RATE=			0.15	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =			0.16	CFS

100 YEAR FLOOD DETENTION VOLUME REQUIRED

$Q_O = Q_a / (C \times A)$ =	0.23	CFS/AC-IMP.
$T_{100} = -25 + (10312.5 / Q_o)^{0.5}$ =	185.4	MIN.
$V_{S100} = \{(16500 \times T_{100}) / (25+T_{100})\} - (40 \times Q_o \times T_{100})$ =	12812	CF/AC-IMP.
$V_{T100} = V_{S100} \times A \times C = V_{ex}$ =	**9044**	CF
BANKFULL FLOOD VOLUME		
V_{BF} = 8170 x A x C=	**5768**	CF
FIRST FLUSH VOLUME		
V_{FF} = 1815 x A x C=	**1281**	CF

PROPOSED DRAINAGE CALCULATION REDEVELOPMENT AREA TRIBUTARY TO 1180 BASIN

Pre-Development	Cover Type	Soil Type	AREA(sf)	AREA(ac)	C Value	CN	CN*A
NaB	Meadow	D	37527	0.862	0.45	78	67
MdA	Meadow	B	10235	0.235	0.25	58	14
		TOTAL	47762	1.096	0.35	74	
Post-Development	**Cover Type**	**Soil Type**	**AREA(sf)**	**AREA(ac)**	**C Value**	**CN**	**CN*A**
Impervious	Pavement	D	29909	0.687	0.95	98	67
	Pond	B	5635	0.129	1	98	13
		TOTAL	35544	0.816	0.96	98	
Pervious	Lawn	D	7618	0.175	0.45	80	14
	Lawn	B	4600	0.106	0.25	61	6.4
		TOTAL	12218	0.280	0.45	73	

PROPOSED DRAINAGE CALCULATION REDEVELOPMENT AREA TRIBUTARY TO 1180 BASIN

	ACRES	C		ON-SITE	
Impervious Area	0.82	0.96	C=	0.83	
Pervious Area	0.28	0.45	A=	1.10	ACRES
ALLOWABLE RELEASE RATE=				0.15	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =				0.16	CFS

FIRST FLUSH VOLUME			
V_{ff} =(1")(1'/12")(43560SF/1ac) x A x C=	V_{ff} =	3296	cf
Pre-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pre-Development CN	**CN=**	74	
S = 1000/CN - 10=	**S=**	3.514	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.526	in.
Total Site Area (sf) excl. S-C BMPs	**A=**	47762	sf
$V_{bf\text{-}pre}$ = Q/12 x A	$V_{bf\text{-}pre}$=	2093	cf
Pervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pervious Cover CN	**CN=**	73	
S = 1000/CN - 10=	**S=**	3.727	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.483	in.
Pervious Cover Area (sf)	**Ap=**	12218	sf
$V_{bf\text{-}per\ post}$ = Q/12 x Ap	$V_{bf\text{-}per\ post}$=	492	cf
Impervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	2.122	in.
Impervious Cover Area (sf)	**Ai=**	35544	sf
$V_{bf\text{-}imp\ post}$ = Q/12 x Ai	$V_{bf\text{-}imp\ post}$=	6284	cf
Pervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Pervious Cover CN	**CN=**	73	
S = 1000/CN - 10=	**S=**	3.727	in.
Q_{100per} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}per}$=	2.354	in.
Pervious Cover Area (sf)	$A_{100\text{-}per}$=	12218	sf
$V_{100\text{-}per\ post}$ = Q/12 x Ap	$V_{100\text{-}per\ post}$=	2397	cf
Impervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q_{100imp} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}imp}$=	4.873	in.
Impervious Cover Area (sf)	$A_{100\text{-}imp}$=	35544	sf
$V_{100\text{-}imp}$= Q/12 x A_{100imp}	$V_{100\text{-}imp}$=	14434	cf

Runoff Summary

V_{ff} =	**3296**	**cf**
$V_{bf\text{-}pre}$=	**2093**	**cf**
$V_{bf\text{-}per\ post}$=	492	cf
$V_{bf\text{-}imp\ post}$=	6284	cf
$V_{bf\text{-}post}$=	**6776**	**cf**
$V_{100\text{-}per}$ =	2397	cf
$V_{100\text{-}imp}$ =	14434	cf
V_{100}=	**16831**	**cf**

On-Site Infiltration Requirement

Greator of First Flush volume or Difference between pre and post development bankfull volumes

Bankfull Volume Difference = $V_{bf\text{-}post} - V_{bf\text{-}pre}$ = **4683 cf**

Time of Concentration

Flow Type	K	Elev. Change	Length (L)	Slope % (S)	$S^{0.5}$	V=K * $S^{0.5}$	T_c=L / (V*3600)
Sheet Flow	0.48	2.0	300	0.667	0.816	0.392	0.213
Waterway	1.20	3.0	100	3.000	1.732	2.078	0.013
Small Tributary	2.10	0.0	0	0.000	0.000	0.000	0.000

	T_c=	0.23	hr
$Q_p = 238.6 \times T_c^{-0.82}$=	Q_p =	807.81	cfs/in-mi^2
Total Site Area (ac) excl. SC-BMPs	A=	1.10	ac
$Q_{100} = Q_{100\text{-}per} + Q_{100\text{-}Imp}$ =	Q_{100}=	7.23	in
Peak Flow (PF) = $Q_p \times Q_{100}$ x A / 640	PF=	10.00	cfs
Δ = PF(cfs) - 0.15(cfs/ac)*A(ac)	Δ=	9.84	cfs
V_0 = Δ / PF x V_{100}	$V_0 = V_{tr\text{-}ex}$=	**16554**	**cf**

EX. AREA TRIBUTARY FIRST FLUSH TO INFILTRATION BASIN

	ACRES		ON-SITE	
Impervious Area (0.95)	1.54	C=	0.84	
Pervious Area (0.25)	0.28	A=	1.83	ACRES
Bankfull Basin(1.0)	0.00			
ALLOWABLE RELEASE RATE=			0.15	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =			0.27	CFS
FIRST FLUSH VOLUME				
$V_{FF\text{-}inf}$ = 1815 x A x C=	**2789**	CF		

PROPOSED DRAINAGE CALCULATION NEW AREA TRIBUTARY TO 1180 BASIN

Pre-Development	Cover Type	Soil Type	AREA(sf)	AREA(ac)	C Value	CN	CN*A
NaB	Meadow	D	12875	0.296	0.45	78	23
		TOTAL	12875	0.296	0.45	78	
Post-Development	**Cover Type**	**Soil Type**	**AREA(sf)**	**AREA(ac)**	**C Value**	**CN**	**CN*A**
Impervious	Pavement	D	9921	0.228	0.95	98	22
		TOTAL	9921	0.228	0.95	98	
Pervious	Lawn	D	2954	0.068	0.45	80	5.4
		TOTAL	2954	0.068	0.45	80	

PROPOSED DRAINAGE CALCULATION NEW AREA TRIBUTARY TO 1180 BASIN

	ACRES	C		ON-SITE	
Impervious Area	0.23	0.95	C=	0.84	
Pervious Area	0.07	0.45	A=	0.30	ACRES
ALLOWABLE RELEASE RATE=				0.15	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =				0.04	CFS

FIRST FLUSH VOLUME			
V_{ff} =(1")(1'/12")(43560SF/1ac) x A x C=	V_{ff} =	896	cf
Pre-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pre-Development CN	**CN=**	78	
S = 1000/CN - 10=	**S=**	2.821	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.692	in.
Total Site Area (sf) excl. S-C BMPs	**A=**	12875	sf
$V_{bf\text{-}pre}$ = Q/12 x A	$V_{bf\text{-}pre}$=	743	cf
Pervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pervious Cover CN	**CN=**	80	
S = 1000/CN - 10=	**S=**	2.500	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.787	in.
Pervious Cover Area (sf)	**Ap=**	2954	sf
$V_{bf\text{-}per\ post}$ = Q/12 x Ap	$V_{bf\text{-}per\ post}$=	194	cf
Impervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	2.122	in.
Impervious Cover Area (sf)	**Ai=**	9921	sf
$V_{bf\text{-}imp\ post}$ = Q/12 x Ai	$V_{bf\text{-}imp\ post}$=	1754	cf
Pervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Pervious Cover CN	**CN=**	80	
S = 1000/CN - 10=	**S=**	2.500	in.
Q_{100per} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}per}$=	2.989	in.
Pervious Cover Area (sf)	$A_{100\text{-}per}$=	2954	sf
$V_{100\text{-}per\ post}$ = Q/12 x Ap	$V_{100\text{-}per\ post}$=	736	cf
Impervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q_{100imp} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}imp}$=	4.873	in.
Impervious Cover Area (sf)	$A_{100\text{-}imp}$=	9921	sf
$V_{100\text{-}imp}$= Q/12 x A_{100imp}	$V_{100\text{-}imp}$=	4029	cf

Runoff Summary

V_{ff} =	**896**	**cf**
$V_{bf\text{-}pre}$=	**743**	**cf**
$V_{bf\text{-}per\ post}$=	194	cf
$V_{bf\text{-}imp\ post}$=	1754	cf
$V_{bf\text{-}post}$=	**1948**	**cf**
$V_{100\text{-}per}$ =	736	cf
$V_{100\text{-}imp}$ =	4029	cf
V_{100}=	**4765**	**cf**

On-Site Infiltration Requirement

Greator of First Flush volume or Difference between pre and post development bankfull volumes

Bankfull Volume Difference = $V_{bf\text{-}post} - V_{bf\text{-}pre}$ = **1205 cf**

INFILTRATION DESIGN

Required Infiltration	$V_{req\text{-}inf}$ =	5888	cf
Depth of basin storage	d =	1.5	ft
Field Infiltration Rate	I_f =	0.75	in/hr
Design Infiltration Rate $I_d = I_f$ /2	I_d =	0.375	in/hr
Infiltration period	t_i =	6	hr
Infiltration Interface Area	A_i =	5018	sf
Initial Infiltration Volume			
$V_i = A_i \times I_d$(in/hr) x 1(ft)/12(in) x t_i (hr)=	V_i =	941	cf
Basin Storage Volume BASIN	V_b =	5028	cf
Total Proposed Infiltration	V_{inf} =	**5968**	**cf**

PROPOSED INFILTRATION BASIN

ELEV.	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)
817.5	5809	0.5	2,707	5,028
817	5018	0.5	2,321	2,321
816.5	4265	0	0	0

On-Site Infiltration Proposed

On-Site design soil infiltration rate I_d =	0.38	in/hr
PROPOSED INFILTRATION V_{inf} =	**5968**	**cf**
INFILTRATION PERIOD T_i =	**38.1**	**hr**

Time of Concentration

Flow Type	K	Elev. Change	Length (L)	Slope % (S)	$S^{0.5}$	V=K * $S^{0.5}$	T_c=L / (V*3600)
Sheet Flow	0.48	2.0	300	0.667	0.816	0.392	0.213
Waterway	1.20	3.0	100	3.000	1.732	2.078	0.013
Small Tributary	2.10	0.0	0	0.000	0.000	0.000	0.000

	T_c=	0.23	hr
$Q_p = 238.6 \times T_c^{-0.82}$=	Q_p =	807.81	cfs/in-mi^2
Total Site Area (ac) excl. SC-BMPs	A=	0.30	ac
$Q_{100} = Q_{100\text{-}per} + Q_{100\text{-}Imp}$ =	Q_{100}=	7.86	in
Peak Flow (PF) = $Q_p \times Q_{100}$ x A / 640	PF=	2.93	cfs
Δ = PF(cfs) - 0.15(cfs/ac)*A(ac)	Δ=	2.89	cfs
V_0 = Δ / PF x V_{100}	V_0=	**4693**	**cf**
REQUIRED DETENTION VOLUME WITH INFILTRATION			
$V_{tr\text{-}new} = V_0 - V_{inf}$ =	$V_{tr\text{-}new}$ =	**-1276**	**cf**
REQUIRED STORAGE VOLUME	V_{ex}=	**9044**	**cf**
	$V_{tr\text{-}ex}$=	**16554**	**cf**
$V_{tr\text{-}new} + V_{tr\text{-}ex} - V_{ex}$=	V_{det}=	**6234**	**cf**
	$V_{1180pre}$=	60623	cf
$V_{1180pr} = V_{det} + V_{1180pre}$=	V_{1180pr}=	**66857**	**cf**
	$V_{1180ff\text{-}pre}$=	8451	cf
$V_{1180ff\text{-}pr} = V_{ff\text{-}pre} - V_{ff\text{-}ex} - V_{FF\text{-}inf} + V_{ff\text{-}tr\text{-}ex} + V_{ff\text{-}tr\text{-}new}$ =	$V_{1180ff\text{-}pr}$ =	**8573**	**cf**
	$V_{1180bf\text{-}pre}$=	38043	cf
$V_{1180bf\text{-}pr} = V_{bf\text{-}pre} - V_{bf\text{-}ex} - V_{inf} + V_{bf\text{-}tr\text{-}ex} + V_{bf\text{-}tr\text{-}new}$ =	$V_{1180bf\text{-}pr}$ =	**35030**	**cf**

STORAGE PROVIDED

PROPOSED 1180 DETENTION BASIN

ELEV.	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
820	34965	1	33,256	105,342	**FREEBOARD ELEVATION**
819	31546	1	29,506	72,087	**DESIGN HIGHWATER ELEVATION**
818	27466	0.5	13,051	42,581	
817.5	24736	0	0	29,530	
817.5	19746	0.5	9,377	29,530	
817	17761	1	16,396	20,153	
816	15030	0.5	3,758	3,758	
815.5	1	0	0	0	

		PROPOSED	EXISTING	VOLUME AT EX. ELEV.	
FIRST FLUSH	$X_{1180ff\text{-}pr}$ =	816.29	816.28	8348	CF
BANKFULL	$X_{1180bf\text{-}pr}$ =	817.71	817.84	38404	CF
DETENTION	X_{1180pr} =	818.82	818.77	65300	CF

EXISTING DRAINAGE CALCULATION REDEVELOPMENT TRIBUTARY TO 1428 BASIN

	ACRES	C		ON-SITE	
Building Area	0.00	0.90	C=	0.49	
Paving Area	0.96	0.80	A=	2.000	ACRES
Pervious Area	1.04	0.20			
ALLOWABLE RELEASE RATE=				0.2	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =				0.40	CFS

