

OWNER

ROBERT WEBER
13102 LYONS HWY.
SAND CREEK, MI

DEVELOPER/BUILDER

PETERS BUILDING COMPANY
172 S. INDUSTRIAL DRIVE
SALINE, MI. 48176
CONTACT: JIM HAEUSSLER
734-429-4200

**SURVEYOR/ENGINEER/
LANDSCAPE ARCHITECT**

MIDWESTERN CONSULTING, LLC
3815 PLAZA DR.
ANN ARBOR, MI 48108
CONTACT: TOM COVERT, RLA, AICP, LEED AP
TINA FIX, RLA, LEED AP
734-995-0200

ARCHITECT

J.B. MOORE AND ASSOCIATES
4844 JACKSON ROAD, SUITE 150
ANN ARBOR, MI 48103
CONTACT: BRAD MOORE
734-930-1500

SITE AREA CALCULATION

EXISTING SITE AREA (GROSS)	346,772 S.F./43560 = 7.96 AC.
EXISTING ROW	13,389 S.F./43560 = 0.31 AC.
EXISTING SITE AREA (NET)	333,383 S.F./43560 = 7.65 AC.
PROPOSED SITE AREA (GROSS)	346,772 S.F./43560 = 7.96 AC.
PROPOSED ROW	20,303 S.F./43560 = 0.47 AC.
PROPOSED SITE AREA (NET)	326,469 S.F./43560 = 7.49 AC.

DENSITY CALCULATION

TOTAL UNITS / SITE AREA = DWELLING UNITS PER ACRE
51 UNITS / 7.49 AC. = 7 DU/AC

SITE DATA COMPARISON CHART

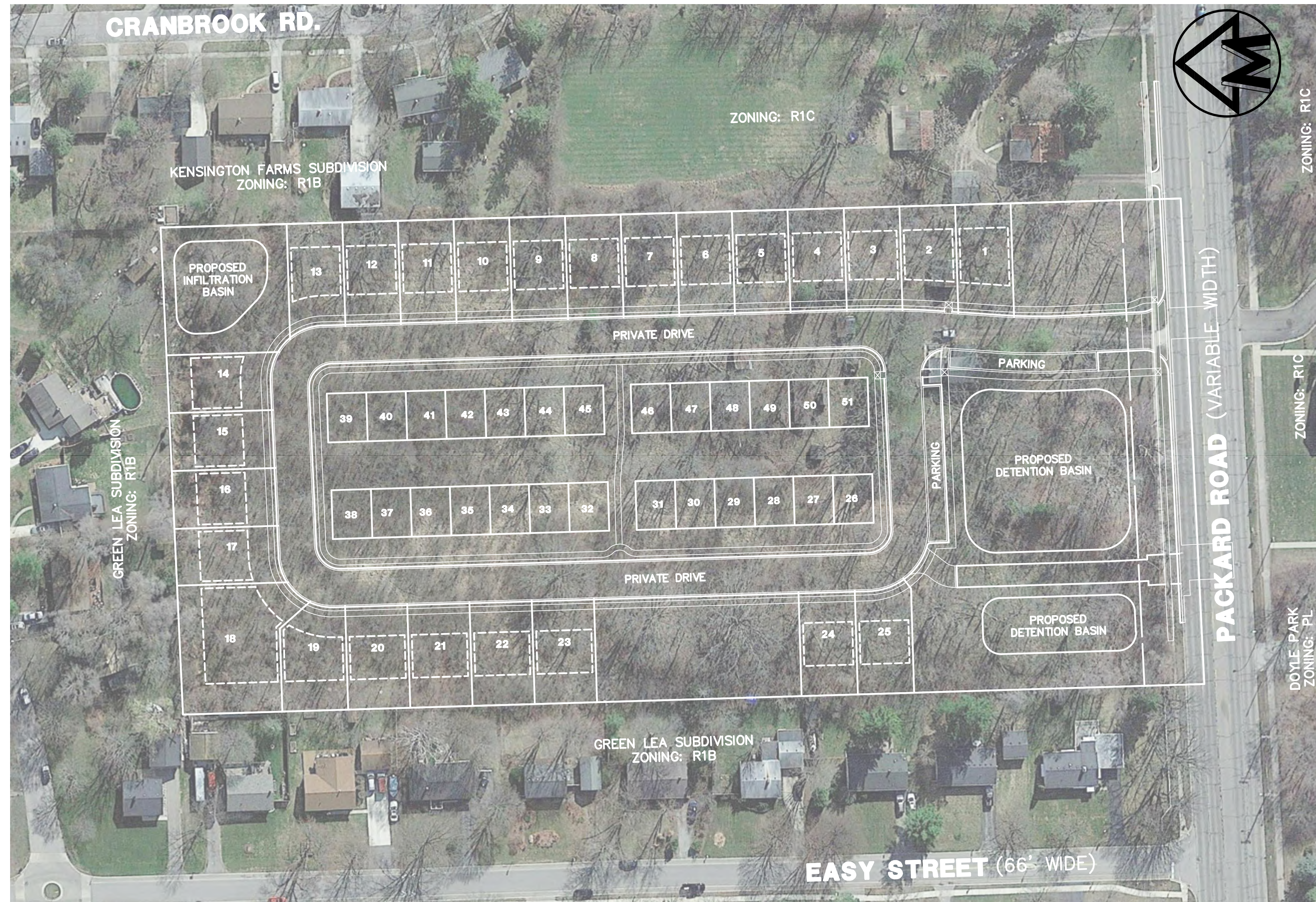
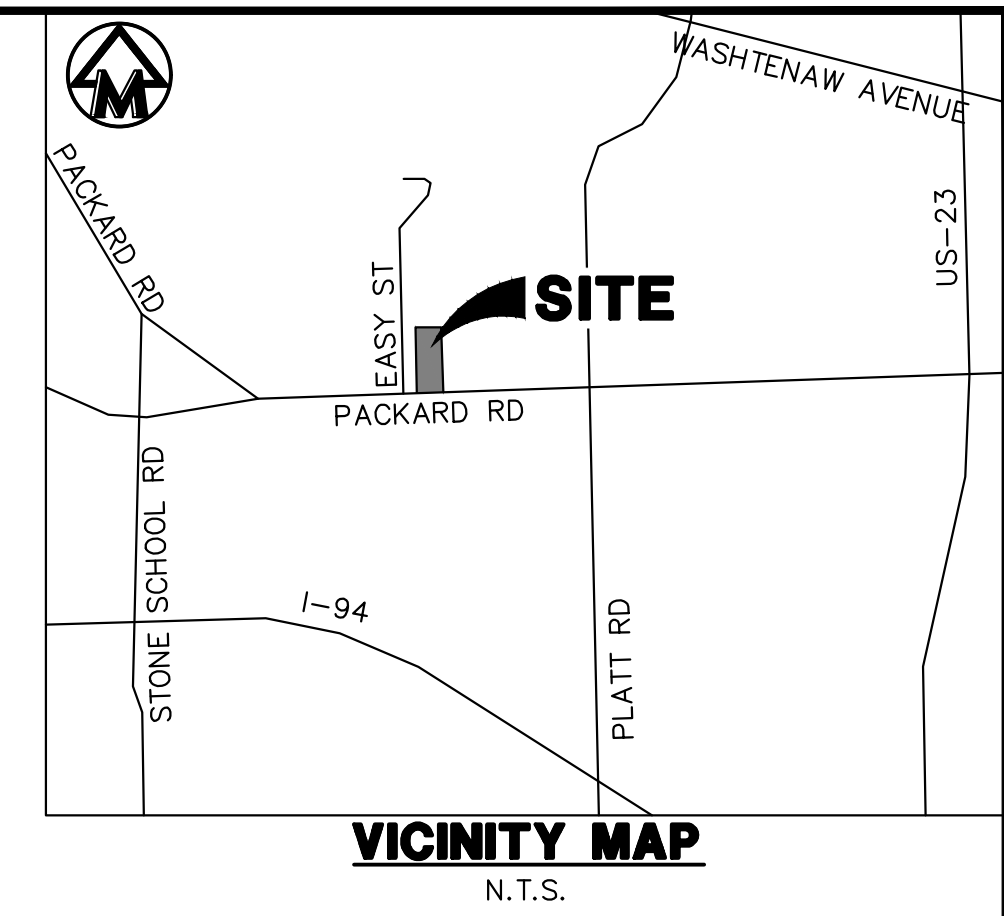
	PROPOSED	REQ./ALLOWED
SITE ZONING	PUD	R1E
SITE USE	PLANNED UNIT DEVELOPMENT	SINGLE FAMILY DWELLING DISTRICT
SITE AREA (GROSS)	7.96 AC.	N/A
SITE AREA (NET)	7.49 AC.	N/A
LOT WIDTH	46.1 FT. MIN.	34 FT. MIN.
LOT AREA	4,000 S.F. MIN.	4,000 S.F. MIN.
AVERAGE LOT AREA	4,403 S.F.	N/A
LOT SETBACKS		
FRONT	20-25 FT	15 FT MIN.
SIDE	3 FT/6FT TOTAL	3 FT/6 FT TOTAL
REAR	20 FT MIN.	20 FT MIN.
NUMBER OF UNITS	51	79 MAX. (52 MAX. WITH CONDITIONAL REZONING)
SITE DENSITY	7.0 DU/AC	10 DU/AC. MAX.
HOME FLOOR AREA	2,000SF MAX.*	2,000SF MAX.
*UNFINISHED BASEMENT	NOT INCLUDED IN FLOOR AREA CALCULATIONS	
HOME HEIGHT	30 FT. MAX.	30 FT MAX.
OPEN SPACE	4.38 AC. (58%)	N/A
ON-STREET PARKING (PRIVATE STREETS ORD.)	51 SPACES	51 SPACES (1 PER UNIT)
RESIDENTIAL PARKING	102 SPACES (2-CAR GARAGE)	51 SPACES (1 PER SINGLE FAMILY DWELLING)

GENERAL NOTES

- PER CHAPTER 49, SECTION 4:58 OF THE CITY CODE, "ALL SIDEWALKS ARE TO BE KEPT AND MAINTAINED IN GOOD REPAIR BY THE OWNER OF THE LAND ADJACENT TO AND ABUTTING THE SAME." PRIOR TO ISSUANCE OF THE FINAL CERTIFICATE OF OCCUPANCY FOR THIS SITE, ALL EXISTING SIDEWALKS MUST BE REPAIRED IN ACCORDANCE WITH CITY STANDARDS.
- THE CONSTRUCTION COVERED BY THESE PLANS SHALL CONFORM TO THE CITY OF ANN ARBOR PUBLIC SERVICES DEPARTMENT STANDARD SPECIFICATIONS WHICH ARE INCLUDED BY REFERENCE.
- THE OMISSION OF ANY STANDARD DETAILS DOES NOT RELIEVE THE CONTRACTORS OF THEIR OBLIGATION TO CONSTRUCT ITEMS IN COMPLETE ACCORDANCE WITH PUBLIC SERVICES DEPARTMENT STANDARDS AND SPECIFICATIONS.

2857 PACKARD ROAD

CITY OF ANN ARBOR, WASHTENAW COUNTY, MICHIGAN SECTION 3, T3S, R6E PLANNED UNIT DEVELOPMENT - SITE PLAN



SHEET INDEX

- | # | SHEET TITLE |
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| 01 | COVER SHEET |
| 02 | SITE PLAN NARRATIVES |
| 03 | ALTA-NSPS LAND TITLE SURVEY |
| 04 | EXISTING CONDITIONS AND NATURAL FEATURES PLAN |
| 05 | TREE LIST |
| 06 | SOIL PIT LOGS |
| 07 | SITE REMOVAL PLAN |
| 08 | SITE LAYOUT PLAN |
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| 10 | GRADING PLAN AND CROSS-SECTIONS |
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PROJECT SUMMARY

THE PROPOSED PLANNED UNIT DEVELOPMENT REZONING AND SITE PLAN CONSISTS OF 51 RESIDENTIAL HOMES (25 SINGLE FAMILY RESIDENTIAL LOTS AND 26 ATTACHED RESIDENTIAL UNITS IN 4 BUILDINGS) EACH HOME WITH TWO-CAR GARAGES. THE DEVELOPMENT INCLUDES APPROXIMATELY 1,628 LINEAR FEET OF PRIVATE ROADWAY AND 3,109 LINEAR FEET OF SIDEWALK AND A STORM WATER MANAGEMENT SYSTEM WITH INFILTRATION AND 100-YEAR DETENTION VOLUMES. THE DEVELOPMENT INCORPORATES PRESERVATION OF SOME NATURAL FEATURES ON THE SITE, INCLUDING WOODLAND AND LANDMARK TREES.

THE PROPOSED OVERALL SITE DENSITY IS 7.0 DWELLING UNITS PER ACRE WITH A MINIMUM LOT SIZE OF 4,000 SF. THE SITE IS CURRENTLY ZONED R1E SINGLE FAMILY RESIDENTIAL WITH CONDITIONS INCLUDING:

- A MAXIMUM OF 51 DWELLING UNITS WITH A MINIMUM OF 4 DISTINCT MODEL HOMES (TWO 2-STORY, ONE 1.5-STORY, ONE 1-STORY) AND THE SAME MODEL SHALL NOT BE BUILT NEXT TO EACH OTHER. DWELLING UNITS WILL HAVE VARYING EXTERIOR COLORS WITH NO TWO ADJACENT FACING THE STREET BEING THE SAME COLOR
- A MINIMUM OF FIVE 1-STORY RANCH STYLE HOUSES AROUND PERIMETER OF DEVELOPMENT.
- ATTACHED GARAGES SHALL NOT PROJECT FURTHER THAN 12 FEET OUT FROM THE FRONT OF EACH HOUSE OR 6 FEET FROM THE PORCH.
- A 15-FOOT WIDE LANDSCAPE BUFFER ALONG THE PERIMETER OF THE PROPERTY SHALL BE PROVIDED TO SCREEN DEVELOPMENT FROM ADJACENT RESIDENCES.

PER CITY REVIEW 08/20/19

2857 PACKARD ROAD

JOB No. 16070	DATE: 4/25/19	01
REVISIONS:	SHEET 01 OF 27	
PER CITY REVIEW 05/31/19	CADD: CTS	
PER CITY REVIEW 06/14/19	ENG: SGF	
PER CITY REVIEW 06/26/19	PM: TJC	
PER CITY REVIEW 07/10/19	TECH: TES	
PER CITY REVIEW 07/12/19	SITE PLAN/16070CV1	
PER CITY REVIEW 07/25/19		



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Land Development • Land Survey • Institutional • Municipal
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RELEASED FOR:	DATE

SCOTT G. FISHER
P.E. #58473

TYPICAL DETACHED AND ATTACHED HOUSING TYPOLOGY



PUD - DEVELOPMENT PROGRAM

THE PROPOSED DEVELOPMENT DOES NOT DEVIATE FROM THE AREA, HEIGHT, AND PLACEMENT REQUIREMENTS OR THE OFF-STREET PARKING OR LANDSCAPING REQUIREMENTS. THE PROPOSED DEVIATION IS FOR THE MULTI-FAMILY RESIDENTIAL LAND USE IN THE RIE ZONING DISTRICT FOR THE PROPOSED SIDE BY SIDE ATTACHED RESIDENTIAL UNITS.

DESCRIPTION OF OBJECTIVES, PURPOSES, AND BENEFICIAL EFFECT FOR THE CITY PROPOSED TO BE ACHIEVED BY THE PUD ZONING DISTRICT:

- DIVERSE HOUSING TYPOLOGY FOR ANN ARBOR HOUSING MARKET: THE PROPOSED RESIDENTIAL LOT SIZE AND ATTACHED RESIDENTIAL UNITS PROVIDE A HOUSING TYPOLOGY THAT IS NOT CURRENTLY AVAILABLE IN THE COMMUNITY; A SMALLER SINGLE FAMILY RESIDENTIAL LOT AT A MARKET PRICE GEARED TOWARD HOUSEHOLDS WITH ONE FULL-TIME AND ONE PART TIME INCOME AND ATTACHED RESIDENTIAL UNITS WITHIN AN ESTABLISHED SINGLE FAMILY RESIDENTIAL COMMUNITY ALONG A MAJOR TRANSIT ROUTE/PEDESTRIAN CORRIDOR WITHIN THE CITY LIMITS.
- LIMITATION ON DENSITY: THE PROPOSED DENSITY OF THE DEVELOPMENT LIMITS THE NUMBER OF RESIDENTIAL UNITS TO 51 DWELLING UNITS WITH 25 SINGLE FAMILY RESIDENTIAL LOTS AND 26 ATTACHED UNITS. THE PLACEMENT OF THE DETACHED SINGLE FAMILY RESIDENTIAL LOTS ALONG THE PERIMETER, AND THE INTENT TO MEET THE CONDITIONAL REZONING REQUIREMENT OF A MINIMUM NUMBER OF RANCH STYLE HOUSES ALONG THE PERIMETER, CREATES A DEVELOPMENT THAT IS COMPATIBLE WITH THE ADJACENT EXISTING RESIDENTIAL SUBDIVISIONS.
- MANAGEMENT OF STORMWATER FROM OFF-SITE NEIGHBORS: THE PROPOSED REAR YARD DRAINAGE SYSTEM AND STORMWATER MANAGEMENT BASIN IN THE NORTHEAST CORNER OF THE SITE, ALLOW FOR STORMWATER CONVEYANCE AND INFILTRATION OF OFF-SITE DRAINAGE THAT HAS HISTORICALLY CAUSED FLOODING ISSUES AS IDENTIFIED BY THE PROJECT NEIGHBORS. IT IS ANTICIPATED THESE STORMWATER IMPROVEMENTS AND INFRASTRUCTURE WILL REDUCE OR ENTIRELY RESOLVE HISTORICAL NEIGHBOR CONCERNS OF PONDING IN THIS AREA. THE PROJECT IS ADDRESSING 2.3 ACRES OF OFF-SITE DRAINAGE THAT PASSES THROUGH THE SITE AND CREATES PONDING/FLOODING OF THE NEIGHBOR'S REAR YARDS. THE PROJECT AS DESIGNED WILL GATHER THIS WATER AND STORE IN AN INFILTRATION BASIN WHILE RELEASING ANY OVERFLOW WATER TO THE UNDERGROUND PIPE CONVEYANCE SYSTEM AWAY FROM THE AREA OF HISTORICAL FLOODING.
- NATURAL FEATURES PRESERVATION: IN ORDER TO ACHIEVE ADDITIONAL PRESERVATION OF LANDMARK TREES AND WOODLANDS MORE CONSISTENT WITH THE ORIGINAL AREA PLAN APPROVED WITH THE REZONING, THE SINGLE FAMILY LOTS IN THE INTERIOR OF THE PRIVATE DRIVE LOOP WERE CHANGED TO ATTACHED RESIDENTIAL UNITS. THESE UNITS AS ATTACHED ARE OF THE SAME SIZE, DESIGN, AND CHARACTER AS PROPOSED IN THE PLAN WHERE THEY WERE DETACHED. AS A RESULT, THERE ARE TWO AREAS OF LANDMARK TREE/WOODLAND PRESERVATION ALONG THE WESTERN PROPERTY EDGE, WOODLAND PRESERVATION IN THE SOUTHEAST CORNER OF THE PROPERTY, AND WOODLAND PRESERVATION BETWEEN THE ATTACHED SINGLE FAMILY UNITS.
- NATURAL FEATURES MAINTENANCE PLAN: THE PRESERVED WOODLAND AND LANDMARK TREES ON THE SITE ARE A VALUABLE RESOURCE TO THE DEVELOPMENT AND THE ANN ARBOR COMMUNITY. IN ORDER TO MAINTAIN THE HEALTH AND VIABILITY OF THESE TREES, A NATURAL FEATURES MAINTENANCE PLAN, INCLUDING INVASIVE SPECIES CONTROL, IS BEING PROPOSED AS PART OF THE DEVELOPMENT AND WOULD BE PERPETUATED AS PART OF THE MASTER DEED AND BYLAWS THROUGH THE HOMEOWNERS ASSOCIATION.
- IN-FILL DEVELOPMENT (NOT GREENFIELD DEVELOPMENT) THIS PROJECT IS PROPOSED FOR DEVELOPMENT OF A PROPERTY THAT HAS ADJACENCY AND ACCESS TO:
 - UTILITY INFRASTRUCTURE THAT DOES NOT REQUIRE IMPROVEMENTS TO ACCOMMODATE
 - ALONG A COLLECTOR ROADWAY W/ PUBLIC TRANSIT STOPS
 - SURROUNDED BY PARKS
 - PROXIMITY TO EMPLOYERS
 - PROXIMITY TO SCHOOLS AND EDUCATION
 - PROXIMITY TO SERVICES

WHY BENEFICIAL EFFECT CANNOT BE ACHIEVED UNDER OTHER ZONING DESIGNATION:

THE INCLUSION OF ATTACHED MULTI-FAMILY UNITS ENABLES FURTHER PRESERVATION OF NATURAL FEATURES THAT CANNOT BE ACHIEVED WITH THE CONDITIONAL RIE ZONING CLASSIFICATION.