100 YEAR FLOOD DETENTION VOLUME REQUIRED

$Q_O = Q_a / (C \times A)$ =	0.41	CFS/AC-IMP.
T100 = -25 + (10312/ Qo)0.5 =	133.95	MIN.
VS100 ={(16500 x T100) / (25+T100)} - (40 x Qo x T100) =	11718	CF/AC-IMP.
$V_{T100} = V_{S100} \times A \times C = V_{EX\text{-}TR}$ =	**11484**	CF

EXISTING DRAINAGE CALCULATION REMAINING TRIBUTARY AREA TO 1428 BASIN

	ACRES	C		ON-SITE	
Building Area	0.60	0.90	C=	0.64	
Paving Area	0.46	0.80	A=	1.58	ACRES
Pervious Area	0.52	0.20			
ALLOWABLE RELEASE RATE=				0.2	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =				0.32	CFS

100 YEAR FLOOD DETENTION VOLUME REQUIRED

$Q_O = Q_a / (C \times A)$ =	0.31	CFS/AC-IMP.
T100 = -25 + (10312/ Qo)0.5 =	156.65	MIN.
VS100 ={(16500 x T100) / (25+T100)} - (40 x Qo x T100) =	12271	CF/AC-IMP.
$V_{T100} = V_{S100} \times A \times C = V_{EX\text{-}REM}$	**12408**	CF
BANKFULL FLOOD VOLUME		
$V_{EX\text{-}REM\text{-}BF}$ = 8170 x A x C=	**8262**	CF
FIRST FLUSH VOLUME		
$V_{EX\text{-}REM\text{-}FF}$ = 1815 x A x C=	**1835**	CF

PROPOSED DRAINAGE CALCULATION REDEVELOPMENT AREA TRIBUTARY TO 1428 BASIN

Pre-Development	Cover Type	Soil Type	AREA(sf)	AREA(ac)	C Value	CN	CN*A
	Meadow	D	75089	1.724	0.45	78	134
	Meadow	B	12040	0.276	0.25	58	16
		TOTAL	87129	2.000	0.39	75	
Post-Development	**Cover Type**	**Soil Type**	**AREA(sf)**	**AREA(ac)**	**C Value**	**CN**	**CN*A**
Impervious	Pavement	D	28079	0.645	0.95	98	63
	Pond	B	4115	0.094	1	98	9
	Building	D	22196	0.510	0.95	98	50
		TOTAL	54390	1.249	0.95	98	
Pervious	Lawn	D	24814	0.570	0.45	74	42
	Lawn	B	7925	0.182	0.25	61	11.1
		TOTAL	32739	0.752	0.40	71	

FOREBAY VOLUME SOUTH BASIN

V(F) = 5% OF THE 100-YEAR STORM VOLUME BASED ON THE AREA TRIBUTARY TO THE INLET

	V(F)= (.05) * (V_0)		
	V(F)= (.05) *	27584	
VOLUME REQUIRED:	V(F)=	**1379**	**CF**

PR. STORAGE PROVIDED

SOUTH DETENTION BASIN RESHAPE

ELEV	*AREA*	DEPTH	*VOLUME*	*TOTAL VOL.*	
826	7829	1	6992	22353	
825	6154	1	5417	15362	
824	4679	1	4043	9945	
823	3406	1	2870	5903	
822	2333	1	1897	3033	**FOREBAY VOLUME**
821	1461	1	1136	1136	
820	811	0	0	0	

STORAGE VOLUME PROVIDED: **3033** CF

PROPOSED OUTLET CONTROL 1180 BASIN

FIRST FLUSH OF RUNOFF

THE AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 0.5" OVER AREA OF SITE IN 24 HRS.

$Q_{FF} = V_{FF}$ x (1/24HRS) x (1HR/3600SEC)= 0.099 CFS

PLACE OPENINGS IN STANDPIPE AT BOTTOM OF BASIN = 815.50

TO DETERMINE THE APPROPRIATE SIZE ORIFICE TO RELEASE THE FIRST FLUSH VOLUME, AN AVERAGE HEAD VALUE MUST BE USED IN THE ORIFICE EQUATION. IF THE BASIN IS DESIGNED TO BE TRAPEZOIDAL IN SHAPE, 2/3 OF THE TOTAL HEAD IS AN ACCEPTABLE APPROXIMATION FOR THE AVERAGE HEAD.

h_{ave}= 2/3 x (X_{FF} - BOTTOM BASIN ELEV.)= 0.53 FT

A = Q_{FF} / (0.62 x (2 x 32.2 x h_{ave})$^{0.5}$) = 0.027 FT^2

A 1.5 INCH DIAMETER ORIFICE HAS AN AREA O 0.0123 SF

A/ 0.0123 = 2.23

THEREFORE, USE THE FOLLOWING NUMBER OF 1.5" DIAMETER HOLES,

2 HOLES, AT ELEV. 815.50

BANKFULL FLOOD

FOR THE ALLOWABLE RELEASE RATE OF 24-40 HOURS, CHECK THE DISCHARGE THROUGH THE FIRST FLUSH ORIFICE TO SEE IF ADDITIONAL HOLES ARE NECESSARY.

h_{ave}= 2/3 x (X_{BF} - BOTTOM BASIN ELEV.)= 1.47 FT

$Q_{90.0}$ = 0.62x #HOLES x (AREA EACH $HOLE_{FF}$) x (2 x 32.2 x h_{ave})$^{0.5}$ = 0.148 CFS

$T_{90.0}$ = (1SEC / $Q_{90.0}$) x V_{BF} x (1HR / 3600SEC) = 65.64 HRS

BECAUSE THE HOLDING TIME EXCEEDS 40 HRS, ADDITIONAL ORIFICES IN THE STANDPIPE ARE REQUIRED.

VOLUME THROUGH 2 1.5 INCH DIAMETER HOLES IN 24 HOURS:

V=Q90.0x24HRSx3600SEC/HR = 12809 CF

REMAINING VOL. = 22222 CF

QBF = REMAINING VOLUME x (1 / 24HRS) x (1 / 3600SEC) = 0.257 CFS

PLACE OPENINGS AT FIRST FLUSH ELEVATION = 816.29

have = 2/3 x (XBF - XFF) = 0.94 FT

A = QBF / { O.62 * SQRT(2*32.2*have)} = 0.053 SF

A 1.5 INCH DIAMETER ORIFICE HAS AN AREA OF 0.012 SF

A/ 0.012 = 4.33

THEREFORE, USE 4 1.5 INCH DIAMETER HOLES AT ELEV. = 816.29

100 YEAR FLOOD

Q_a = ALLOWABLE RELEASE RATE x AREA SITE IN ACRES= 1.00 CFS

Q_a IS A PEAK OR MAXIMUM FLOW. CALCULATE THE MAXIMUM FLOW PASSING THROUGH FIRST FLUSH AND BANKFULL ORIFICES, USING THE TOTAL HEAD, AND SUBTRACT FROM Q_a TO DETERMINE THE ORIFICE SIZE TO RELEASE THE 100 YEAR STORM VOLUME:

$Q_{FF} + Q_{BF}$ = 0.62x#$HOLES_{FF}$xAREA EACH $HOLE_{FF}$x{2*32.2*(X_{100}-$X_{BOTTOM\ BASIN}$)}$^{0.5}$

+ 0.62x#$HOLES_{BF}$xAREA EACH $HOLE_{BF}$x{2*32.2*(X_{100}-X_{FF})}$^{0.5}$

$Q_{FF}+Q_{BF}$ = 0.61 CFS

Q_a - (Q_{FF} + Q_{BF}) = 0.39 CFS

A= Q_a / (0.62 * (2 *32.2 * (X_{100}-X_{BF}))$^{0.5}$) = 0.075 SF

A 2 INCH DIAMETER ORIFICE HAS AN AREA O 0.022 SF

A/ 0.022 = 3.43

THEREFORE, USE THE FOLLOWING NUMBER OF 2" DIAMETER HOLES:

3 HOLES AT ELEV. = 817.71

Since the proposed outlet structure revisions are negligible, no modifications will be made to the outlet structure.

PROPOSED DRAINAGE CALCULATION REDEVELOPMENT AREA TRIBUTARY TO 1428 BASIN

	ACRES	C		ON-SITE	
Impervious Area	1.25	0.95	C=	0.75	
Pervious Area	0.75	0.40	A=	2.00	ACRES
ALLOWABLE RELEASE RATE=				0.15	CFS/AC
$Q_{a(on\text{-}site)}$ = ALLOWABLE RELEASE RATE x A =				0.30	CFS

FIRST FLUSH VOLUME			
V_{ff} =(1")(1'/12")(43560SF/1ac) x A x C=	V_{ff} =	5419	cf
Pre-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pre-Development CN	**CN=**	75	
S = 1000/CN - 10=	**S=**	3.333	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.565	in.
Total Site Area (sf) excl. S-C BMPs	**A=**	87129	sf
$V_{bf\text{-}pre}$ = Q/12 x A	$V_{bf\text{-}pre}$=	4101	cf
Pervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Pervious Cover CN	**CN=**	71	
S = 1000/CN - 10=	**S=**	4.114	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	0.413	in.
Pervious Cover Area (sf)	**Ap=**	32739	sf
$V_{bf\text{-}per\ post}$ = Q/12 x Ap	$V_{bf\text{-}per\ post}$=	1128	cf
Impervious Cover Post-Development Bankfull Volume			
2-year/24 hour storm event	**P=**	2.35	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q = (P-0.2S)^2 / (P+0.8S)	**Q=**	2.122	in.
Impervious Cover Area (sf)	**Ai=**	54390	sf
$V_{bf\text{-}imp\ post}$ = Q/12 x Ai	$V_{bf\text{-}imp\ post}$=	9616	cf
Pervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Pervious Cover CN	**CN=**	71	
S = 1000/CN - 10=	**S=**	4.114	in.
Q_{100per} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}per}$=	2.188	in.
Pervious Cover Area (sf)	$A_{100\text{-}per}$=	32739	sf
$V_{100\text{-}per\ post}$ = Q/12 x Ap	$V_{100\text{-}per\ post}$=	5969	cf
Impervious Cover Post-Development 100-Year Volume			
100-year storm event	**P=**	5.11	in.
Impervious Cover CN	**CN=**	98	
S = 1000/CN - 10=	**S=**	0.204	in.
Q_{100imp} = (P-0.2S)^2 / (P+0.8S)	$Q_{100\text{-}imp}$=	4.873	in.
Impervious Cover Area (sf)	$A_{100\text{-}imp}$=	54390	sf
$V_{100\text{-}imp}$= Q/12 x A_{100imp}	$V_{100\text{-}imp}$=	22087	cf

Runoff Summary

V_{ff} =	**5419**	cf
$V_{bf\text{-}pre}$=	**4101**	cf
$V_{bf\text{-}per\ post}$=	1128	cf
$V_{bf\text{-}imp\ post}$=	9616	cf
$V_{bf\text{-}post}$=	**10745**	cf
$V_{100\text{-}per}$ =	5969	cf
$V_{100\text{-}imp}$ =	22087	cf
V_{100}=	**28056**	cf

On-Site Infiltration Requirement

Greator of First Flush volume or Difference between pre and post development bankfull volumes

Bankfull Volume Difference = $V_{bf\text{-}post} - V_{bf\text{-}pre}$ = **6643** cf

PROPOSED INFILTRATION V_{inf} = 0 cf

Time of Concentration

Flow Type	K	Elev. Change	Length (L)	Slope % (S)	$S^{0.5}$	V=K * $S^{0.5}$	T_c=L / (V*3600)
Sheet Flow	0.48	2.0	300	0.667	0.816	0.392	0.213
Waterway	1.20	3.0	100	3.000	1.732	2.078	0.013
Small Tributary	2.10	0.0	0	0.000	0.000	0.000	0.000

	T_c=	0.23	hr
$Q_p = 238.6 \times T_c^{-0.82}$=	Q_p =	807.81	cfs/in-mi^2
Total Site Area (ac) excl. SC-BMPs	A=	2.00	ac
$Q_{100} = Q_{100\text{-}per} + Q_{100\text{-}Imp}$ =	Q_{100}=	7.06	in
Peak Flow (PF) = $Q_p \times Q_{100}$ x A / 640	PF=	17.83	cfs
Δ = PF(cfs) - 0.15(cfs/ac)*A(ac)	Δ=	17.53	cfs
V_0 = Δ / PF x V_{100}	$V_0 = V_{PR\text{-}TR}$=	27584	cf
REQUIRED DETENTION VOLUME WITHOUT INFILTRATION			
$V_{PR\text{-}TR}$ = Δ / PF x V_{100} x 1.2 =	$V_{PR\text{-}TR}$=	**33101**	cf
	$V_{EX\text{-}TR}$=	**11484**	cf
$V_{PR\text{-}TR} - V_{EX}$ =	V_{DET}=	**21617**	cf
	$V_{EX\text{-}REM}$=	**12408**	cf
REQUIRED DETENTION STORAGE VOLUME			
$V_{1428PR} = V_{DET} + V_{EX\text{-}REM}$ =	V_{1428PR}=	**34026**	cf
$V_{1428PR\text{-}FF} = V_{ff} + V_{EX\text{-}REM\text{-}FF}$ =	$V_{1428PR\text{-}FF}$=	**7254**	cf
$V_{1428PR\text{-}BF} = Vbf_{post} + V_{EX\text{-}REM\text{-}BF}$ =	$V_{1428PR\text{-}BF}$=	**19006**	cf

PR. STORAGE PROVIDED

ELEV.	DEPTH (FT)	NORTH AREA (FT^2)	SOUTH AREA (FT^2)	NORTH VOL. (FT^3)	SOUTH VOL. (FT^3)	TOTAL VOLUME(FT_3)	
825	1	17550	6154	15,102	5,417	57,519	**Freeboard**
824	1	12653	4679	10,747	4,043	37,001	**Design Volume**
823	1	8840	3406	7,274	2,870	22,212	
822	1	5708	2333	4,736	1,897	12,069	
821	1	3763	1461	2,959	1,136	5,436	
820	1	2154	811	1,342	0	1,342	
819	0	529		0	0	0	

BOTTOM OF BASIN	X_o =	819.00
FIRST FLUSH	X_{ff} =	821.27
BANKFULL	X_{bf} =	822.68
DETENTION	X_{DET} =	823.80

PROPOSED OUTLET CONTROL 1428 NORTH BASIN

FIRST FLUSH OF RUNOFF

THE AVERAGE ALLOWABLE RELEASE RATE FOR RUNOFF IS 1" OVER AREA OF SITE IN 24 HRS.