CONFORMITY TO THE ADOPTED MASTER PLAN AND POLICIES OF THE CITY OR DETAILED COMPELLING JUSTIFICATION FOR DEPARTURES FROM THE PLAN AND POLICIES:

THE SITE IS IDENTIFIED AS SITE 8 IN THE SOUTH AREA OF THE LAND USE ELEMENT MASTER PLAN AND SINGLE-FAMILY DETACHED RESIDENTIAL USE IS RECOMMENDED. THE PERIMETER OF THE SITE INCLUDES SINGLE FAMILY RESIDENTIAL LOTS AT COMPLEMENTARY DENSITY TO ADJACENT NEIGHBORHOODS WITH THE INTENT TO MAINTAIN REZONING CONDITIONS IDENTIFIED IN THE CONDITIONAL REZONING TO RIE INCLUDING A 15 FOOT WIDE BUFFER, TYPE AND NUMBER OF MODELS, AND RANCH HOUSES. THE INTERNAL BLOCK INCLUDES FOUR BUILDINGS WITH ATTACHED RESIDENTIAL UNITS THAT HAVE SIMILAR SIZE AS WOULD BE ANTICIPATED WITH THE SINGLE FAMILY HOMES AS APPROVED WITH THE AREA PLAN. THE PROPOSED UNITS WITH THIS DEVELOPMENT WOULD SUPPORT THE WASHTENAW COUNTY OFFICE OF COMMUNITY AND ECONOMIC DEVELOPMENT'S REPORT, HOUSING AFFORDABILITY AND ECONOMIC EQUITY ANALYSIS, WASHTENAW COUNTY, MICHIGAN THAT IDENTIFIES A NEED TO:

- CONSIDER WAYS FOR ZONING TO ENCOURAGE SMALLER STARTER HOMES, FAMILY SIZED UNITS AND TO ADD SOME WORKFORCE OPTIONS TO EXISTING NEIGHBORHOODS.
- CONSIDER CHANGES TO ZONING AND/OR POLICY TO ENCOURAGE DEVELOPMENT OF MIXED-INCOME HOUSING IN TARGETED AREAS

ADDITIONALLY, THE CITY OF ANN ARBOR SUSTAINABILITY FRAMEWORK OUTLINES THREE PRIMARY ASPECTS OF SUSTAINABILITY: ENVIRONMENT, ECONOMY, AND EQUITY. THE PROPOSED DEVELOPMENT INCORPORATES DESIGN ELEMENTS FOR SEVERAL OF THE 16 SUSTAINABILITY GOALS INCLUDING:

- DIVERSE HOUSING - THE DEVELOPMENT IS INTENDED TO ADD DIVERSITY TO THE HOUSING TYPOLOGIES AVAILABLE WITHIN THE ANN ARBOR HOUSING MARKET.
- ACTIVE LIVING AND LEARNING - THE PROPOSED SITE LAYOUT INCLUDES SEVERAL AREAS OF NATURAL FEATURES PRESERVATION ON THE SITE AND A PEDESTRIAN SIDEWALK NETWORK THAT PROVIDES CONNECTIVITY TO PACKARD ROAD AND THROUGHOUT THE SITE, ALLOWING FOR PASSIVE RECREATION AND CONNECTIVITY TO OFF-SITE RECREATIONAL OPPORTUNITIES SUCH AS COBBLESTONE FARM AND BUHR PARK
- ECONOMIC VITALITY - THE HOUSING TYPOLOGY HAS THE POTENTIAL TO ENABLE EXISTING EMPLOYEES WITHIN ANN ARBOR TO LIVE IN ANN ARBOR AND THE POTENTIAL TO ATTRACT A NEW SET OF TALENTED INDIVIDUALS THAT ARE SEEKING EMPLOYMENT IN THE ANN ARBOR AREA BUT ARE HAVING DIFFICULTY FINDING HOUSING THAT DOES NOT EXCEED THEIR BUDGET FOR HOUSING EXPENSES.
- TRANSPORTATION OPTIONS - THE DEVELOPMENT SITE IS LOCATED ALONG PACKARD ROAD, WHICH IS ALONG AN AATA TRANSIT ROUTE, - CLEAN AIR AND WATER - STORMWATER RUNOFF TREATMENT INCLUDES INFILTRATION AND UNDERGROUND DETENTION THAT REDUCED IMPACTS TO NATURAL FEATURES ON THE SITE.
- HEALTHY ECOSYSTEMS - THE DEVELOPMENT INCLUDES PRESERVATION OF EXISTING WOODLANDS AND LANDMARK TREES ON THE SITE.

DEVELOPMENT PROGRAM

a. DESCRIPTION: PROPOSED IMPROVEMENTS CONSIST OF 51 RESIDENTIAL UNITS INCLUDING 25 SINGLE FAMILY RESIDENTIAL LOTS AND 26 ATTACHED RESIDENTIAL UNITS FOR A DENSITY OF 7 DWELLING UNITS PER ACRE. THE RESIDENTIAL UNITS WILL HAVE SINGLE-FAMILY HOMES WITH 2 CAR GARAGES. THE APPLICANT CURRENTLY HAS PURCHASE AGREEMENT ON PROPERTY.

THE SITE IS ACCESSED BY ONE PRIMARY ENTRANCE ALIGNED WITH THE EXISTING DRIVEWAY ACROSS PACKARD ROAD. AN SECONDARY EMERGENCY ACCESS IS PROPOSED FROM PACKARD ROAD AS WELL. A 48-FOOT PRIVATE ROADWAY AND PEDESTRIAN EASEMENT INCLUDES 22 FOOT 2 WAY STREET WITH PARKING ON ONE SIDE. ADDITIONAL PARKING IS PROVIDED ADJACENT TO THE PROPOSED DETENTION BASIN ON THE SOUTH SIDE OF THE SITE. A FRANCHISE UTILITY EASEMENT RUNS PARALLEL TO THE PRIVATE STREET ON BOTH SIDES OF THE STREET.

b. PRELIMINARY PHASING PROPOSAL AND PROBABLE CONSTRUCTION COST: SITE IMPROVEMENTS WILL BE CONSTRUCTED IN 1 PHASE AT AN APPROXIMATE COST OF \$2.5 MILLION.

COMMUNITY ANALYSIS

- a. IMPACT OF PROPOSED DEVELOPMENT ON AREA SCHOOLS: THE DEVELOPMENT WILL LIKELY INCREASE THE NUMBER OF CHILDREN ATTENDING THE ANN ARBOR PUBLIC SCHOOLS BY A SMALL AMOUNT, HOWEVER THIS INCREASE WILL BE SPREAD OVER SEVERAL YEARS AND OVER ALL GRADES.
- b. RELATIONSHIP OF INTENDED USE TO NEIGHBORING USES: THE PROPOSED DEVELOPMENT IS IN CHARACTER WITH THE SINGLE-FAMILY RESIDENTIAL UNITS IMMEDIATELY TO THE EAST, WEST, AND NORTH OF THE SITE. THE ATTACHED UNITS WILL BE LOCATED IN THE CENTRAL PORTION OF THE SITE TO PROVIDE ADDITIONAL BUFFER FROM THE NEIGHBORING DETACHED SINGLE FAMILY RESIDENTIAL.
- c. IMPACT OF ADJACENT USES ON THE PROPOSED DEVELOPMENT: THE PROPOSED DEVELOPMENT WILL BE COMPLEMENTED BY THE SINGLE FAMILY RESIDENTIAL UNITS IMMEDIATELY ADJACENT TO THE SITE. THE MANY NEARBY PARKS AND MALLETT'S CREEK BRANCH LIBRARY SERVE AS AMENITIES TO THE RESIDENTS OF THE DEVELOPMENT.
- d. IMPACT OF PROPOSED DEVELOPMENT ON THE AIR/WATER QUALITY AND ON EXISTING NATURAL FEATURES OF THE SITE AND NEIGHBORING SITES: A MINIMAL LOCAL IMPACT ON AIR QUALITY MAY ARISE FROM INCREASED TRAFFIC DUE TO THE ADDITIONAL RESIDENTS. HOWEVER, THIS MAY BE COUNTERBALANCED REGIONALLY DUE TO SHORTER COMMUTES. PUBLIC TRANSPORTATION USE AND PEDESTRIAN TRAVEL OF RESIDENTS MOVING CLOSER TO WORK OPPORTUNITIES, WATER QUALITY AND FLOW RATES WILL BE TREATED AND CONTROLLED IN ACCORDANCE WITH THE 2016 WASHTENAW COUNTY WATER RESOURCES COMMISSIONER REQUIREMENTS: THE FIRST FLUSH (RUNOFF FROM 1" STORM) WILL BE TREATED FOR QUALITY, THE GREATER OF THE FIRST FLUSH OR THE INCREASE IN THE 2-YEAR 24-HOUR EVENT WILL BE INFILTRATED, AND THE FLOW RATE OF ALL STORMS UP TO THE 100-YEAR 24-HOUR STORM WILL BE RESTRICTED TO LESS THAN 0.15 CFS/ACRE. NATURAL FEATURES ON-SITE INCLUDE EXISTING WOODLAND AND LANDMARK TREES. NATURAL FEATURES ARE INTEGRATED INTO A 15-FOOT LANDSCAPE BUFFER ALONG THE PERIMETER OF THE PROPERTY AND DESIGNATED OPEN SPACES. IMPACTED NATURAL FEATURES WILL BE MITIGATED AS REQUIRED BY THE CITY ORDINANCE.
- e. IMPACT ON HISTORIC SITES OR STRUCTURES: THERE ARE NO REGISTERED HISTORIC STRUCTURES ON SITE. THE HOUSE WAS BUILT IN 1840 AND HAS BEEN A RENTAL UNIT FOR THE LAST 30+ YEARS WITH MANY INTERIOR MODIFICATIONS.

SITE ANALYSIS

- a. EXISTING LAND USE AND ACTIVITY ON THE SITE-THE SITE IS A SINGLE FAMILY RESIDENTIAL LOT CURRENTLY USED AS A RENTAL PROPERTY. SEE EXISTING CONDITIONS PLAN.
- b. INVENTORY OF SITE CONDITIONS-SEE EXISTING CONDITIONS PLAN.
- c. DESCRIPTION OF NATURAL FEATURES-SEE EXISTING CONDITIONS PLAN.
 - i. NO KNOWN ENDANGERED SPECIES HABITAT ON THE SITE.
 - ii. NO 100-YEAR FLOODPLAIN IDENTIFIED ON THE SITE.
 - iii. LANDMARK TREES - SEE EXISTING CONDITIONS PLAN AND TREE LIST
 - iv. STEEP SLOPES - NO STEEP SLOPES IDENTIFIED ON THE SITE.
 - v. NO WATERCOURSES IDENTIFIED ON THE SITE.
 - vi. NO WETLANDS IDENTIFIED ON THE SITE.
 - vii. WOODLANDS - SEE EXISTING CONDITIONS PLAN AND TREE LIST.
- d. LOCATION AND USE OF ALL EXISTING STRUCTURES ON THE SITE-SEE EXISTING CONDITIONS PLAN.
- e. EXISTING AND PROPOSED VEHICULAR, PEDESTRIAN, AND BICYCLE WAYS AND ACCESS POINTS-SEE SITE LAYOUT PLAN
- f. UTILITY AVAILABILITY AND PROPOSED CONNECTIONS WITH EXISTING PUBLIC RIGHTS-OF-WAY AND PUBLIC AND PRIVATE EASEMENTS - WATER SERVICE WILL LOOP TO PACKARD ROAD. SANITARY SERVICE WILL EXTEND FROM EAST ALONG PACKARD ROAD. THE STORMWATER MANAGEMENT SYSTEM WILL OUTLET TO THE STORM SYSTEM ON PACKARD ROAD. SEE EXISTING CONDITIONS PLAN AND SITE UTILITY PLAN.
- g. EXISTING AND PROPOSED GENERAL DRAINAGE PATTERN - THE SITE GENERALLY SLOPES TOWARD PACKARD ROAD AND TO THE NORTHEAST OF THE PROPERTY. SEE EXISTING CONDITIONS PLAN FOR EXISTING TOPOGRAPHY AND SITE GRADING PLAN FOR PROPOSED CONDITIONS.
- h. SUMMARY OVERLAY SHOWING HOW PROPOSED LAND USE RELATES TO EXISTING CONDITIONS - SEE ALTERNATIVE ANALYSIS PLAN

SCHEMATIC DESIGN

- a. COMPARISON CHART - SEE SITE DATA ON COVER SHEET
- b. EXISTING AND PROPOSED TOPOGRAPHY-SEE SITE GRADING PLAN
- c. ORIENTATION AND LOCATION OF IMPROVEMENTS-SEE SITE LAYOUT PLAN
- d. VERTICAL SECTION THROUGH THE SITE-SEE SITE CROSS-SECTIONS
- e. PROPOSED CIRCULATION PATTERNS-SEE SITE LAYOUT PLAN
- f. PROPOSED LOT LINES AND SETBACKS-SEE SITE LAYOUT PLAN
- g. NATURAL FEATURE IMPACT AREAS - SEE SITE REMOVAL PLAN AND TREE LIST

TRAFFIC ANALYSIS

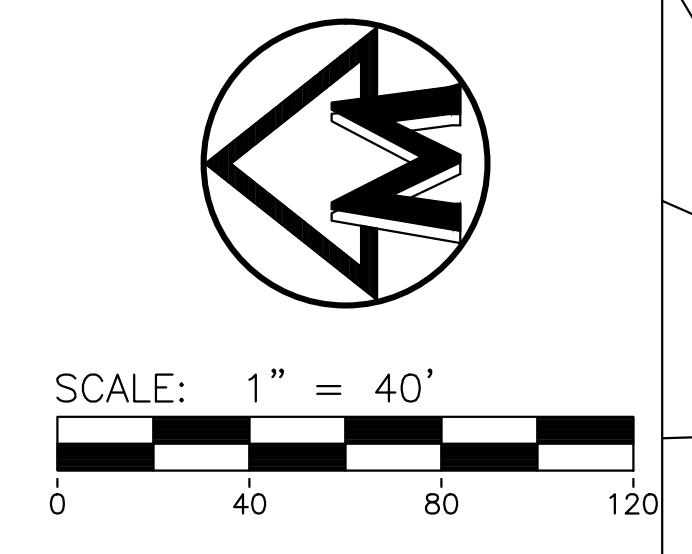
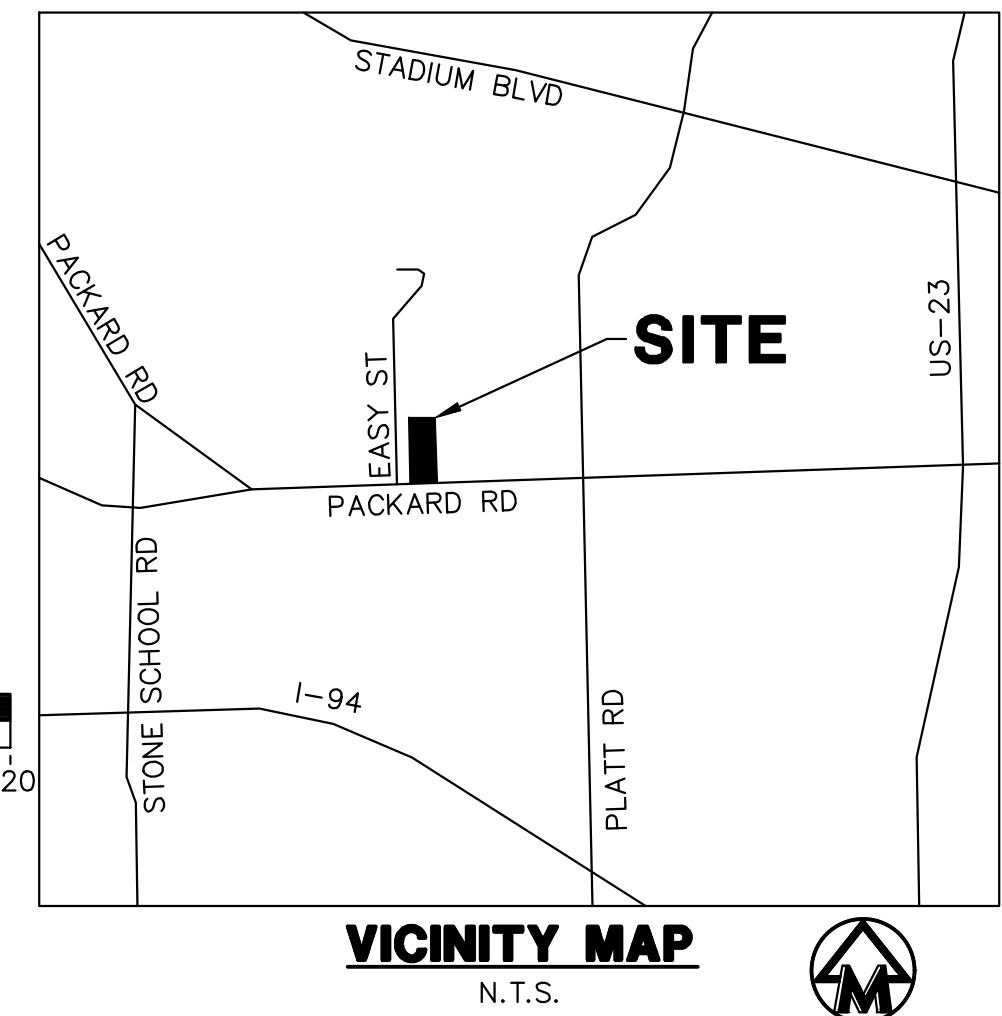
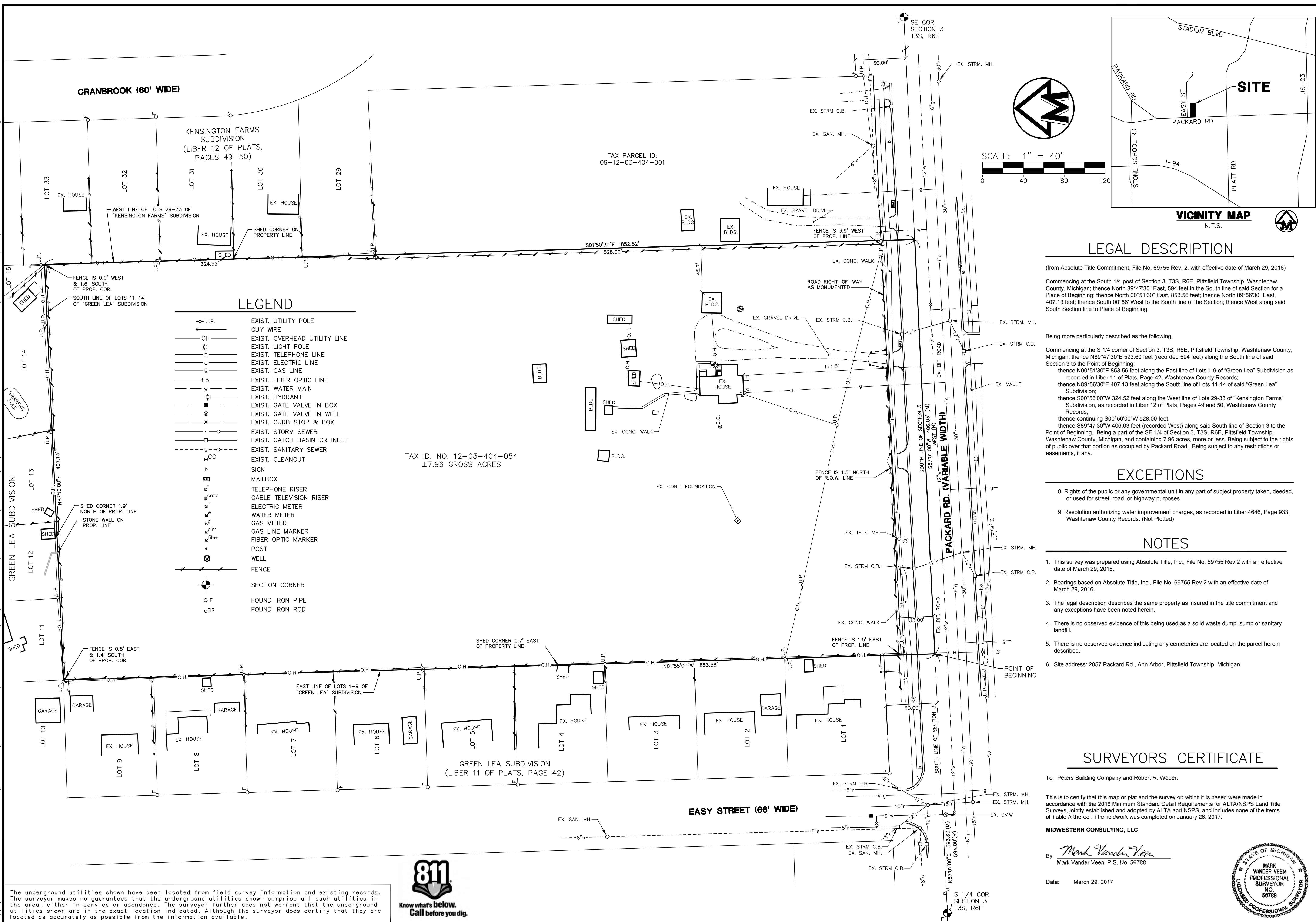
NUMBER OF PEAK HOUR TRIPS PER TRIP GENERATION MANUAL (10TH EDITION):

Land Use	Code	ITE Size (Units)	Volume	Morning Peak Hour				Afternoon Peak Hour			
				Enter	Exit	Total	Enter	Exit	Total		
Single Family, Detached	210	25	290	6	17	23	17	10	27		
Single Family, Attached	220	26	156	3	10	13	11	7	18		
		51	446	9	27	36	28	17	45		

TRAFFIC IMPACT STUDY SUBMITTED SEPARATELY.