$Q_{FF} = V_{FF}$ x (1/24HRS) x (1HR/3600SEC)= 0.084 CFS

PLACE OPENINGS IN STANDPIPE AT BOTTOM OF BASIN = 819.00

TO DETERMINE THE APPROPRIATE SIZE ORIFICE TO RELEASE THE FIRST FLUSH VOLUME, AN AVERAGE HEAD VALUE MUST BE USED IN THE ORIFICE EQUATION. IF THE BASIN IS DESIGNED TO BE TRAPEZOIDAL IN SHAPE, 2/3 OF THE TOTAL HEAD IS AN ACCEPTABLE APPROXIMATION FOR THE AVERAGE HEAD.

h_{ave}= 2/3 x (X_{FF} - X_o)= 1.52 FT

A = Q_{FF} / (0.62 x (2 x 32.2 x h_{ave})$^{0.5}$) = 0.014 FT^2

A 1 INCH DIA. ORIFICE HAS AN AREA OF 0.0055 SF

A/ 0.0055 = 2.51

THEREFORE, USE THE FOLLOWING NUMBER OF 1" DIAMETER HOLES,

2 HOLES, AT ELEV. 819.00

BANKFULL FLOOD

FOR THE ALLOWABLE RELEASE RATE OF 24-40 HOURS, CHECK THE DISCHARGE THROUGH THE FIRST FLUSH ORIFICE TO SEE IF ADDITIONAL HOLES ARE NECESSARY.

h_{ave}= 2/3 x (X_{BF} - BOTTOM BASIN ELEV.)= 2.46 FT

Q90.0 = 0.62x #HOLES x (AREA EACH HOLEFF) x (2 x 32.2 x have)0.5 = 0.085 CFS

$T_{90.0}$ = (1SEC / $Q_{90.0}$) x V_{BF} x (1HR / 3600SEC) = 62.07 HRS

BECAUSE THE HOLDING TIME EXCEEDS 40 HRS, ADDITIONAL ORIFICES IN THE STANDPIPE ARE REQUIRED.

VOLUME THROUGH 2 1 INCH DIAMETER HOLES IN 24 HOURS:

V=Q90.0x24HRSx3600SEC/HR = 7349 CF

REMAINING VOL. = 11657 CF

QBF = REMAINING VOLUME x (1 / 24HRS) x (1 / 3600SEC) = 0.135 CFS

PLACE OPENINGS AT FIRST FLUSH ELEVATION = 821.27

have = 2/3 x (XBF - XFF) = 0.94 FT

A = QBF / { 0.62 * SQRT(2*32.2*have)} = 0.028 SF

A 1.25 INCH DIAMETER ORIFICE HAS AN AREA OF 0.009 SF

A/ 0.009 = 3.28

THEREFORE, USE 3 1.25 INCH DIAMETER HOLES AT ELEV. = 821.27

100 YEAR FLOOD

Q_a = ALLOWABLE RELEASE RATE x AREA SITE IN ACRES= 0.54 CFS

Q_a IS A PEAK OR MAXIMUM FLOW. CALCULATE THE MAXIMUM FLOW PASSING THROUGH FIRST FLUSH AND BANKFULL ORIFICES, USING THE TOTAL HEAD, AND SUBTRACT FROM Q_a TO DETERMINE THE ORIFICE SIZE TO RELEASE THE 100 YEAR STORM VOLUME:

$Q_{FF} + Q_{BF}$ = 0.62x#$HOLES_{FF}$xAREA EACH $HOLE_{FF}$x{2*32.2*(X_{DET}-X_o)}$^{0.5}$

+ 0.62x#$HOLES_{BF}$xAREA EACH $HOLE_{BF}$x{2*32.2*(X_{DET}-X_{FF})}$^{0.5}$

$Q_{FF}+Q_{BF}$ = 0.32 CFS

Q_a - (Q_{FF} + Q_{BF}) = 0.22 CFS

A= Q_a / (0.62 * (2 *32.2 * (X_{DET}-X_{BF}))$^{0.5}$) = 0.041 SF

A 1.25 INCH DIAMETER ORIFICE HAS AN AREA OF 0.009 SF

A/ 0.009 = 4.82

THEREFORE, USE THE FOLLOWING NUMBER OF 1.25" DIAMETER HOLES:

4 HOLES AT ELEV. = 822.68

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
e-mail: design@vanston.com ◇ www.vanston.com
Tel: (734) 424-0661
Fax: (734) 424-0677

CAYMAN CHEMICAL 1428 ADDITION

1428 E. Ellsworth Road
Pittsfield Township, Michigan

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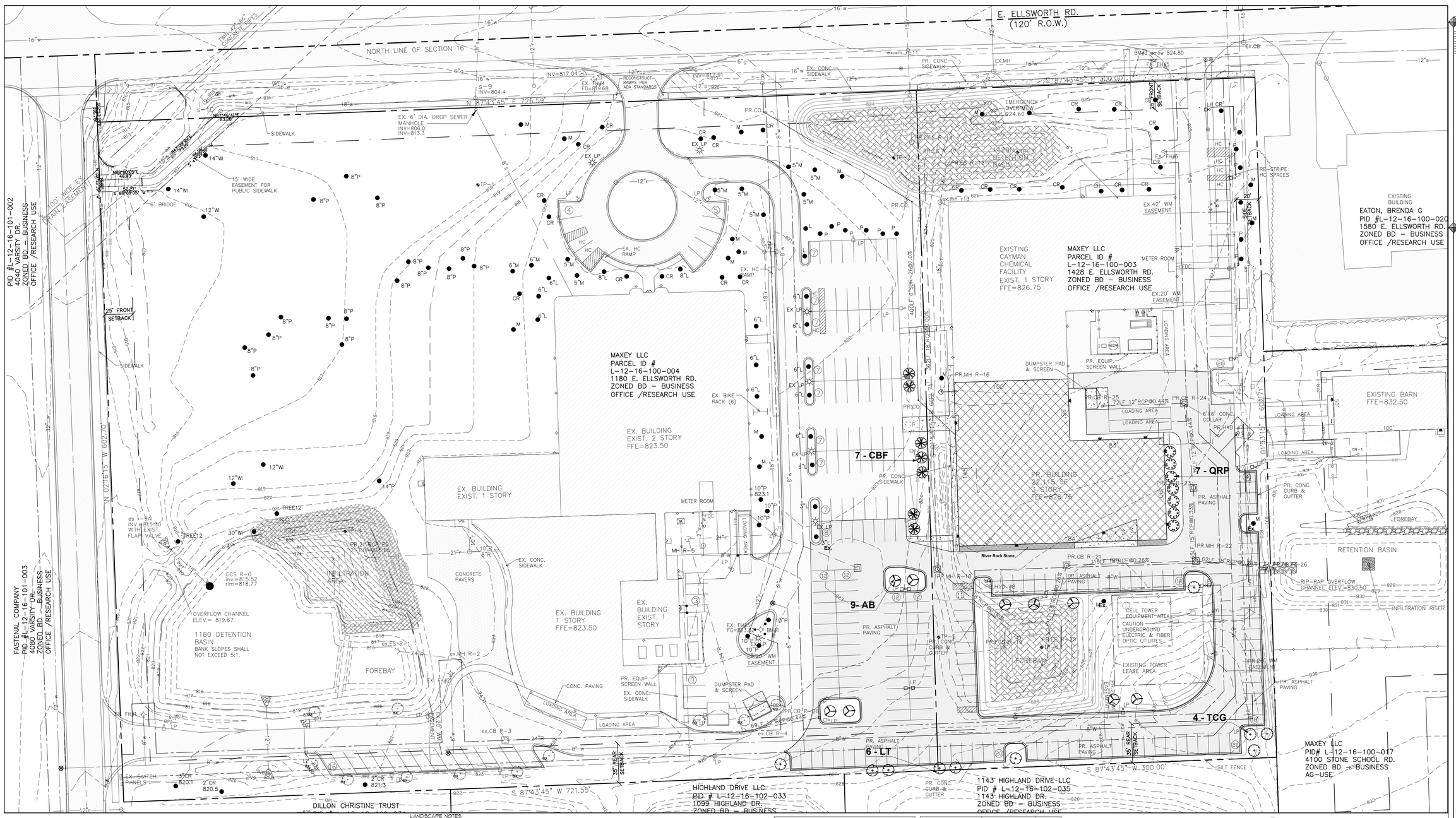
ISSUED FOR:	DATE:
SITE PLAN	10-15-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	2-28-19
REVISED	3-26-19
REVISED	3-29-19
REVISED	4-15-19

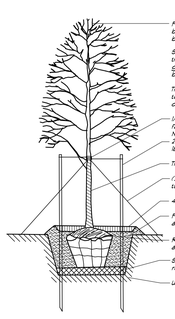
DRAWN BY: GAH/R.S.
JOB NO.: ---

CALCULATIONS

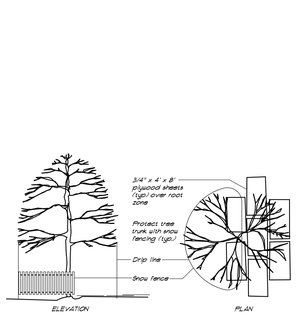
SHEET NO.

C-6





DECIDUOUS TREE PLANTING DETAIL



STANDARD TREE PROTECTION

NOTE: Pull back fencing to install plywood when access in root zone is necessary.

LANDSCAPE NOTES

1. All plant material shall meet current American Association of Nurserymen, Inc. (AAN) standard for nursery stock. (ANSI Z60.1 - 1973)
2. Landscape installation shall be in accordance with the American Association of Nursery standards and with the Pittsfield Township's landscape requirements.
3. Planting schedules: 1) Deciduous material shall be planted from March 15 until May 31, for spring planting, and from October 1 until November 15 for fall planting. 2) Evergreen material shall be planted from March 1 through May 31 for Spring plantings and from August 15 through September 30 for all fall planting. All evergreen plant material shall be treated w/ antidessicant. (Wilt-pruf or better) at time of planting.
4. Mulch plant beds, individual tree and shrub planting pits uniform depth of 3 inches.
5. Provide weed mat for greenbelt and foundation plantings.
6. All planting beds are to be edged. Recommended either "Ryerson Steel" edging or "Black Diamond" plastic edging.
7. All areas with stone cover shall have weed mat.
8. All landscaping to be continually maintained.
9. All site improvements detailed on this plan are to be completed prior to issuance of final certificate of occupancy.
10. All construction to conform to Pittsfield Township's latest applicable regulations.
11. ROW areas to be seeded or sod.
12. Tree protection consists of:
    A. Yellow ribbon barriers for large areas not disturbed by construction.
    B. Stakes 10' on center and wood snow fence around individual and groups of individual trees.
    C. Trees to be removed will be tagged with red ribbon.

    The barrier or fence surrounding the tree or group of trees shall be located no closer to the tree than the tree's drip line. If this is not possible, the barrier shall be no closer than 6 feet from the trunk of the tree or group of trees.
13. Large trees shall not be planted directly on top of utility pipes or service leads.
14. Seed Mix-lawn areas
    - Temporary planting mixture for erosion control.
      - Seed Oats — 30 pounds per acre
      - Perennial Rye — 10 pounds per acre
      - Timothy — 2 pounds per acre
    - Permanent planting mixture on all disturbed areas.
      - Scaldis Hard Fescue — 12 pounds per acre
      - Danson's Creeping Red Fescue — 6 pounds per acre
      - Perennial Rye — 20 pounds per acre
      - Buffalo Grass — 20 pounds per acre
      - Creeping Bent — 0.5 pounds per acre
      - Little Blue Stem — 20 pounds per acre
      - Sheep Fescue — 15 pounds per acre

    Existing soil nutrient levels shall be tested by an independent soil testing laboratory before fertilizers are applied.
15. Rain Garden / Infiltration Basin soils, seed, & plantings
    - Within areas above the first flush elevation of the infiltration basins, seeding and/or live plantings are allowed. Only native seeds (as defined by Michigan Flora, www.michiganflora.net) are allowed for permanent soil stabilization. Annual seeds are allowed in an amount necessary to temporarily stabilize the limits of disturbance.
    - Within areas below the first flush elevation of the infiltration basins, only live plantings are allowed in a storm water system of any kind. Native plants are preferred. Cultivars and non-native perennials are allowable if approved by WCWRC. Plants listed on the WCWRC Rain Garden Plant List are acceptable. Invasive species are not allowed (see the City of Ann Arbor's invasive species list).
    - All plantings (both seeds and live plants) should be locally adapted and appropriate to the hydric conditions proposed. For more information on individual species, see "Plants for Stormwater Design: Species Selection for the Upper Midwest" by Daniel Snu & Rusty Schmidt.
    - All plantings (both seeds and live plants) should be spaced according to each species size and growth potential to allow for sufficient coverage as required by the soil erosion permit.
    - Soils within the infiltration basin must be amended with a composted organic material. Soils must be free of construction debris and subsoils. A recommended soil blend includes 20 to 30 percent compost.
16. Detention Basin Seed Mix shall consist of native seeds (as defined by Michigan Flora, www.michiganflora.net) as approved by the engineer or landscape architect.

STORM WATER BMP SEED MIX FOR AREAS ABOVE FIRST FLUSH

Botanical Name	Common Name	PLS Oz/Acre
Permanent Grasses/Sedges		
Bouteloua curtipendula	Side Oats Grama	16.00
Carex spp.	Prairie Sedge Mix	4.00
Elymus canadensis	Canada Wild Rye	32.00
Koeleria pyramidata	June Grass	1.00
Panicum virgatum	Switch Grass	1.00
Schizachyrium scoparium	Little Bluestem	36.00
	Total	90.00
Temporary Cover		
Avena sativa	Common Oat	360.00
Lolium multiflorum	Annual Rye	100.00
	Total	460.00
Forbs		
Amorpha canescens	Lead Plant	0.50
Anemone cylindrica	Thimbleweed	0.50
Asclepias syriaca	Common Milkweed	2.00
Asclepias tuberosa	Butterfly Weed	2.00
Baptisia alba	White Wild Indigo	2.00
Chamaecrista fasciculata	Partridge Pea	12.00
Coreopsis lanceolata	Sand Coreopsis	5.00
Coreopsis palmata	Prairie Coreopsis	1.00
Dalea purpurea	Purple Prairie Clover	1.50
Echinacea purpurea	Broad-Leaved Purple	7.00
Eryngium yuccifolium	Rattlesnake Master	3.00
Lespedeza capitata	Round-Head Bush Clover	2.00
Liatris aspera	Rough Blazing Star	0.50
Lupinus perennis	Wild Lupine	4.00
Monarda fistulosa	Wild Bergamot	0.75
Oligoneuron rigidum	Stiff Goldenrod	1.00
Penstemon digitalis	Foxglove Beard Tongue	0.50
Penstemon hirsutus	Hairy Beard Tongue	0.50
Pycnanthemum virginianum	Common Mountain Mint	1.00
Ratibida pinnata	Yellow Coneflower	4.00
Rudbeckia hirta	Black-Eyed Susan	5.00
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.00
Silphium terebinthinaceum	Prairie Dock	0.50
Solidago speciosa	Showy Goldenrod	0.50
Symphyotrichum ericoides	Heath Aster	0.25
Symphyotrichum laeve	Smooth Blue Aster	1.00
Symphyotrichum novae-angliae	New England Aster	0.50
Tradescantia ohiensis	Common Spiderwort	0.75
Verbena stricta	Hoary Vervain	1.00
Vernonia spp.	Ironweed Mix	1.75
Veronicastrum virginicum	Culver's Root	0.25
	Total	67.75

Apply at 38.67 PLS pounds per acre

STORM WATER BMP PLANTINGS FOR AREAS BELOW FIRST FLUSH

Qty	Species	Size	Specs
450	Elymus virginicus	Plug	Live Planting
	Virginia Wild Rye		24" OC
	Height 2-4'		
400	Liatris spicata	Plug	Live Planting
	Marsh Blazing Star		24" OC
	Height 1-3'		
400	Senna hebecarpa	Plug	Live Planting
	Wild Senna		24" OC
	Height 3-5'		

SITE LANDSCAPING
267,500 sf site landscaping = 43.8%

LANDSCAPE PLAN

SCALE: 1" = 40'-0"

LANDSCAPE REQUIREMENT CHART

		Required	Provided
PARKING LOT LANDSCAPING	147 New Spaces		
(Rate is 1 tree per 8 spaces)		19	19
PARKING LOT PERIMETER			
(Rate is 1 tree per 40 ln ft)	680 Linear Ft.	17	17*
(* 3 are existing - see plans)			
	TOTAL:	36	36

PLANT LIST

KEY	QTY	SPECIES	SIZE	SPECS	CATEGORY
AB	9	Acer rubrum 'Autumn Blaze' Autumn Blaze Maple	2.0"	B&B	PL
CBF	7	Carpinus betulus 'Fastigata' Columnar European Hornbeam	2.0"	B&B	Perimeter
LT	6	Liriondendron tulipifera Tuliptree	2.0"	B&B	PL
QRP	7	Quercus x warei 'Long' Regal Prince Oak	2.0"	B&B	Perimeter
TCG	4	Tilia cordata 'Greenspire' Greenspire Linden	2.0"	B&B	PL

INFILTRATION AREA PLANTINGS BELOW FIRST FLUSH
INFILTRATION AREA SEEDING ABOVE FIRST FLUSH
DETENTION BASIN NATIVE SEEDING

LANDSCAPE PLAN PREPARED BY:
ECO LANDSCAPE
Waterford, MI.

STATE OF MICHIGAN
ROBERT M. O'REILLY
LANDSCAPE ARCHITECT
NO. 3001001417
LICENSED LANDSCAPE ARCHITECT

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

CAYMAN CHEMICAL 1428 ADDITION

1428 E. Ellsworth Road
Pittsfield Township, Michigan

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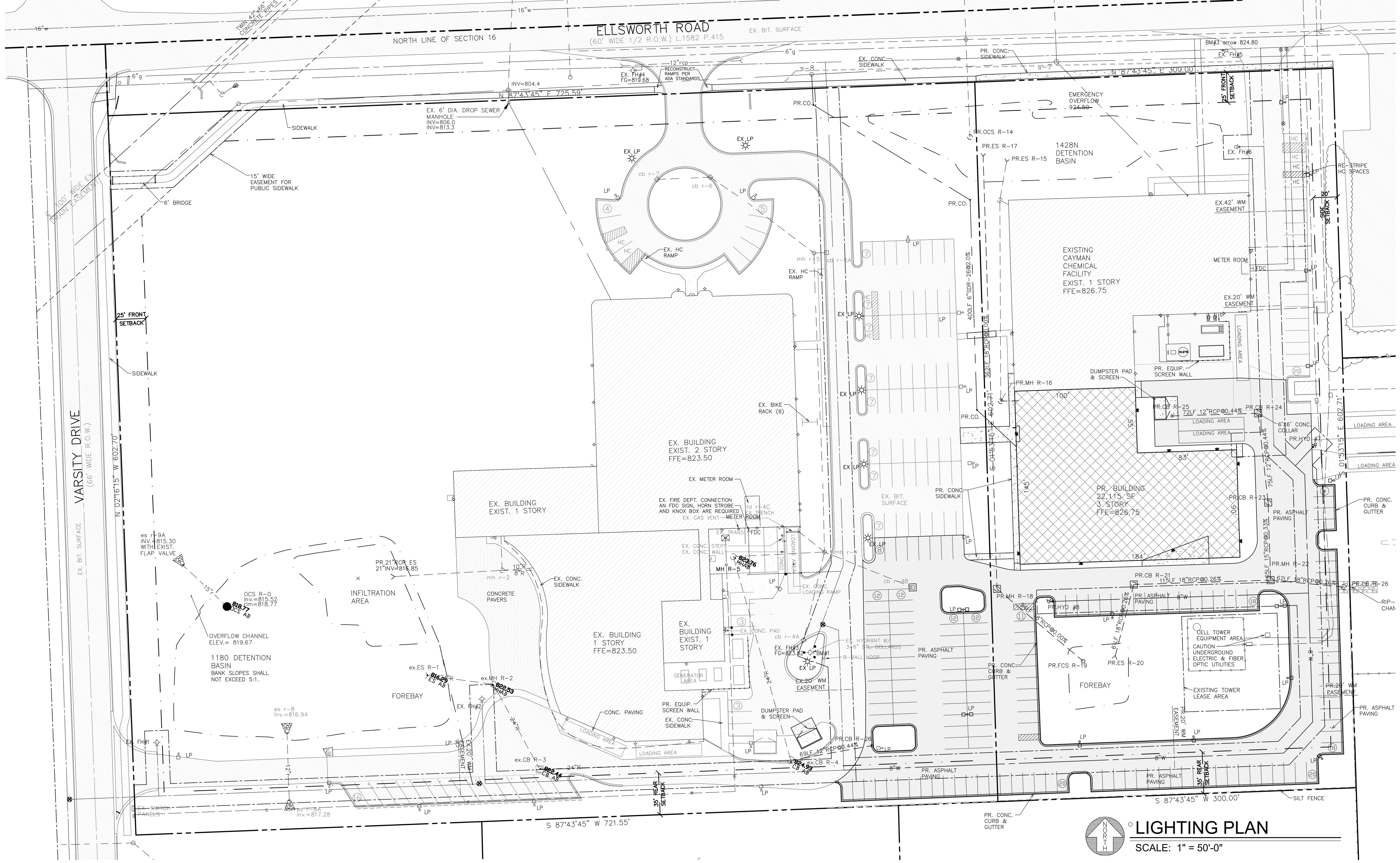
ISSUED FOR:	DATE:
SITE PLAN	10-15-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	2-28-19
REVISED	4-15-19

DRAWN BY: GAH/R.S.
JOB NO.: ---

LANDSCAPE PLAN

SHEET NO.
C-7



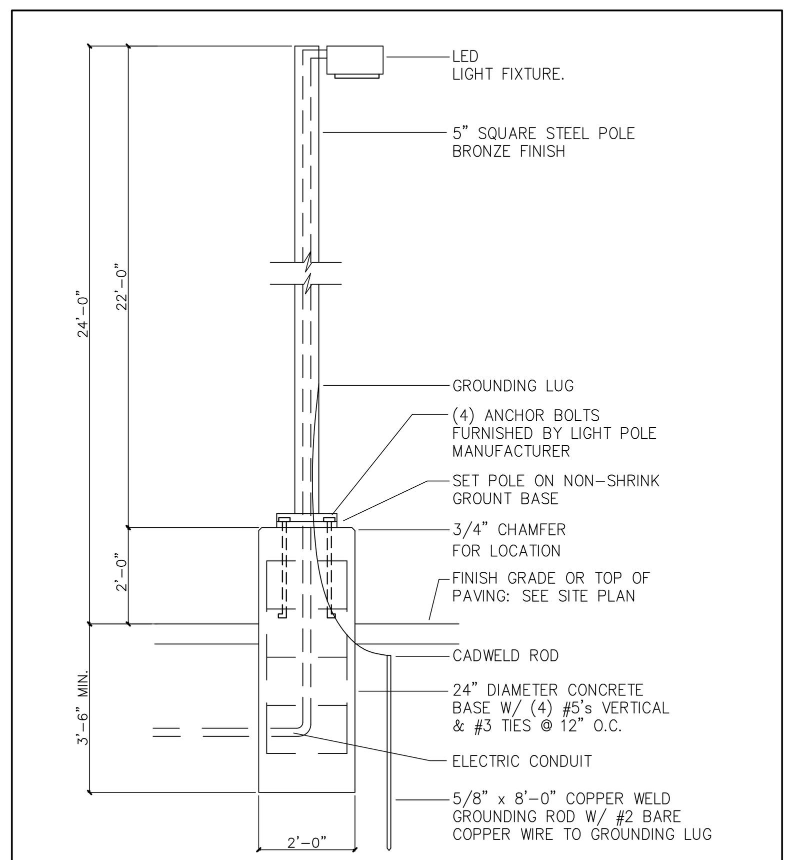
LEGEND

Line type	Symbol	Hatch
PROPERTY LINE	EXISTING WALL MOUNTED LIGHT FIXTURE	EXISTING BUILDING
SETBACK	NEW BUILDING MOUNTED LIGHTING	EXISTING GRAVEL SURFACE
EASEMENT	NEW POLE–MOUNTED LIGHT	EXISTING ASPHALT PAVING
PROPOSED STORM	EX.UP EXISTING UTILITY POLE	
PROPOSED WATER	EX.MH EXISTING MANHOLE	PROPOSED BUILDING
PROPOSED UNDERGROUND ELECTRIC & TELEPHONE	EX.CO EXISTING CLEAN OUT	PROPOSED ASPHALT PAVING
PROPOSED GAS	CB R–1 NEW CATCH BASIN	PROPOSED CONCRETE
PROPOSED SANITARY	EX. FH EXISTING FIRE HYDRANT	PROPOSED HEAVY DUTY ASPHALT PAVING
EXISTING STORM	NEW FH #3 NEW FIRE HYDRANT	
EXISTING WATER	EXISTING ELEVATION	
EXISTING TELEPHONE	PROPOSED ELEVATION	
EXISTING ELECTRIC		
EXISTING UNDERGROUND CABLE		
EXISTING GAS		
EXISTING SANITARY		
EXISTING CENTERLINE OF DITCH		
LINE OF SILT FENCE		

NOTES:
1. All egress doors shall be equipped with emergency exit lighting w/battery backup. Specifications and model to be provided to building department inspector.
2. Site lighting shall be controlled by time clock to reduce lighting levels 11:00pm to sunrise.
3. All light sources shall be fully shielded and downward directed to prevent light trespass.

Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	H	9	Lithonia Lighting	KAD LED 20C 1000 40K R2 MVOLT HS	KAD LED, 20 LED, 1 AMP MVOLT DRIVER, 4000K, TYPE 2 OPTICS WITH HOUSE SIDE SHIELDS.	LED	1	KAD_LED_20C_1000_40K_R2_MVOLT_HS.ies	6597	0.82	73
	I	10	Lithonia Lighting	KAD LED 20C 1000 40K R2 MVOLT HS	KAD LED, 20 LED, 1 AMP MVOLT DRIVER, 4000K, TYPE 2 OPTICS WITH HOUSE SIDE SHIELDS.	LED	1	KAD_LED_20C_1000_40K_R2_MVOLT_HS.ies	6597	0.82	73
	J	3	Lithonia Lighting	KAD LED 40C 1000 40K R3 MVOLT	KAD LED, 40 LED, 1 AMP MVOLT DRIVER, 4000K, TYPE 3 OPTICS.	LED	2	KAD_LED_40C_1000_40K_R3_MVOLT.ies	14889	0.82	282



SITE LIGHT POLE - ONE FIXTURE
NO SCALE

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
LOADING ZONE 1180		4.8 fc	8.6 fc	2.0 fc	4.3:1	2.4:1
LOADING ZONE 1428		2.1 fc	6.6 fc	0.1 fc	66.0:1	21.0:1
PARKING		2.0 fc	6.0 fc	0.6 fc	10.0:1	3.3:1
PROPERTY LINE EAST		0.1 fc	0.1 fc	0.0 fc	N/A	N/A
PROPERTY LINE SOUTH		0.2 fc	0.5 fc	0.0 fc	N/A	N/A
SITE VALUES		1.0 fc	9.0 fc	0.0 fc	N/A	N/A

KAD LED
LED Area Luminaire

Specifications
EPA: 1.2 ft² (0.11 m²)
Length: 17-1/2" (44.5 cm)
Width: 17-1/2" (44.5 cm)
Height: 7-1/8" (18.1 cm)
Weight (max): 36 lbs. (16.4 kg)

Catalog Number
Notes
Type

A+ Capable Luminaire
This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and system-level interoperability.
- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is A+ Certified when ordered with DTL® controls marked by a shaded background. DTL DLL equipped luminaires meet the A+ specification for luminaire to photocontrol interoperability1
- This luminaire is part of an A+ Certified solution for ROAM®2 or XPoint™ Wireless control networks, providing out-of-the-box control compatibility with simple commissioning, when ordered with drivers and control options marked by a shaded background1

To learn more about A+, visit www.acuitybrands.com/aplus.
1. See ordering tree for details.
2. A+ Certified Solutions for ROAM require the order of one ROAM node per luminaire. Sold Separately: Link to Roam; Link to DTL DLL

A+ Capable options indicated by this color background.