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LEGEND

	EXIST. UTILITY POLE
	GUY WIRE
	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	EXIST. TELEPHONE LINE
	EXIST. ELECTRIC LINE
	EXIST. GAS LINE
	EXIST. FIBER OPTIC LINE
	EXIST. WATER MAIN
	EXIST. HYDRANT
	EXIST. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	EXIST. SANITARY SEWER
	EXIST. CLEANOUT
	SIGN
	MAILBOX
	TELEPHONE RISER
	CABLE TELEVISION RISER
	ELECTRIC METER
	WATER METER
	GAS METER
	GAS LINE MARKER
	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SECTION CORNER
	FOUND IRON PIPE
	FOUND IRON ROD

LEGAL DESCRIPTION

(from Absolute Title Commitment, File No. 69755 Rev. 2, with effective date of March 29, 2016)

Commencing at the South 1/4 post of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence North 89°47'30" East, 594 feet in the South line of said Section for a Place of Beginning; thence North 00°51'30" East, 853.56 feet; thence North 89°56'30" East, 407.13 feet; thence South 00°56' West to the South line of the Section; thence West along said South Section line to Place of Beginning.

Being more particularly described as the following:

Commencing at the S 1/4 corner of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence N89°47'30" E 593.60 feet (recorded 594 feet) along the South line of said Section 3 to the Point of Beginning; thence N00°51'30" E 853.56 feet along the East line of Lots 1-9 of "Green Lea" Subdivision as recorded in Liber 11 of Plats, Page 42, Washtenaw County Records; thence N89°56'30" E 407.13 feet along the South line of Lots 11-14 of said "Green Lea" Subdivision; thence S00°56'00" W 324.52 feet along the West line of Lots 29-33 of "Kensington Farms" Subdivision, as recorded in Liber 12 of Plats, Pages 49 and 50, Washtenaw County Records; thence continuing S00°56'00" W 528.00 feet; thence S89°47'30" W 406.03 feet (recorded West) along said South line of Section 3 to the Point of Beginning. Being a part of the SE 1/4 of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, and containing 7.96 acres, more or less. Being subject to the rights of public over that portion as occupied by Packard Road. Being subject to any restrictions or easements, if any.

EXCEPTIONS

8. Rights of the public or any governmental unit in any part of subject property taken, deeded, or used for street, road, or highway purposes.
9. Resolution authorizing water improvement charges, as recorded in Liber 4646, Page 933, Washtenaw County Records. (Not Plotted)

NOTES

1. This survey was prepared using Absolute Title, Inc., File No. 69755 Rev.2 with an effective date of March 29, 2016.
2. Bearings based on Absolute Title, Inc., File No. 69755 Rev.2 with an effective date of March 29, 2016.
3. The legal description describes the same property as insured in the title commitment and any exceptions have been noted herein.
4. There is no observed evidence of this being used as a solid waste dump, sump or sanitary landfill.
5. There is no observed evidence indicating any cemeteries are located on the parcel herein described.
6. Site address: 2857 Packard Rd., Ann Arbor, Pittsfield Township, Michigan

SURVEYORS CERTIFICATE

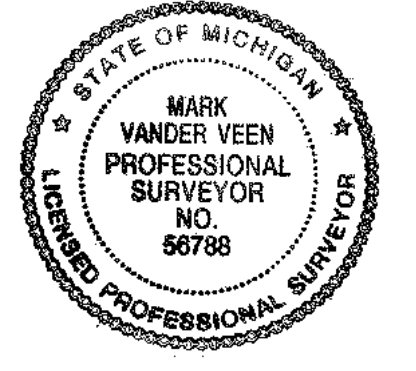
To: Peters Building Company and Robert R. Weber.

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes none of the items of Table A thereof. The fieldwork was completed on January 26, 2017.

MIDWESTERN CONSULTING, LLC

By: *Mark Vander Veen*
Mark Vander Veen, P.S. No. 56788

Date: March 29, 2017



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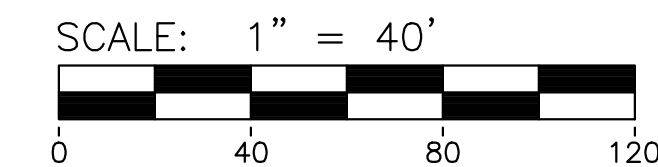
2857 PACKARD ROAD

PLANNED UNIT DEVELOPMENT
ALTA-NSPS LAND TITLE SURVEY

03

JOB NO. 16070

DATE: 4/25/19
SHEET 03 OF 27
REV. DATE: 05/31/19
CADD: GTS
ENG: SGF
PM: TIC
TECH: TES
SITE: PDBY/16070/ALTA/NSPS



NOTE
 1. THE BASE SURVEY WAS PREPARED BY MIDWESTERN CONSULTING IN APRIL 2016. ALL UNDERGROUND UTILITIES AND STRUCTURES HAVE BEEN SHOWN TO A REASONABLE DEGREE OF ACCURACY AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCING WORK.

BENCHMARKS
 BM#1—NORTHEAST BOLT OF SILVER LAMP POST SOUTH SIDE OF PACKARD ROAD, SE OF EXISTING DRIVE ACCESS TO PROPERTY. ELEVATION = 806.12 (NAVD88 DATUM)
 BM#2—SET SPIKE IN EAST FACE OF UTILITY POLE ON NORTH SIDE OF PACKARD ROAD, SOUTHWEST CORNER OF PROPERTY. ELEVATION = 814.88 (NAVD88 DATUM)

CITY OF ANN ARBOR BM #0016: +/-450' WEST OF PROPERTY, LOCATED IN BUHR PARK ON THE NORTH SIDE OF PACKARD ROAD. ELEVATION = 817.66 (NAVD88 DATUM)

SOILS DESCRIPTION
 BnB – BOYER LOAMY SAND, 1-6% SLOPES (TYPE B SOILS)
 WaA – WASEPI SANDY LOAM, 0-4% SLOPES (TYPE B SOILS)

NOTE: SEE INFILTRATION TESTING RESULTS ON SOIL BORING LOGS SHEET FOR MORE DETAILED INFORMATION.

FLOODPLAIN
 SUBJECT PROPERTY IS NOT LOCATED WITHIN A 100-YEAR FLOODPLAIN, PER FLOOD INSURANCE RATE MAP NO. 26161C0402E, IN WASHTENAW COUNTY, STATE OF MICHIGAN, WITH AN EFFECTIVE DATE OF APRIL 3, 2012.

WETLANDS/WATER COURSES
 NO WETLANDS IDENTIFIED ON THE SITE

STEEP SLOPES
 THERE ARE NO STEEP SLOPES PRESENT ON THIS SITE.

NATURAL FEATURES SUMMARY
 WASHTENAW COUNTY WATER RESOURCES COMMISSIONER'S OFFICE

WATER BODIES	MAPPED	TOTAL AREA	PROTECTED/UNDISTURBED
FLOODPLAINS	NO	0 AC.	0 AC.
RIPARIAN AREAS	NO	0 AC.	0 AC.
WETLANDS	NO	0 L.F.	0 L.F.
WOODLANDS	YES	3.40 AC.	+0.89 AC.
SLOPES (>33%)	NO	0 AC.	0 AC.

GENERAL DESC. OF NATURAL FEATURES
 THE 8 ACRE SITE IS CURRENTLY UTILIZED AS A RESIDENTIAL RENTAL PROPERTY WITH A MAIN HOUSE AND SEVERAL FORMER FARM OUTHOUSES. THE PORTION OF THE SITE NEAR THE RESIDENCE IS WOODED WITH A MANICURED LAWN. THE REMAINDER OF THE SITE IS NATURALIZED WITH MOWED TRAILS MAINTAINED THROUGH PORTIONS OF THE SITE.

THE SOUTHERN PORTION OF THE SITE IS PRIMARILY WOODED WITH A SOMEWHAT LIMITED UNDERSTORY OF VEGETATION. THE NORTHERN PORTION OF THE SITE IS A FORMER FALLOW FIELD THAT HAS NATURALIZED WITH EARLY SUCCESSIONAL SHRUBS, INCLUDING BUCKTHORN AND TREE SAPLINGS INCLUDING WALNUT AND ELM.

THE SITE HAS REGULATED NATURAL FEATURES INCLUDING LANDMARK TREES AND REGULATED WOODLANDS. TREES OVER 6" DBH IN SIZE HAVE BEEN IDENTIFIED AND MAPPED. A TREE LIST, INCLUDING LOCATION, HEALTH, AND LANDMARK STATUS IS PROVIDED. THE REGULATED WOODLAND BOUNDARY HAS BEEN DELINEATED PER THE WOODLAND DEFINITION IN THE CITY OF ANN ARBOR UNIFIED DEVELOPMENT CODE.

SEE NATURAL FEATURES OVERLAY PLAN FOR PROPOSED NATURAL FEATURES PROTECTION MEASURES. SEE LANDSCAPE PLAN FOR NATURAL FEATURES MITIGATION CALCULATIONS. SEE ALTERNATIVE ANALYSIS PLANS FOR NATURAL FEATURES ALTERNATIVE ANALYSIS. SEE NATURAL FEATURES MAINTENANCE PLAN FOR NATURAL FEATURES PROTECTION AND POST CONSTRUCTION MAINTENANCE.

LEGAL DESCRIPTION
 (from Absolute Title Commitment, File No. 69755 Rev. 2, with effective date of March 29, 2016)

Commencing at the South 1/4 post of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence North 89°47'30" East, 594 feet in the South line of said Section for a Place of Beginning; thence North 00°51'30" East, 853.56 feet; thence North 89°56'30" East, 407.13 feet; thence South 00°56' West to the South line of the Section; thence West along said South Section line to Place of Beginning.

Being more particularly described as the following:

Commencing at the S 1/4 corner of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence North 89°47'30" E 593.60 feet (recorded 594 feet) along the South line of said Section 3 to the Point of Beginning; thence North 00°51'30" E 853.56 feet along the East line of Lots 11-14 of "Green Lea" Subdivision as recorded in Liber 11 of Plats, Page 42, Washtenaw County Records; thence North 89°56'30" E 407.13 feet along the South line of Lots 11-14 of said "Green Lea" Subdivision; thence South 00°56' West along the West line of Lots 29-33 of "Kensington Farms" Subdivision, as recorded in Liber 12 of Plats, Pages 49 and 50, Washtenaw County Records; thence continuing South 00°56'00" W 528.00 feet; thence South 89°47'30" W 408.03 feet (recorded West) along said South line of Section 3 to the Point of Beginning. Being a part of the SE 1/4 of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, and containing 7.96 acres, more or less. Being subject to the rights of public over that portion as occupied by Packard Road. Being subject to any restrictions or easements, if any.