Ordering Information — EXAMPLE: KAD LED 40C 1000 40K R5 MVOLT SPD04 DDBXD

KAD LED

Series	LEDs	Drive current	CCT	Distribution	Voltage	Mounting
KAD LED	20C 20 LEDs; 30C 30 LEDs; 40C 40 LEDs; 60C 60 LEDs	530 530 mA; 700 700 mA; 1000 1000 mA	30K 3000 K; 40K 4000 K; 50K 5000 K	R2 Type II; R3 Type III; R4 Type IV; R5 Type V	MVOLT; 120; 208; 240; 277; 347; 480	Shipped included: SPUMBAK__ Square pole universal mounting adaptor; RPUMBAK__ Round pole universal mounting adaptor; SPD__ Square pole; RPD__ Round pole; WBD__ Wall bracket; WWD__ Wood pole or wall; 04 4" arm; 06 6" arm; 09 9" arm; 12 12" arm. Shipped separately: DAD12P Degree arm (pole); DAD12WB Degree arm (wall); KMA Mast arm external fitter

Options — Shipped installed: PER5 NEMA twist-lock five-wire receptacle only (no controls); PER7 Seven-wire receptacle only (no controls); SF Single fuse (120, 277, 347V); DF Double fuse (208, 240, 480V); PIR Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 5fc; PIRH Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 5fc; PIR1FC3V Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc; PIRH1FC3V Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc; BL30 Bi-level switched dimming, 30%; BL50 Bi-level switched dimming, 50%; PNMTDD3 Part night, dim till dawn; PNMT5D3 Part night, dim 5 hrs; PNMT6D3 Part night, dim 6 hrs; PNMT7D3 Part night, dim 7 hrs; HS Houseside shield. Shipped separately: WG Wire guard

Finish (required): DDBXD Dark bronze; DBLXD Black; DNAXD Natural aluminum; DWHXD White; DDBTXD Textured dark bronze; DBLBXD Textured black; DNATXD Textured natural aluminum; DWHGXD Textured white

LITHONIA LIGHTING — One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • www.lithonia.com
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KAD-LED Rev. 07/18/18

Luminaire Locations

	No.	Label	Location X	Location Y	Location Z	MH	Orientation	Tilt	Aim X	Aim Y	Aim Z
EX	1	A	75.64	-1241.55	24.00	24.00	3.42	0.03	75.72	-1240.18	0.00
	2	A	171.63	-1237.50	24.00	24.00	358.22	0.00	171.59	-1236.12	0.00
	3	A	361.40	-1225.05	24.00	24.00	0.00	0.00	361.40	-1223.67	0.00
	4	A	534.00	-1013.91	24.00	24.00	268.57	0.00	532.63	-1013.94	0.00
	5	A	537.02	-950.28	24.00	24.00	268.57	0.00	535.65	-950.32	0.00
	6	A	529.00	-888.38	24.00	24.00	268.57	0.00	527.63	-888.41	0.00
	7	A	527.13	-826.06	24.00	24.00	268.57	0.00	525.75	-826.10	0.00
	1	B	462.94	-1189.87	24.00	24.00	270.00	0.03	461.56	-1189.87	0.00
	2	B	238.60	-726.58	24.00	24.00	142.40	0.03	239.44	-727.67	0.00
	3	B	372.52	-726.56	24.00	24.00	215.38	0.00	371.73	-727.68	0.00
	1	C	0.17	-1221.89	24.00	24.00	357.27	0.00	0.11	-1220.55	0.00
	2	C	-122.07	-1194.02	24.00	24.00	178.20	0.03	-122.03	-1195.37	0.00
	3	C	353.33	-1188.45	24.00	24.00	0.00	0.00	353.33	-1187.10	0.00
	4	C	110.73	-1182.75	24.00	24.00	144.81	0.00	111.51	-1183.85	0.00
	5	C	373.60	-1056.15	24.00	24.00	139.59	0.03	374.47	-1057.18	0.00
	6	C	479.00	-762.47	24.00	24.00	178.57	0.00	479.03	-763.82	0.00
	7	C	408.73	-732.29	24.00	24.00	90.00	0.00	410.08	-732.29	0.00
	1	D	399.93	-1117.41	18.50	18.50	0.00	0.00	399.93	-1117.41	0.00
	2	D	450.00	-1014.69	18.50	18.50	90.00	0.00	450.00	-1014.69	0.00
	3	D	447.00	-951.88	18.50	18.50	90.00	0.00	447.00	-951.88	0.00
	4	D	446.00	-890.28	18.50	18.50	90.00	0.00	446.00	-890.28	0.00
	5	D	444.00	-828.25	18.50	18.50	90.00	0.00	444.00	-828.25	0.00
	6	D	255.34	-693.93	18.50	18.50	120.00	0.00	255.34	-693.93	0.00
	7	D	347.85	-685.79	18.50	18.50	1.66	0.00	347.85	-685.79	0.00
	1	E	299.00	-1118.47	12.00	12.00	173.41	0.00	299.00	-1118.47	0.00
	2	E	330.65	-1098.26	12.00	12.00	86.59	0.00	330.65	-1098.26	0.00
	3	E	330.00	-1086.06	15.00	15.00	86.59	0.00	330.00	-1086.06	0.00
	4	E	329.00	-1057.16	12.00	12.00	85.34	0.00	329.00	-1057.16	0.00
	5	E	328.93	-1049.20	12.00	12.00	85.34	0.00	328.93	-1049.20	0.00
	6	E	139.00	-1012.66	12.00	12.00	176.67	0.00	139.00	-1012.66	0.00
	7	E	334.22	-1006.66	12.00	12.00	176.97	0.00	334.22	-1006.66	0.00
	8	E	358.00	-1005.75	12.00	12.00	175.46	0.00	358.00	-1005.75	0.00
	9	E	381.00	-1004.91	12.00	12.00	175.46	0.00	381.00	-1004.91	0.00
	10	E	394.00	-983.97	12.00	12.00	87.02	0.00	394.00	-983.97	0.00
	11	E	104.00	-980.25	12.00	12.00	270.00	0.00	104.00	-980.25	0.00
	12	E	394.00	-956.09	12.00	12.00	85.83	0.00	394.00	-956.09	0.00
	13	E	222.00	-934.59	12.00	12.00	268.12	0.00	222.00	-934.59	0.00
	14	E	393.00	-924.81	12.00	12.00	87.28	0.00	393.00	-924.81	0.00
	15	E	221.00	-899.09	12.00	12.00	266.92	0.00	221.00	-899.09	0.00
	16	E	391.00	-896.19	12.00	12.00	84.12	0.00	391.00	-896.19	0.00
	17	E	674.34	-875.10	16.00	16.00	83.66	0.00	674.34	-875.10	0.00
	18	E	220.00	-868.47	12.00	12.00	264.01	0.00	220.00	-868.47	0.00
	19	E	572.77	-867.18	16.00	16.00	264.01	0.00	572.77	-867.18	0.00
	20	E	390.00	-863.28	12.00	12.00	83.66	0.00	390.00	-863.28	0.00
	21	E	571.81	-844.17	9.00	9.00	264.01	0.00	571.81	-844.17	0.00
	22	E	673.40	-842.15	16.00	16.00	88.93	0.00	673.40	-842.15	0.00
	23	E	697.81	-827.05	9.00	9.00	175.46	0.00	697.81	-827.05	0.00
	24	E	724.36	-826.66	16.00	16.00	175.46	0.00	724.36	-826.66	0.00
	25	E	756.00	-825.69	9.00	9.00	175.46	0.00	756.00	-825.69	0.00
	26	E	770.63	-772.21	9.00	9.00	83.66	0.00	770.63	-772.21	0.00
	1	F	256.82	-1184.48	15.00	15.00	173.46	0.00	256.82	-1184.48	0.00
	2	F	301.60	-1183.13	15.00	15.00	173.46	0.00	301.60	-1183.13	0.00
	3	F	238.10	-1180.66	15.00	15.00	201.13	0.00	238.10	-1180.66	0.00
	4	F	197.35	-1163.02	15.00	15.00	203.36	0.00	197.35	-1163.02	0.00
	5	F	312.54	-1145.69	15.00	15.00	87.49	0.00	312.54	-1145.69	0.00
	6	F	292.00	-807.25	15.00	15.00	0.00	0.00	292.00	-807.25	0.00
	7	F	314.00	-806.47	15.00	15.00	0.00	0.00	314.00	-806.47	0.00
	8	F	771.20	-795.88	16.00	16.00	83.66	0.00	771.20	-795.88	0.00
	1	G	569.17	-769.18	9.00	9.00	0.00	0.00	569.17	-769.18	0.00
	2	G	769.99	-763.56	9.00	9.00	0.00	0.00	769.99	-763.56	0.00
	3	G	568.86	-760.04	9.00	9.00	0.00	0.00	568.86	-760.04	0.00
	4	G	568.75	-755.04	9.00	9.00	0.00	0.00	568.75	-755.04	0.00
	5	G	769.67	-754.42	9.00	9.00	0.00	0.00	769.67	-754.42	0.00
	6	G	769.56	-748.64	9.00	9.00	0.00	0.00	769.56	-748.64	0.00
	7	G	568.12	-746.54	9.00	9.00	0.00	0.00	568.12	-746.54	0.00
	8	G	568.07	-741.75	9.00	9.00	0.00	0.00	568.07	-741.75	0.00
	9	G	769.17	-741.73	9.00	9.00	0.00	0.00	769.17	-741.73	0.00
	10	G	769.07	-734.39	9.00	9.00	0.00	0.00	769.07	-734.39	0.00
	11	G	568.04	-733.88	9.00	9.00	0.00	0.00	568.04	-733.88	0.00
	12	G	577.28	-730.21	9.00	9.00	0.00	0.00	577.28	-730.21	0.00
	13	G	592.60	-729.84	9.00	9.00	0.00	0.00	592.60	-729.84	0.00
	14	G	602.71	-729.53	9.00	9.00	0.00	0.00	602.71	-729.53	0.00
	15	G	622.49	-728.93	9.00	9.00	0.00	0.00	622.49	-728.93	0.00
	16	G	633.53	-728.61	9.00	9.00	0.00	0.00	633.53	-728.61	0.00
	17	G	652.97	-727.99	9.00	9.00	0.00	0.00	652.97	-727.99	0.00
	18	G	663.18	-727.72	9.00	9.00	0.00	0.00	663.18	-727.72	0.00
	19	G	768.93	-727.42	9.00	9.00	0.00	0.00	768.93	-727.42	0.00
	20	G	678.49	-727.21	9.00	9.00	0.00	0.00	678.49	-727.21	0.00
	21	G	684.71	-726.99	9.00	9.00	0.00	0.00	684.71	-726.99	0.00
	22	G	691.62	-726.76	9.00	9.00	0.00	0.00	691.62	-726.76	0.00
	23	G	697.93	-726.59	9.00	9.00	0.00	0.00	697.93	-726.59	0.00
	24	G	712.88	-726.15	9.00	9.00	0.00	0.00	712.88	-726.15	0.00
	25	G	722.79	-725.87	9.00	9.00	0.00	0.00	722.79	-725.87	0.00
	26	G	738.86	-725.26	9.00	9.00	0.00	0.00	738.86	-725.26	0.00
	27	G	749.07	-724.98	9.00	9.00	0.00	0.00	749.07	-724.98	0.00
	28	G	763.16	-724.49	9.00	9.00	0.00	0.00	763.16	-724.49	0.00
NEW	1	H	625.68	-1033.60	16.00	16.00	177.90	0.00	625.69	-1033.92	0.00
	2	H	577.69	-1027.10	16.00	16.00	267.27	0.00	577.37	-1027.12	0.00
	3	H	706.50	-1023.31	16.00	16.00	147.99	0.00	706.67	-1023.58	0.00
	4	H	761.71	-1016.28	16.00	16.00	86.48	0.00	762.03	-1016.26	0.00
	5	H	759.57	-951.48	16.00	16.00	88.26	0.00	759.89	-951.47	0.00
	6	H	702.70	-941.29	16.00	16.00	2.05	0.00	702.71	-940.97	0.00
	7	H	742.85	-940.27	16.00	16.00	2.05	0.00	742.86	-939.95	0.00
	8	H	574.98	-926.07	16.00	16.00	266.53	0.00	574.66	-926.09	0.00
	9	H	675.11	-907.13	16.00	16.00	87.88	0.00	675.43	-907.11	0.00
	1	I	830.49	-1198.68	24.00	24.00	321.03	0.00	829.81	-1197.85	0.00
	2	I	627.62	-1184.24	24.00	24.00	178.79	0.00	627.65	-1185.31	0.00
	3	I	722.97	-1180.29	24.00	24.00	178.79	0.00	723.00	-1181.36	0.00
	4	I	801.73	-1131.26	24.00	24.00	84.59	0.00	802.80	-1131.16	0.00
	5	I	655.35	-1080.60	24.00	24.00	359.14	0.00	655.34	-1079.53	0.00
	6	I	840.71	-965.79	24.00	24.00	267.31	0.00	839.64	-965.84	0.00
	7	I	821.86	-868.84	24.00	24.00	266.68	0.00	820.79	-868.90	0.00
	8	I	820.01	-793.14	24.00	24.00	264.07	0.00	818.95	-793.25	0.00
	9	I	818.71	-709.75	24.00	24.00	264.07	0.00	817.64	-709.86	0.00
	10	I	798.07	-649.05	24.00	24.00	266.68	0.00	797.01	-649.11	0.00
	1	J	533.06	-1162.05	24.00	24.00	266.37	0.00			
		J-1	531.99	-1162.12	24.00	24.00	266.37	0.00	531.99	-1162.12	0.00
		J-2	534.13	-1161.98	24.00	24.00	86.37	0.00	534.13	-1161.98	0.00
	2	J	529.27	-1074.42	24.00	24.00	266.37	0.00			
		J-1	528.20	-1074.49	24.00	24.00	266.37	0.00	528.20	-1074.49	0.00
		J-2	530.33	-1074.36	24.00	24.00	86.37	0.00	530.33	-1074.36	0.00
	3	J	796.15	-1070.69	24.00	24.00	266.37	0.00			
		J-1	795.08	-1070.76	24.00	24.00	266.37	0.00	795.08	-1070.76	0.00
		J-2	797.21	-1070.62	24.00	24.00	86.37	0.00	797.21	-1070.62	0.00

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
e-mail: design@vanston.com ◇ www.vanston.com
Tel: (734) 424-0661
Fax: (734) 424-0677

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1428 E. Ellsworth Road
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ISSUED FOR:	DATE:
SITE PLAN	10–15–18
REVISED	10–30–18
REVISED	11–13–18
FINAL SITE PLAN	1–15–19
REVISED	4–15–19

DRAWN BY: GAH/R.S.
JOB NO.: ---

LIGHTING PLAN
SHEET NO.
C–8

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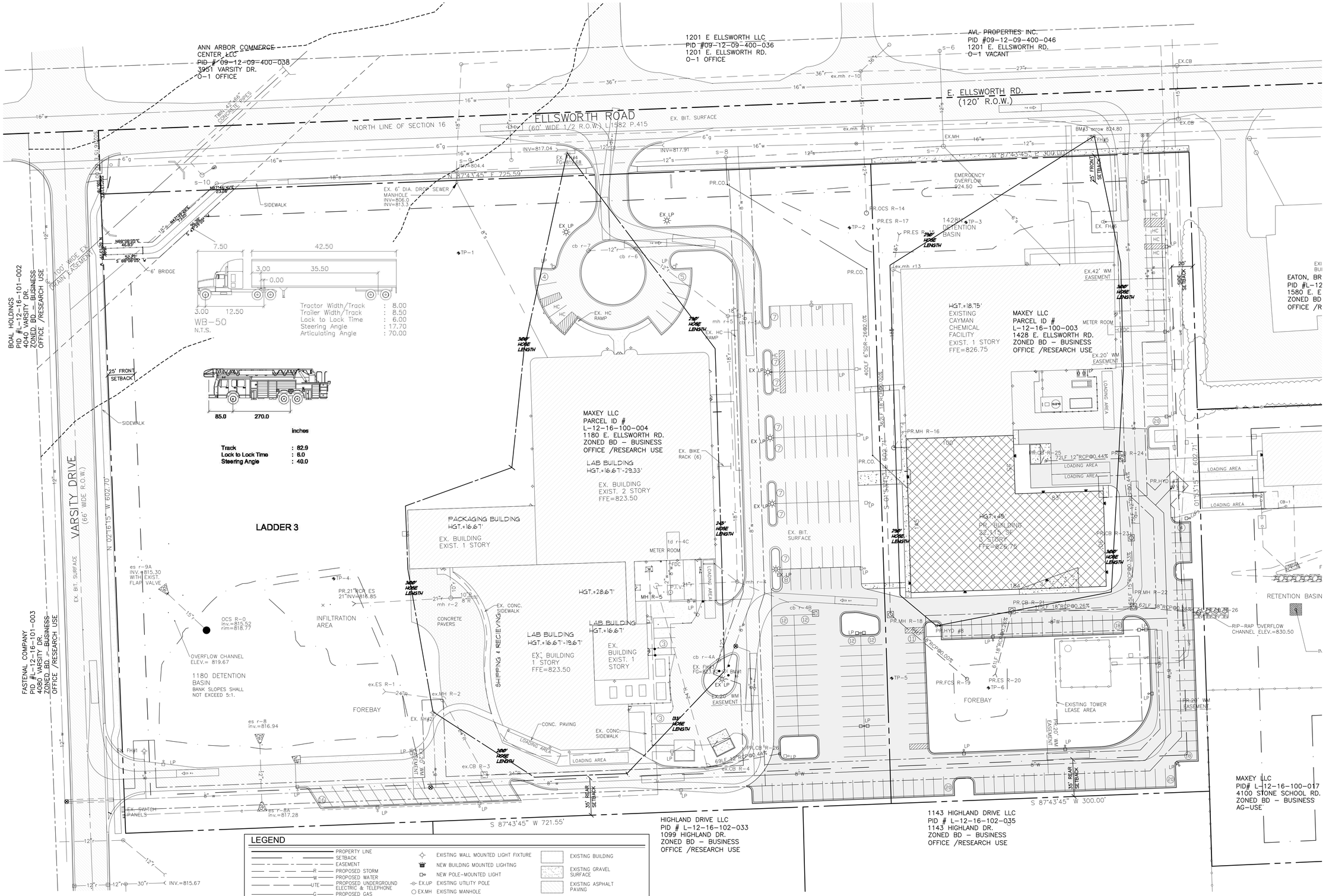

NOTES:
1. WB-50 LARGE TRUCK and PITTSFIELD TOWNSHIP LADDER 3 ACCESS TO THIS FACILITY IS DEPICTED ON THIS PLAN.

FIRE ACCESS PLAN

SCALE: 1" = 40'-0"

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BUILDERS
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Ann Arbor, MI 48103
e-mail: design@vanston.com • www.vanston.com
Tel: (734) 424-0661
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SITE PLAN	10-15-18
REVISED	4-15-19

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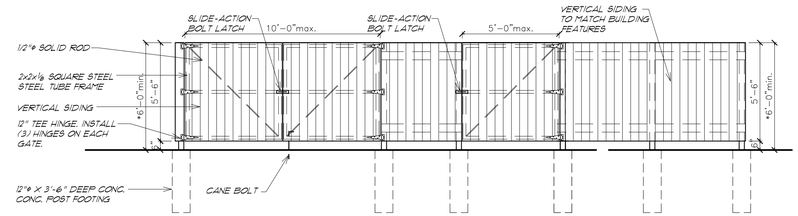
JOB NO.: ---

FIRE ACCESS PLAN

SHEET NO.

C-9

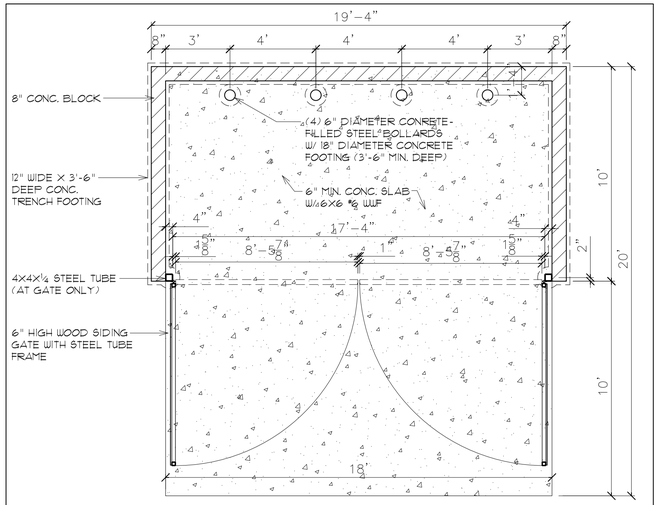
P:\Cayman 1428\AUTOCAD\Site\C-9-Fire.dwg, 4/17/2019 1:06:10 PM



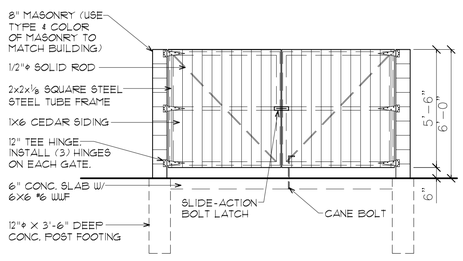
TYPICAL SCREEN WALL & GATE DETAILS

SCALE: NONE

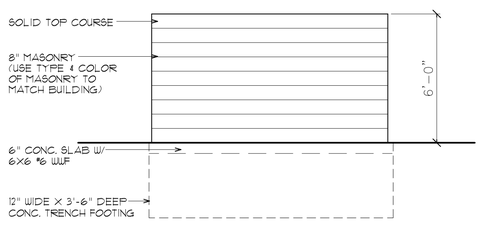
* HEIGHT TO MATCH EQUIPMENT TO BE SCREENED MAX. 12'



REFUSE STATION PLAN



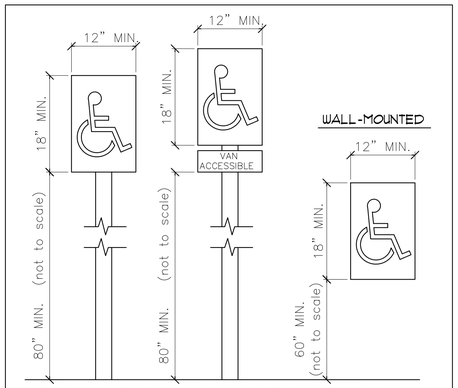
FRONT ELEVATION



SIDE ELEVATION

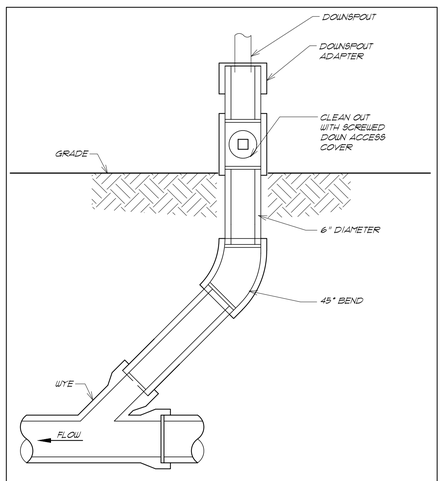
MASONRY DUMPSTER DETAIL

NO SCALE



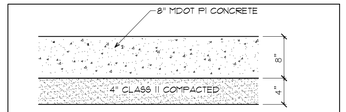
NOTE: EACH ACCESSIBLE PARKING SPACE IS REQUIRED TO HAVE A SIGN. THE SIGN SHALL BE CENTERED IN THE PARKING SPACE. VAN ACCESSIBLE SPACES SHALL BE DESIGNATED "VAN ACCESSIBLE" ON THE FACE OF THE SIGN OR SHALL HAVE AN ADDITIONAL SIGN "VAN ACCESSIBLE" MOUNTED BELOW THE REQUIRED SIGN.

BARRIER-FREE PARKING SIGN



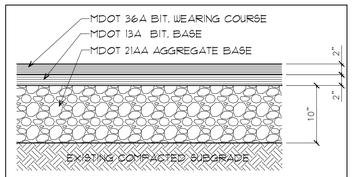
DOWNSPOUT RISER DETAIL

NO SCALE



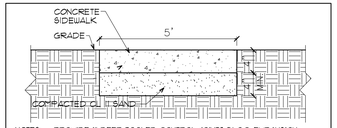
TYPICAL CONC. PAVEMENT SECTION

NO SCALE



ASPHALT PAVEMENT SECTION

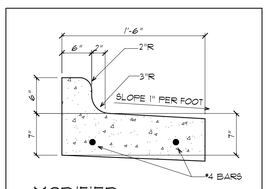
NO SCALE



NOTES: PROVIDE 1" DEEP TOOLED CONTROL JOINTS 5' O.C. EXPANSION JOINTS ONE-HALF INCH (1/2") THICKNESS, COMPOSED OF SOME SUITABLE INERT MATERIAL THOROUGHLY IMPREGNATED WITH BITUMINOUS OR ASPHALTIC COMPOUND, SHALL BE PLACED BETWEEN WALKS, CURBS, DRIVEWAYS AND AT ALL PLACES WHERE THEY MEET AND IN INTERMEDIATE JOINTS AT DISTANCES NOT EXCEEDING FIFTY FEET (50') AND SHALL EXTEND FROM THE FINISHED SIDEWALK SURFACE FOR THE FULL DEPTH OF THE SIDEWALK.

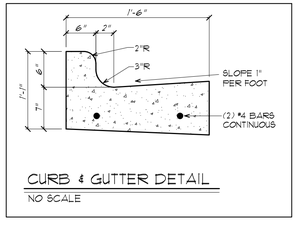
CONCRETE SIDEWALK DETAIL

NO SCALE



MODIFIED CURB & GUTTER DETAIL

NO SCALE



CURB & GUTTER DETAIL

NO SCALE

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Road, Ste. A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

CAYMAN CHEMICAL 1428 ADDITION

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ISSUED FOR:	DATE:
SITE PLAN	10-15-18
REVISED	10-30-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	4-15-19

DRAWN BY: GAH
JOB NO.: xxx

DETAIL SHEET

SHEET NO.

C-10

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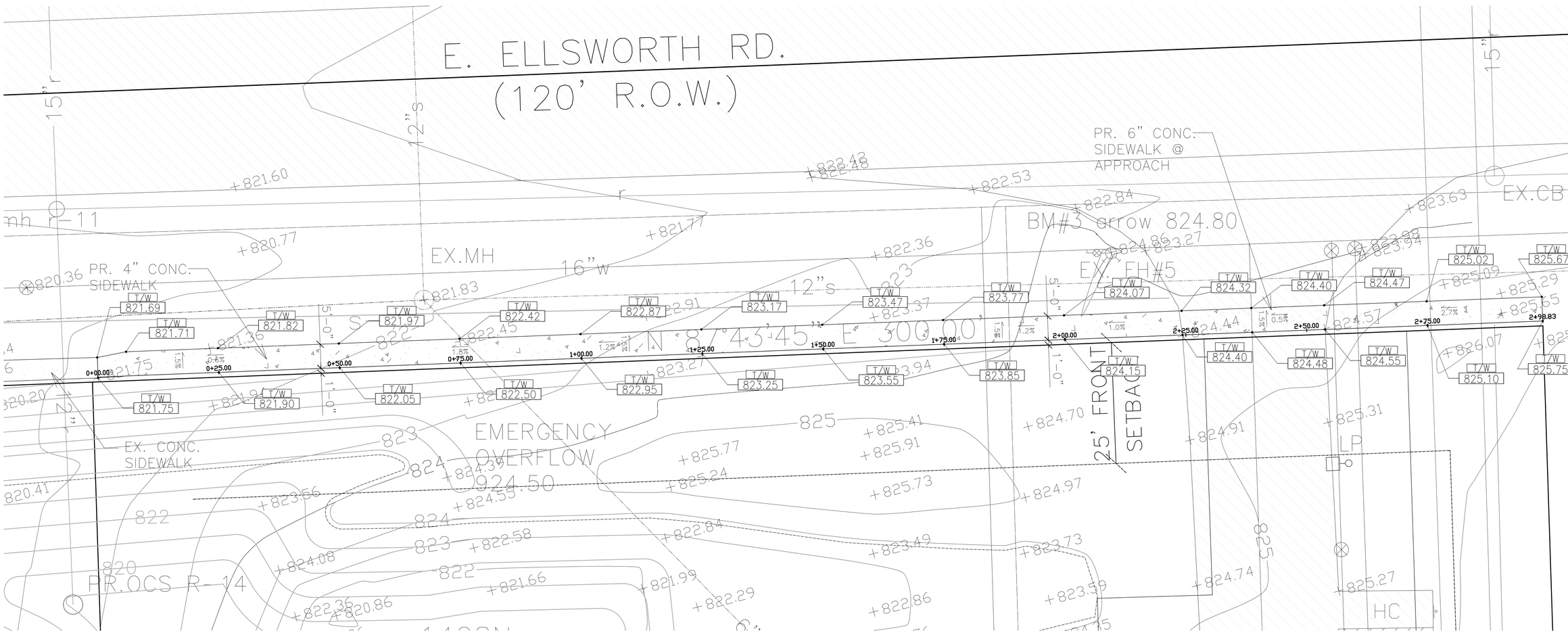