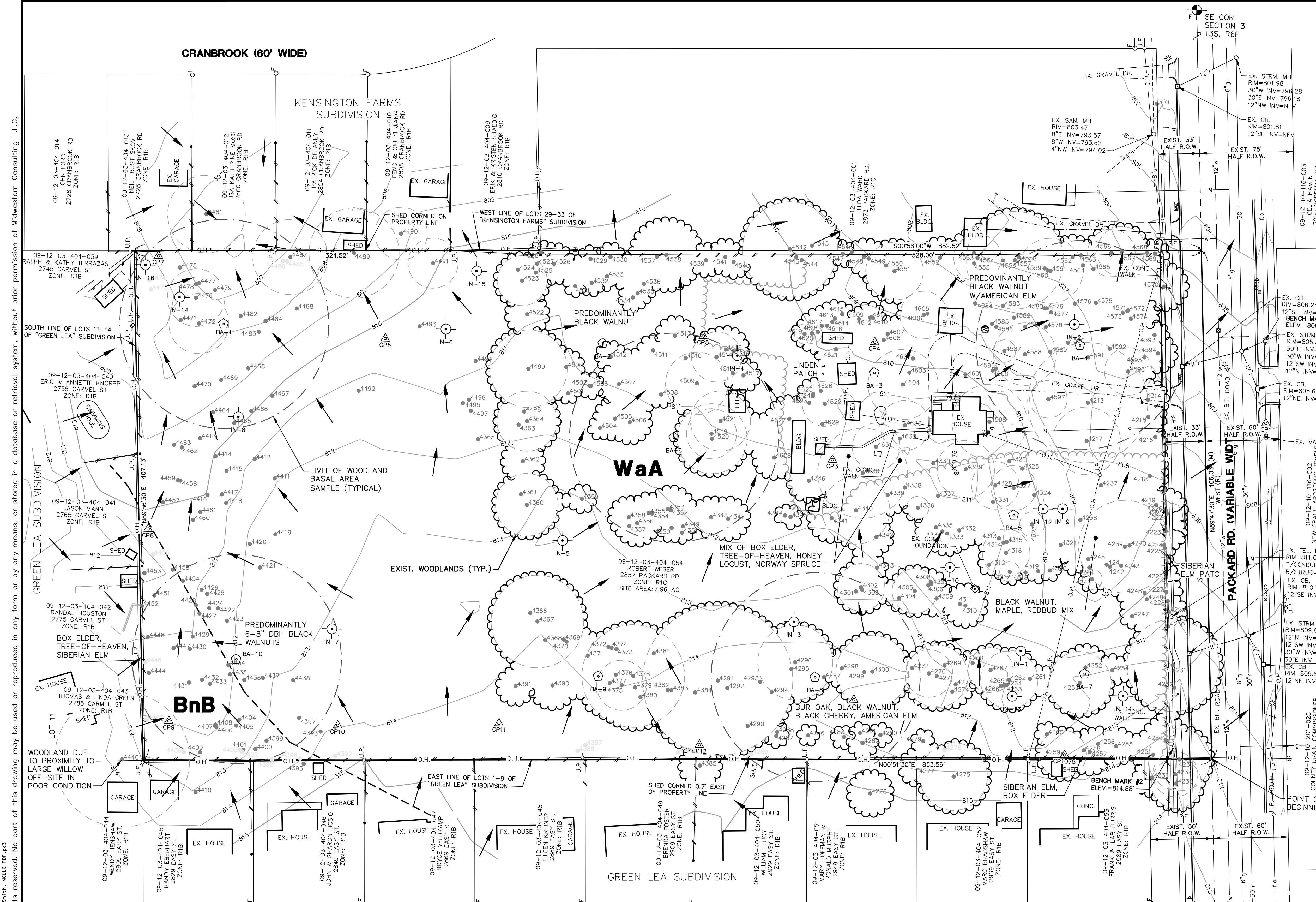
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 JIM HAEUSSLER
 734-429-4200

2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 EXISTING CONDITIONS AND NATURAL FEATURES PLAN

04

JOB NO. 16070
 REVISIONS:
 DATE: 4/25/19
 SHEET 04 OF 27
 ENG. DATE: 05/31/19
 CADD: CTS, TES
 ENG. SGT
 P.M.: JIC
 TECH. MGR.: JIC
 SITE PLAN/16070EXT

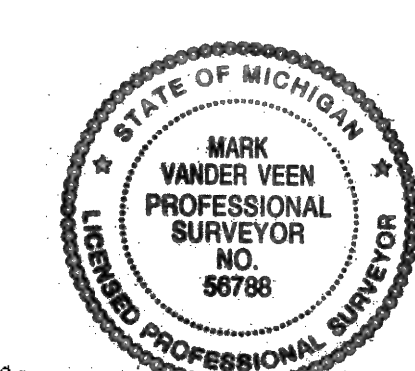


LEGEND

813	EXIST. CONTOUR	—○—	EXIST. STORM SEWER	●	SINGLE TREE
×813.2	EXIST. SPOT ELEVATION	—○—	EXIST. CATCH BASIN OR INLET	●	SINGLE TREE - IMPACTED BY DTE
—U.P.—	EXIST. UTILITY POLE	—○—	EXIST. SANITARY SEWER	●	LANDMARK TREE - CRZ
—GUY—	GUY WIRE	—○—	SIGN	●	TREE OR BRUSH LIMIT
—OH—	EXIST. OVERHEAD UTILITY LINE	—○—	MAILBOX	●	SECTION CORNER
—*—	EXIST. LIGHT POLE	—○—	TELEPHONE RISER	●	TEST PIT LOCATION
—t—	EXIST. TELEPHONE LINE	—○—	ELECTRIC METER	●	FOUND IRON PIPE
—e—	EXIST. ELECTRIC LINE	—○—	GAS METER	●	FOUND MONUMENT
—g—	EXIST. GAS LINE	—○—	TRAFFIC SIGNAL CONTROL BOX	●	FOUND IRON ROD
—f.o.—	EXIST. FIBER OPTIC LINE	—○—	POST	●	EXIST. REGULATED WOODLANDS
—w—	EXIST. WATER MAIN	—○—	FENCE	●	WOODLAND BASAL AREA SAMPLE POINT
—h—	EXIST. HYDRANT	—○—	EXIST. GATE VALVE IN BOX	●	EXIST. DRAINAGE ARROWS
—x—	EXIST. GATE VALVE IN WELL	—○—	EXIST. GATE VALVE IN WELL	●	
—x—	EXIST. CURB STOP & BOX	—○—	EXIST. SOILS TYPE LINE	●	
		—○—	CONTROL PT.	●	

WOODLAND BASAL AREA LIST

BA-1	SAMPLE BASAL AREA 1/2 ACRE PLOT 19 TREES BA-18.25SF DOES NOT MEET WOODLAND CRITERIA	BA-6	SAMPLE BASAL AREA 1/2 ACRE PLOT 33 TREES BA-34.53SF FRAGMENTED WOODLAND
BA-2	30 TREES BA-30.91SF	BA-7	24 TREES BA-31.18SF
BA-3	33 TREES BA-37.85SF	BA-8	SAMPLE BASAL AREA 1/2 ACRE PLOT 22 TREES BA-39.54SF
BA-4	SAMPLE BASAL AREA 1/2 ACRE PLOT 44 TREES BA-54.44SF	BA-9	21 TREES BA-28.05F
BA-5	34 TREES BA-35.37SF	BA-10	SAMPLE BASAL AREA 1/2 ACRE PLOT 33 TREES BA-34.49SF <0.5 ACRE IN SIZE



Mark Vander Veen
 MARK VANDER VEEN, PROFESSIONAL SURVEYOR #56788

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 M:\City\2857Packard\16070\Site Plan\16070\04.dwg, 8/29/2019 4:20 PM, Tyler E. Smith, MLLC PDF, p.3

TREE LIST

Table with 15 columns: TAG#, DBH, CUM. DBH, COMMON NAME, GENUS/SPECIES, STEMS, NOTES, LM, WOODLAND, INV, REMOVE, MITIGATE, OFF-SITE. Rows include various tree species like Northern Catalpa, Black Walnut, American Elm, etc.

Table with 15 columns: TAG#, DBH, CUM. DBH, COMMON NAME, GENUS/SPECIES, STEMS, NOTES, LM, WOODLAND, INV, REMOVE, MITIGATE, OFF-SITE. Rows include Honey Locust, Black Walnut, Bur Oak, etc.

Table with 15 columns: TAG#, DBH, CUM. DBH, COMMON NAME, GENUS/SPECIES, STEMS, NOTES, LM, WOODLAND, INV, REMOVE, MITIGATE, OFF-SITE. Rows include American Elm, Black Walnut, Box Elder, etc.

Table with 15 columns: TAG#, DBH, CUM. DBH, COMMON NAME, GENUS/SPECIES, STEMS, NOTES, LM, WOODLAND, INV, REMOVE, MITIGATE, OFF-SITE. Rows include Linden, Tilia americana, etc.

AARCS WORKSHEET

City of Ann Arbor Geodetic Reference System (AARCS) Coordinate Transformation Worksheet. This document is designed to provide the City of Ann Arbor a datum shift between a Project's local coordinate system and AARCS coordinates (Michigan State Plane).

Project Reference Coordinates table with columns: AARCS No., Easting (X), Northing (Y), Elevation (Z), Description. Includes project name 'PRC - Weber Property MA' and contact 'Mark Weber Uen'.

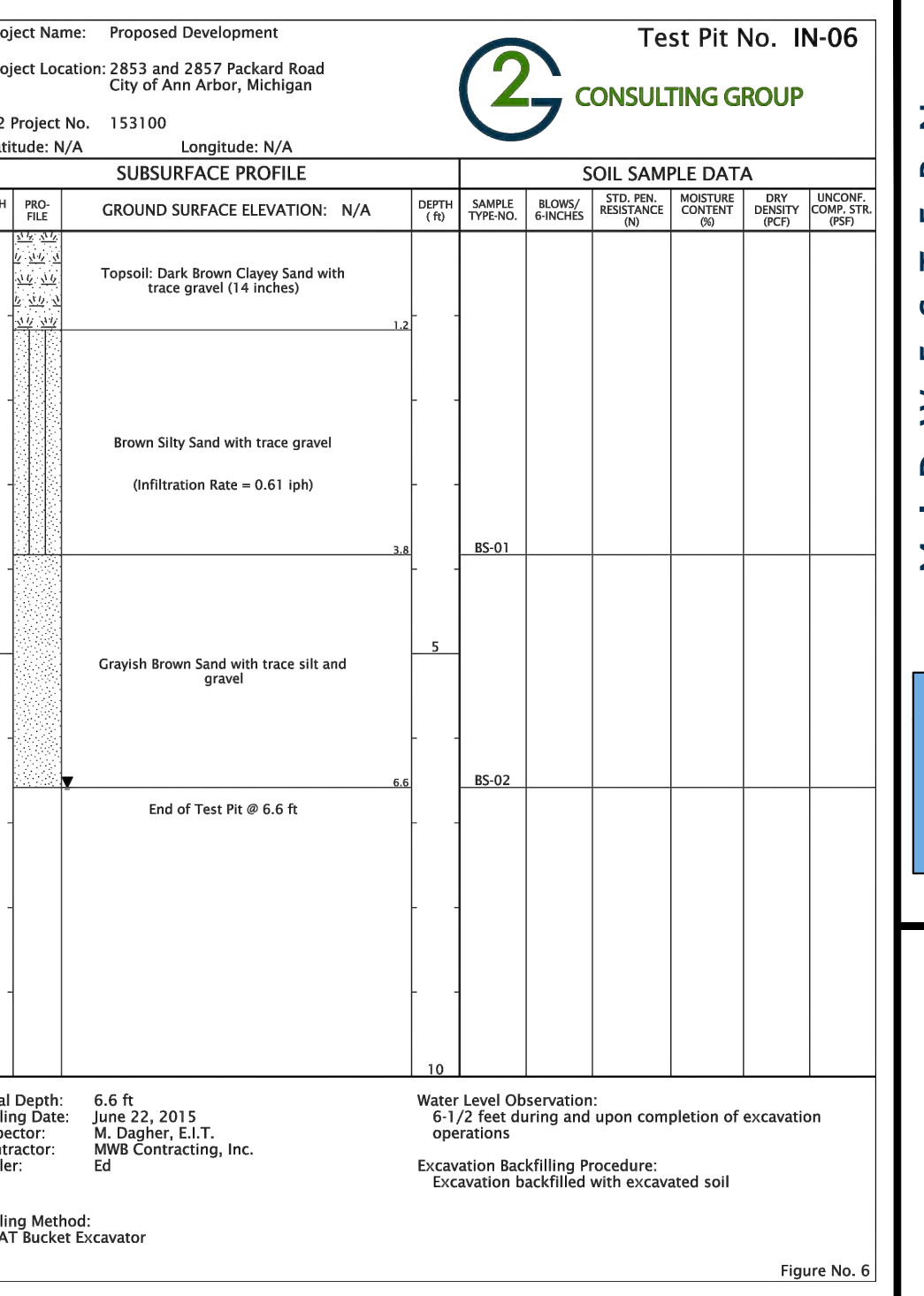
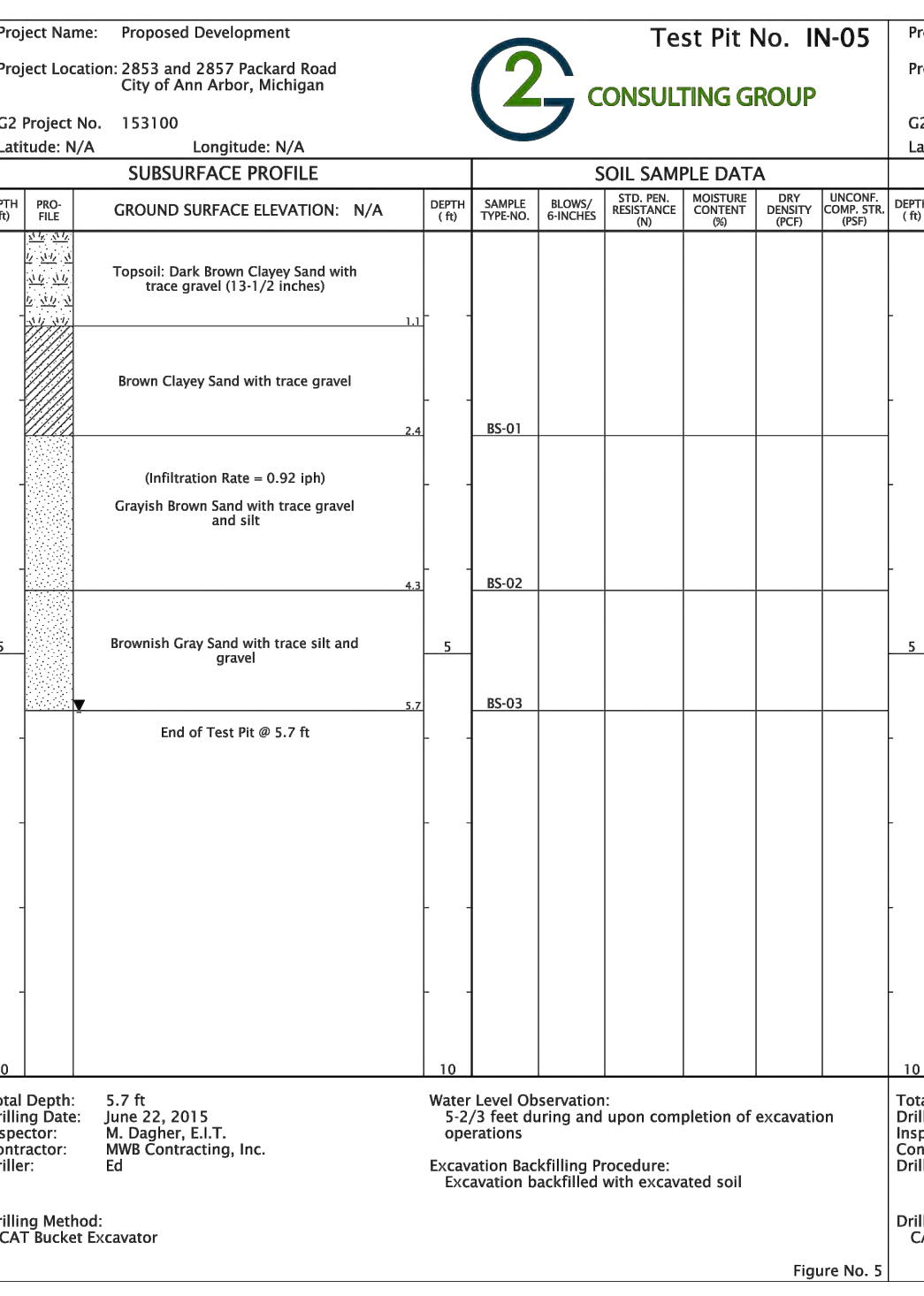
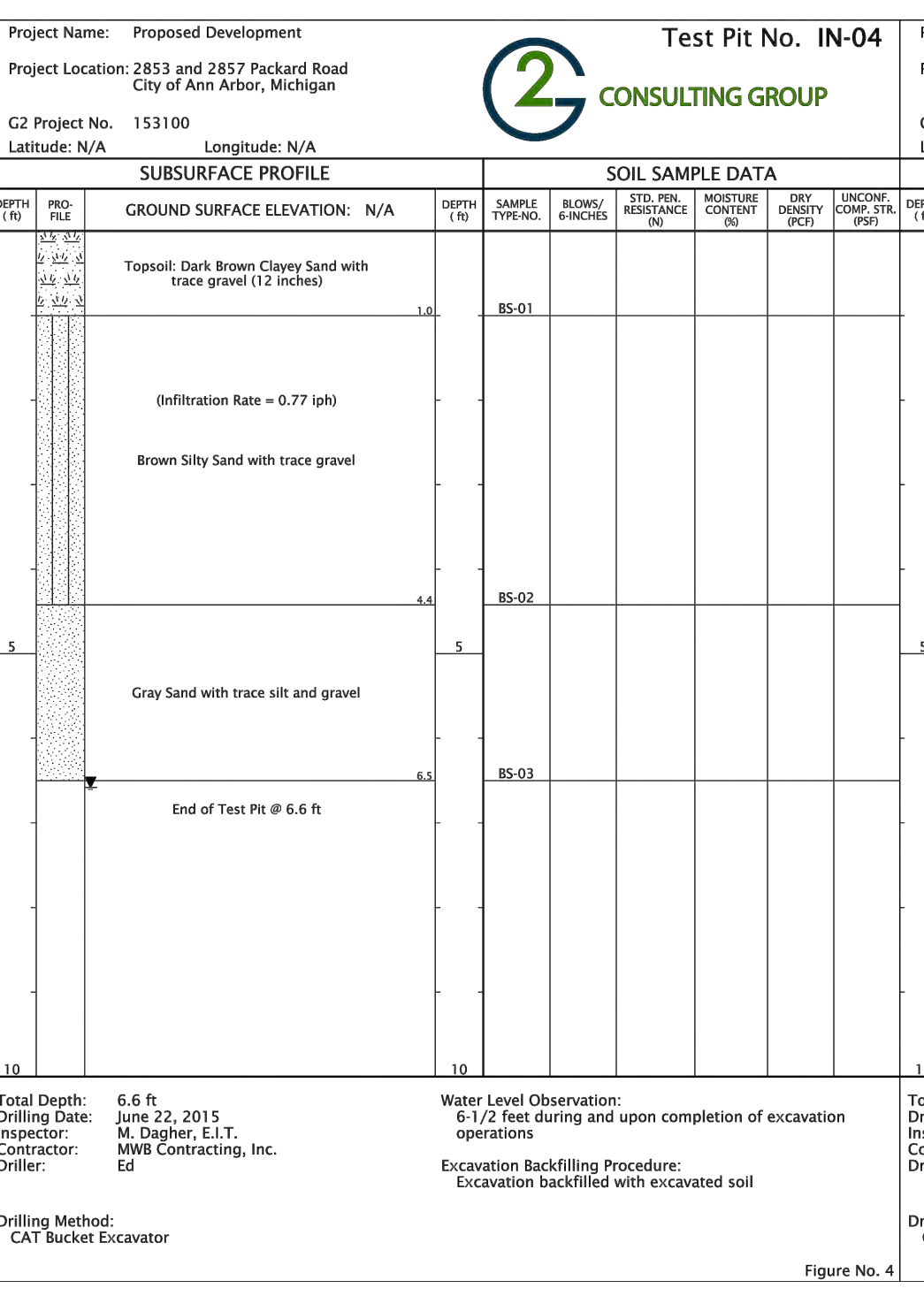
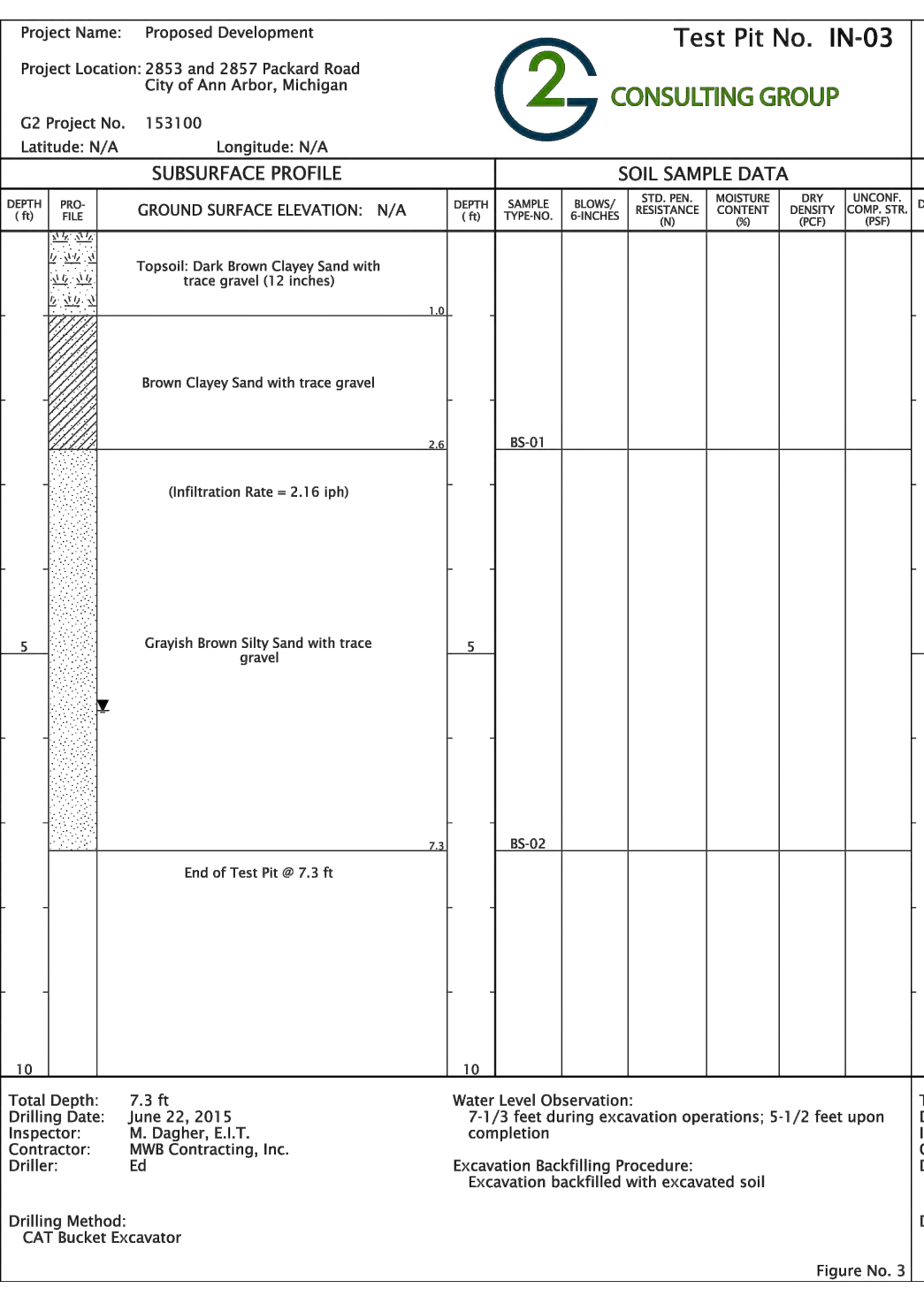
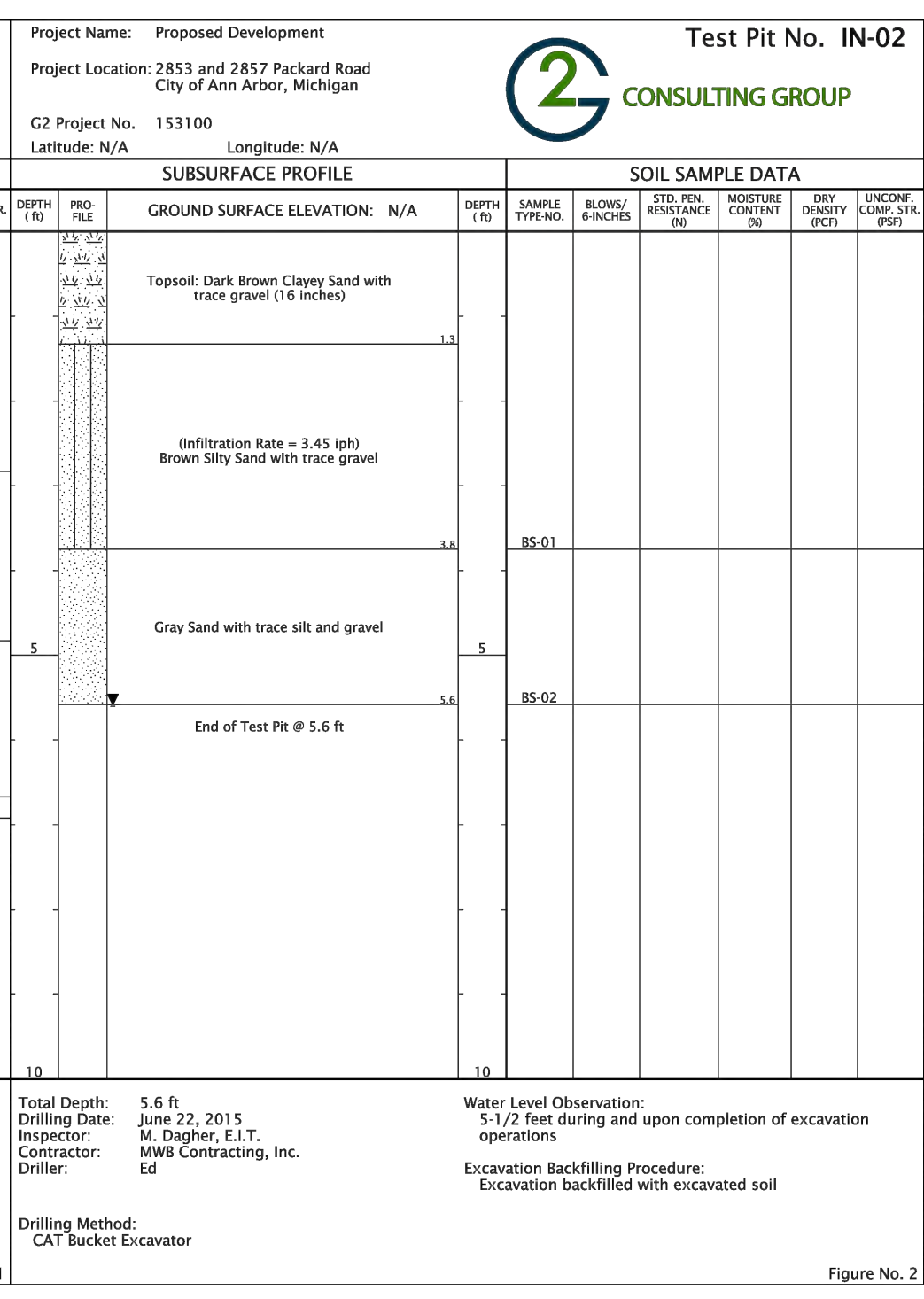