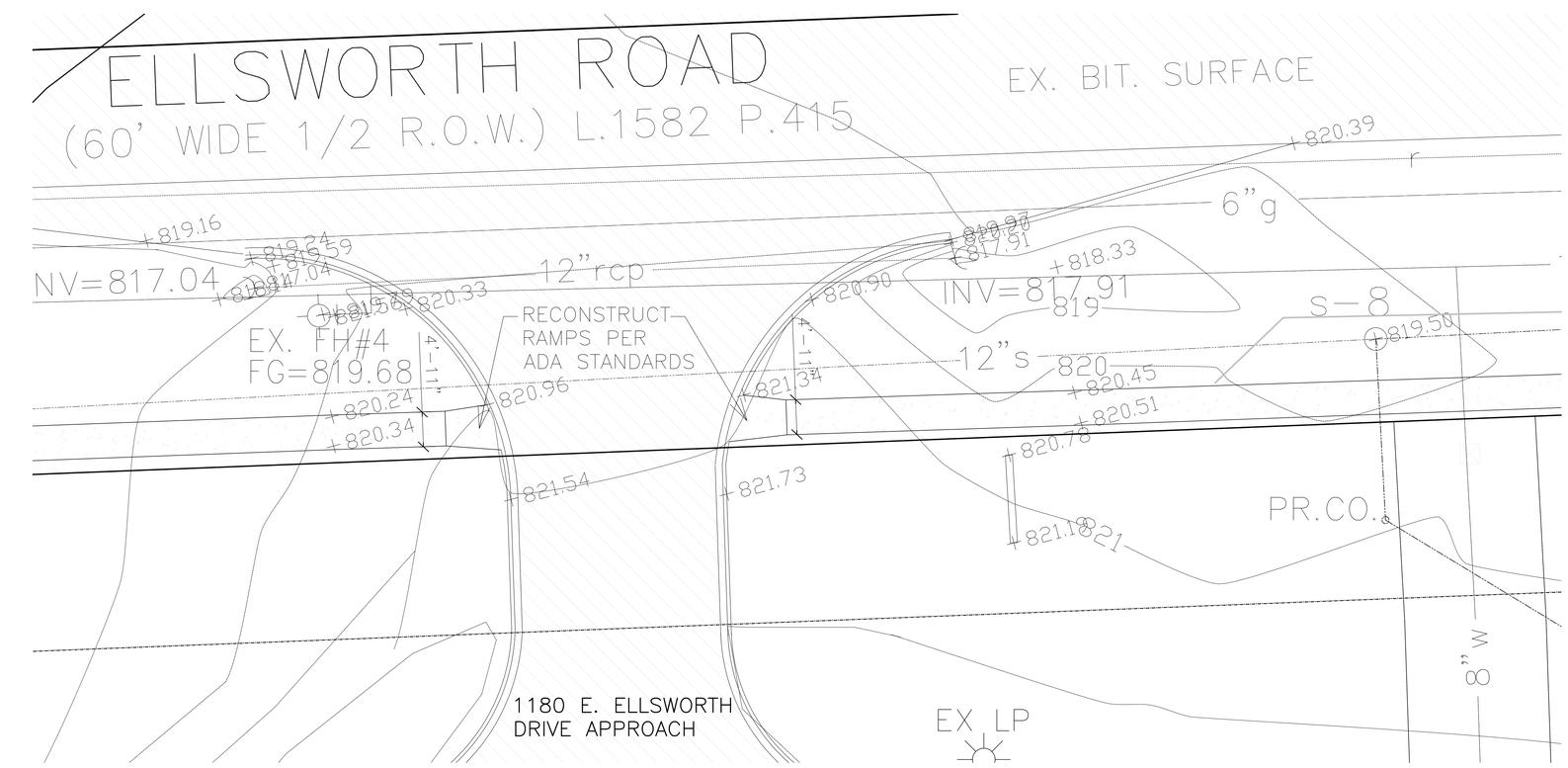

SIDEWALK PLAN

SCALE: 1" = 10'-0"

NOTES:

i. The sidewalk construction covered by these plans shall conform to the City of Ann Arbor Public Services Standard Specifications.

ii. The omission of any standard details does not relieve the contractors of their obligation to construct items in complete accordance with the Public Services Standard Specifications.

iii. The contractor shall take all necessary precautions to protect the existing public road pavement. Damage to the public road pavement during the course of construction may necessitate milling and resurfacing of the damaged areas prior to final project acceptance.

iv. Reconstruction of sidewalk ramps to the 1180 E. Ellsworth drive approach shall be coordinated with City inspection services and meet ADA Standards.

LEGEND

	PROPERTY LINE
	SETBACK
	EASEMENT
R	PROPOSED STORM
W	PROPOSED WATER
UTE	PROPOSED UNDERGROUND ELECTRIC & TELEPHONE
G	PROPOSED GAS
S	PROPOSED SANITARY
	EXISTING STORM
W	EXISTING WATER
T	EXISTING TELEPHONE
E	EXISTING ELECTRIC
UG	EXISTING UNDERGROUND CABLE
G	EXISTING GAS
S	EXISTING SANITARY
	EXISTING CENTERLINE OF DITCH
(914)	EXISTING CONTOUR
914	PROPOSED CONTOUR
	LINE OF SILT FENCE
	EXISTING WALL MOUNTED LIGHT FIXTURE
	NEW BUILDING MOUNTED LIGHTING
	NEW POLE-MOUNTED LIGHT
EX.UP	EXISTING UTILITY POLE
EX.MH	EXISTING MANHOLE
EX.CO	EXISTING CLEAN OUT
CB R-1	NEW CATCH BASIN
EX FH	EXISTING FIRE HYDRANT
NEW FH #3	NEW FIRE HYDRANT
× 660.90	EXISTING ELEVATION
	PROPOSED ELEVATION
	EXISTING BUILDING
	EXISTING GRAVEL SURFACE
	EXISTING ASPHALT PAVING
	PROPOSED BUILDING
	PROPOSED ASPHALT PAVING
	PROPOSED CONCRETE
	PROPOSED HEAVY DUTY ASPHALT PAVING

CAYMAN CHEMICAL

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

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SITE PLAN	10-15-18
REVISED	11-13-18
FINAL SITE PLAN	1-15-19
REVISED	2-6-19
REVISED	4-15-19

DRAWN BY: GAH/B.S.
JOB NO.: ---

SIDEWALK PLAN
SHEET NO.
C-11

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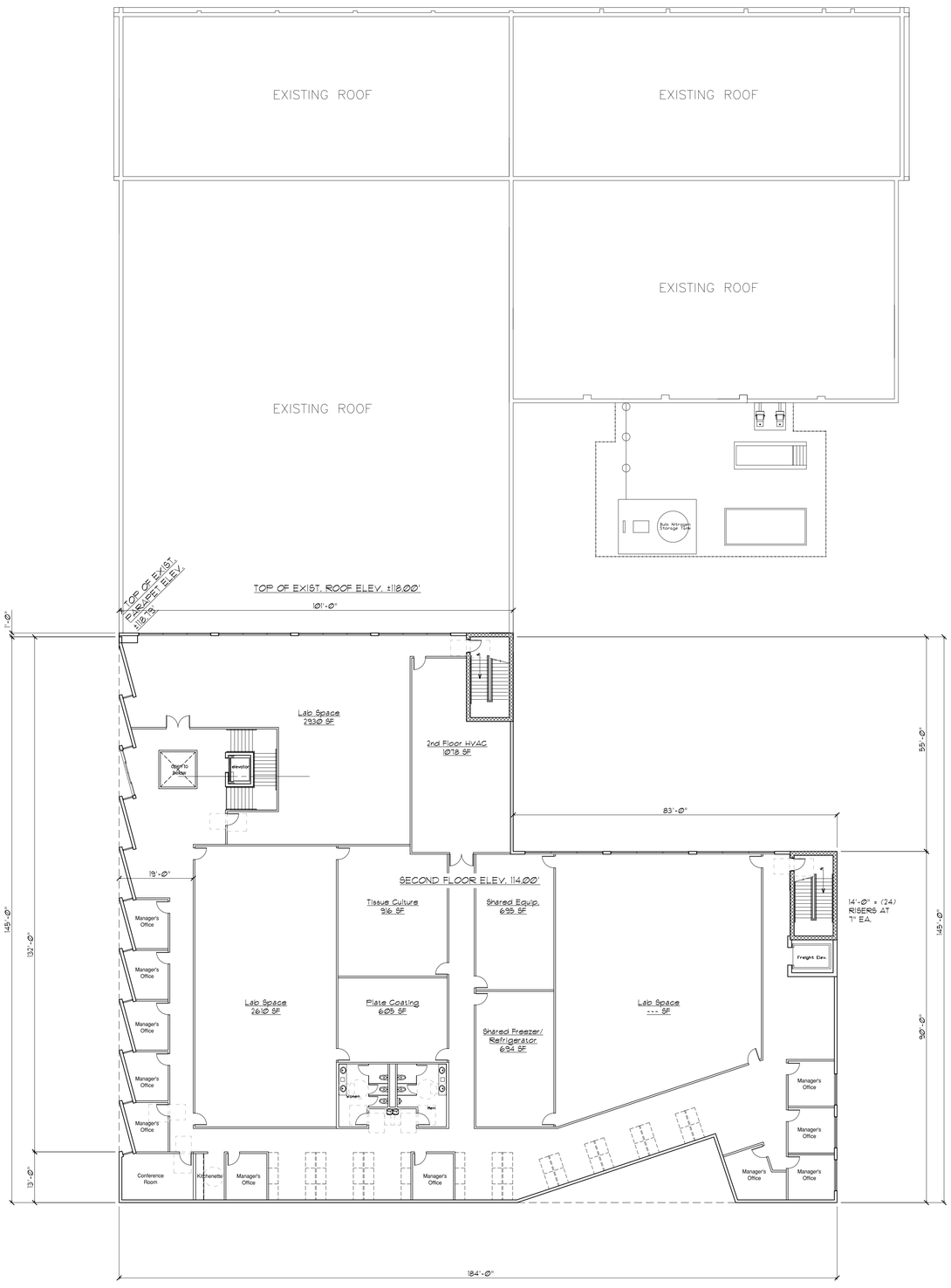
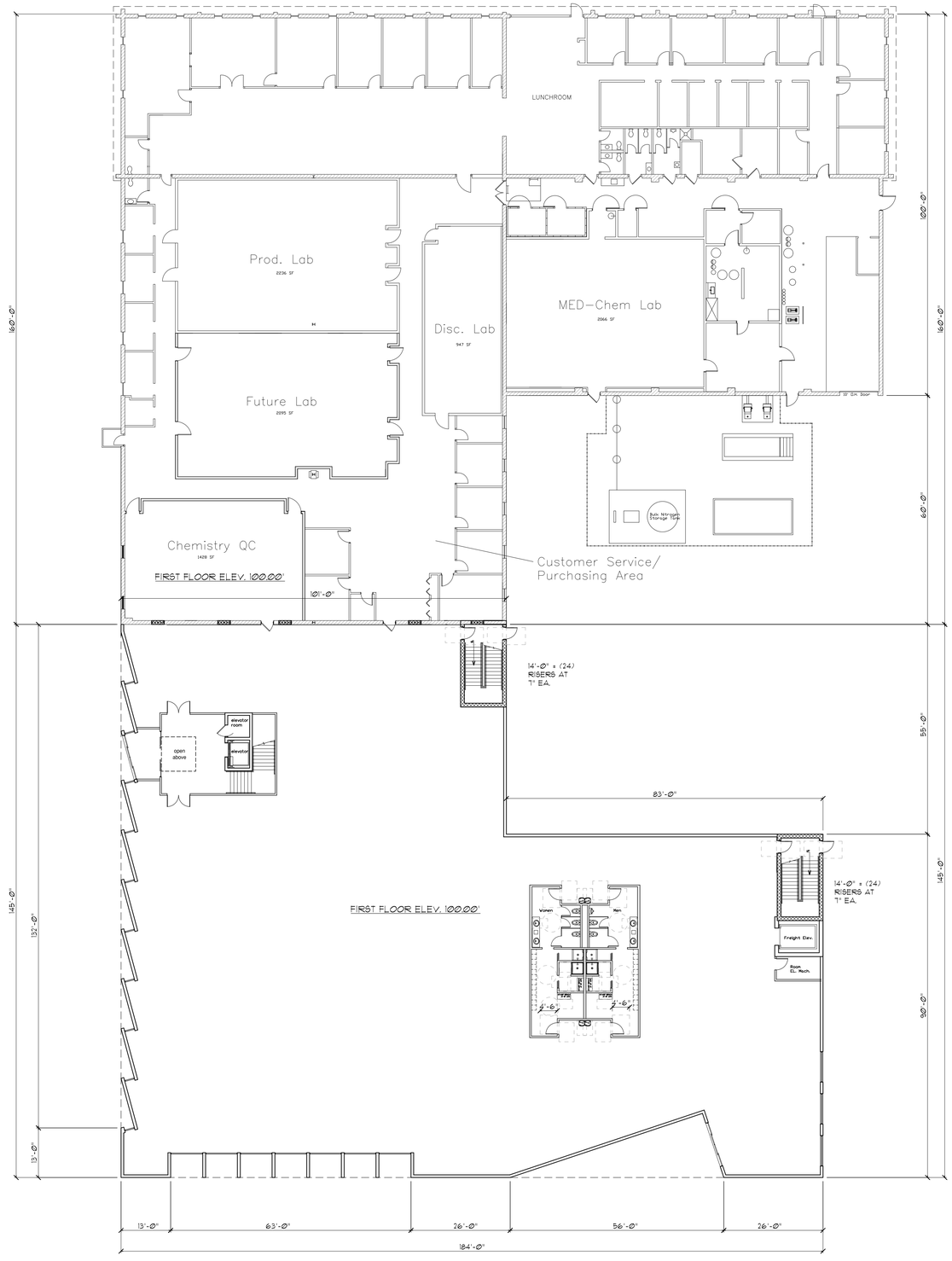


SECOND FLOOR PLAN

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



FIRST FLOOR PLAN

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

DESIGNERS
Vanston/O'Brien, Inc.
BUILDERS
8150 Jackson Rd, Suite A
Ann Arbor, MI 48103
Tel: (734) 424-0661
Fax: (734) 424-0677
e-mail: design@vanston.com • www.vanston.com

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ISSUED FOR:	DATE:
REVIEW	9-26-18
REVIEW	11-14-18
REVIEW	1-9-18
REVISED	1-14-19

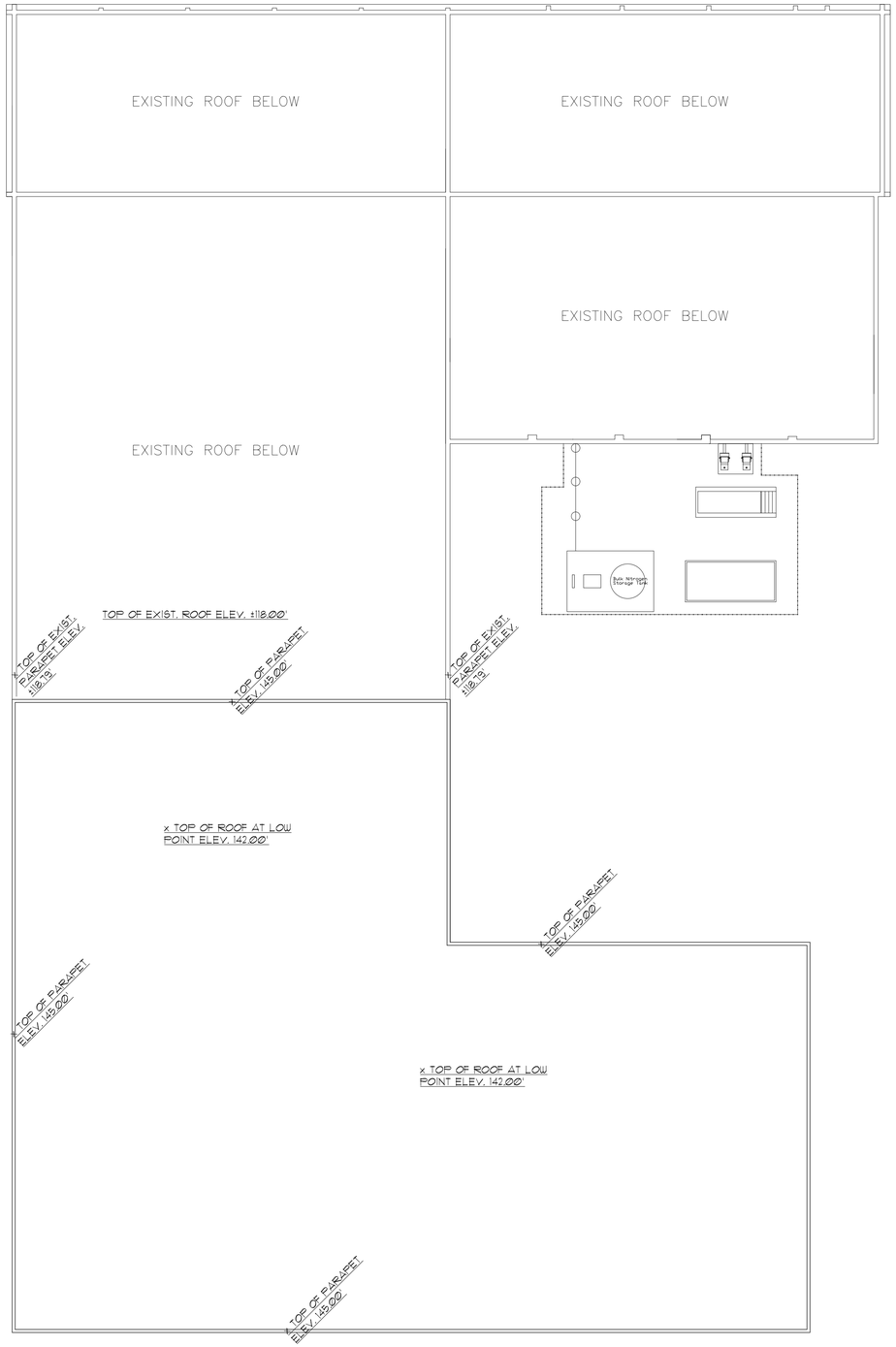
DRAWN BY: CLN
JOB NO.: ---

FLOOR PLANS

SHEET NO.

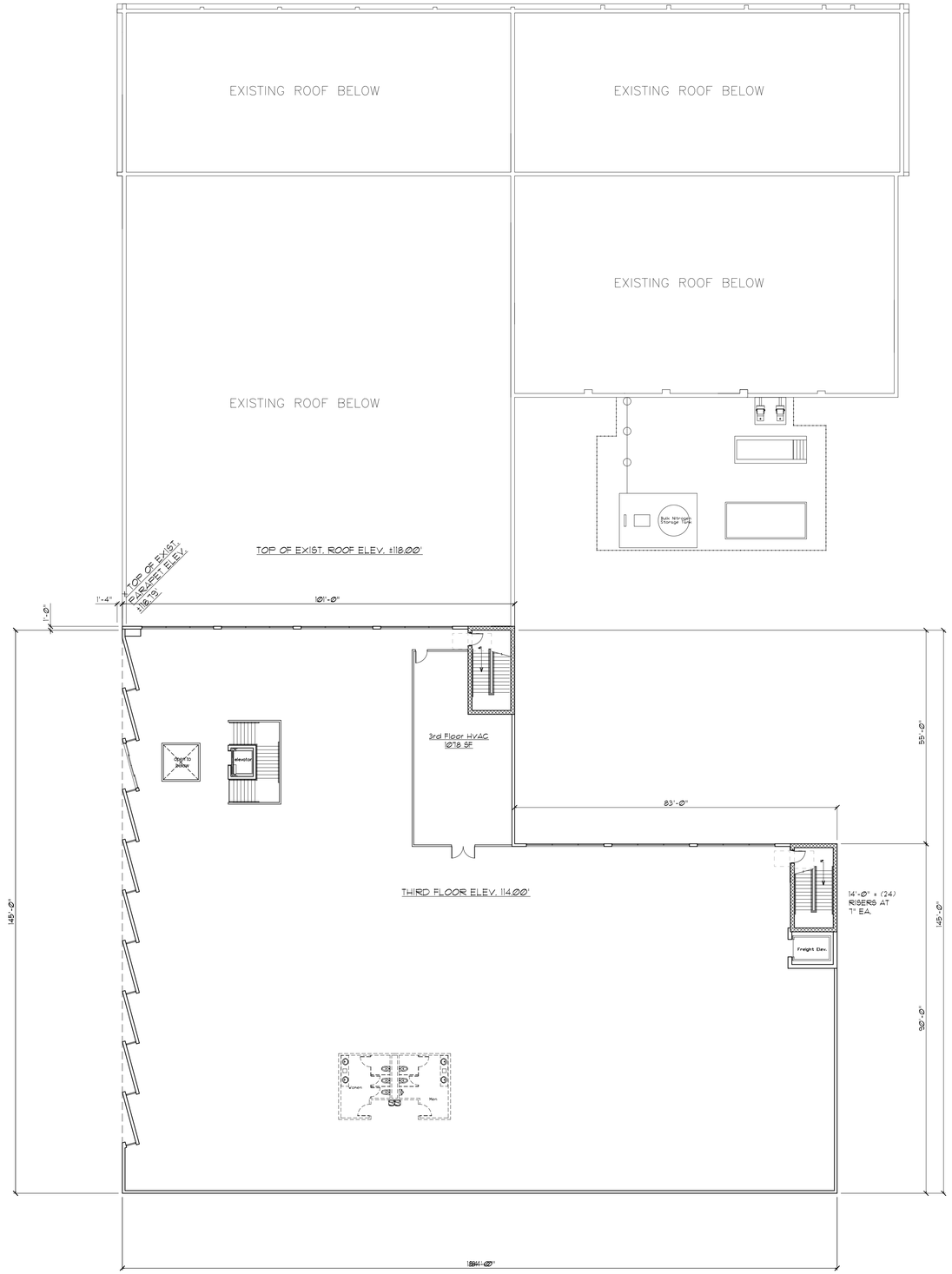
C-12

P:\Cayman 1428\AUTOCAD\3Site\A-1rev2.dwg, 4/17/2019 1:06:29 PM



ROOF PLAN

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



THIRD FLOOR PLAN

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

CAYMAN 1428 ADDITION

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Vanston/O'Brien, Inc.
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Ann Arbor, MI 48103
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REVIEW	1-9-18
REVISED	1-14-19

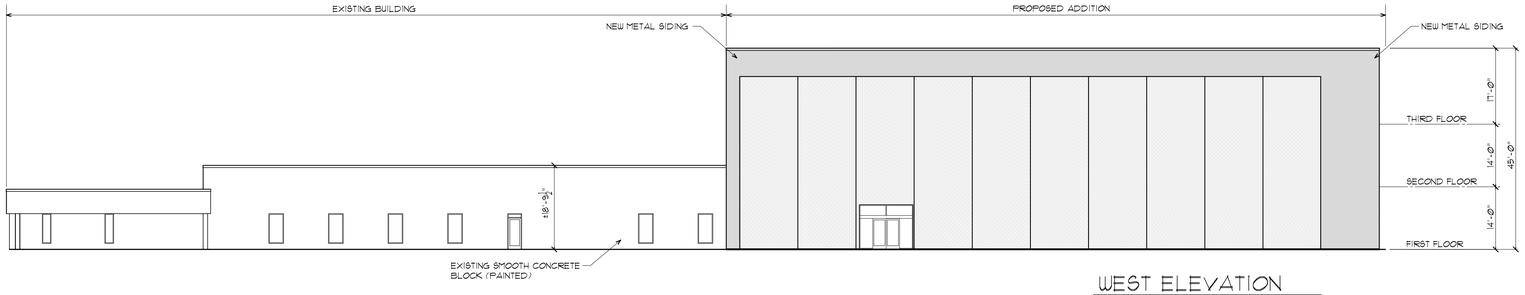
DRAWN BY: CLN
JOB NO.: ---

FLOOR PLANS

SHEET NO.

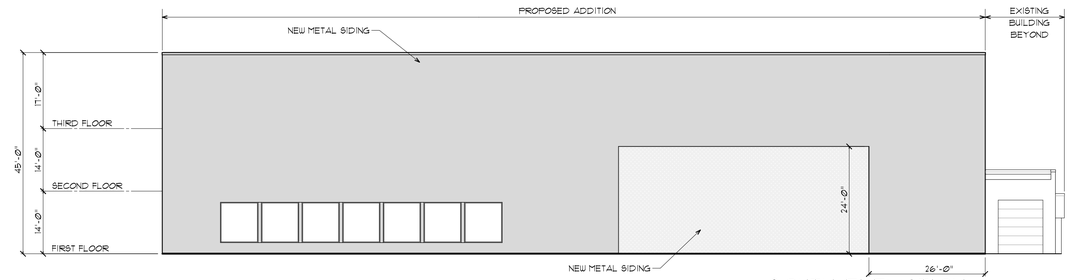
C-13

P:\Cayman 1428\AUTOCAD\3Site\A-2rev2.dwg, 4/17/2019 1:06:34 PM



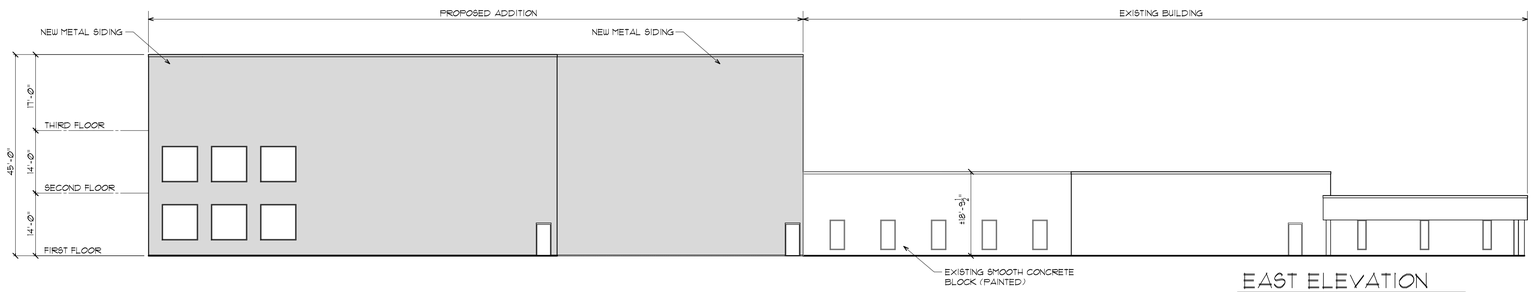
WEST ELEVATION

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



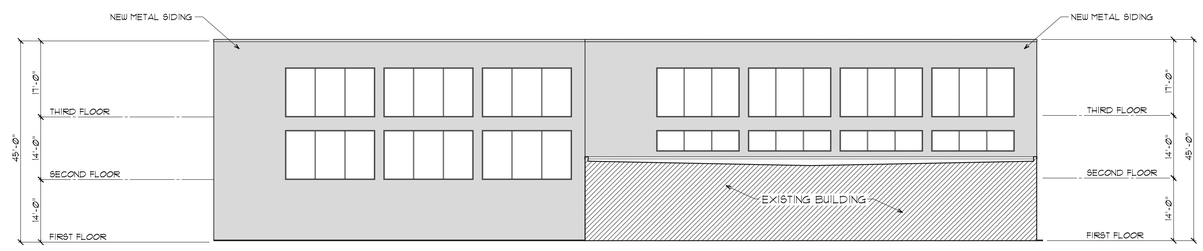
SOUTH ELEVATION

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



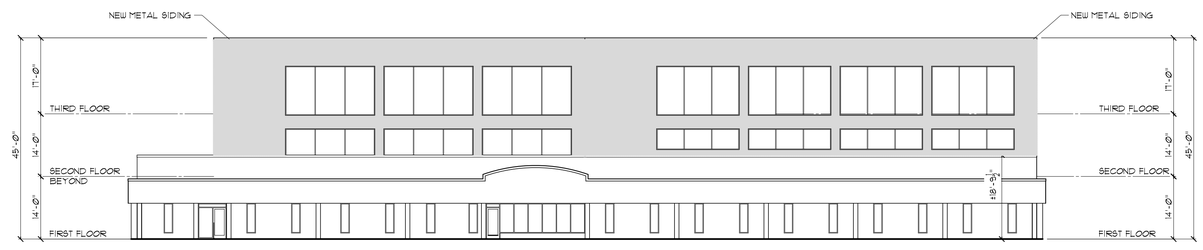
EAST ELEVATION

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



NORTH ELEVATION CUT THROUGH EXISTING BUILDING

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



NORTH ELEVATION FROM ELLSWORTH ROAD

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

CAYMAN 1428 ADDITION

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ISSUED FOR:	DATE:
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REVIEW	1-9-18
REVISED	1-14-19

DRAWN BY: CLN
JOB NO.: ---

ELEVATIONS

SHEET NO.

C-14

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