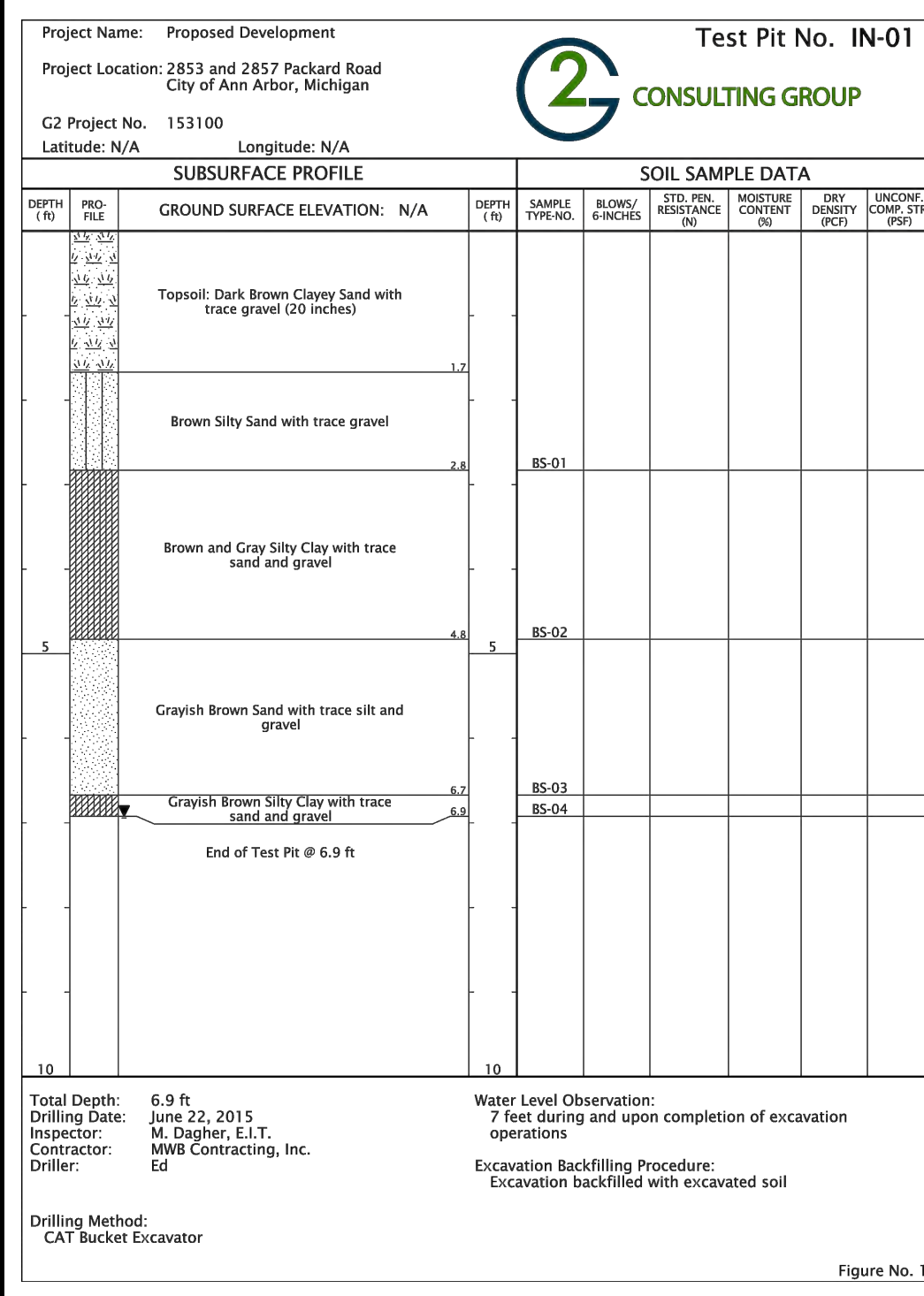
Local coordinates projected into AARCS Michigan State Plane coordinates (International feet) table. Includes a scale factor and a note that the area below is for City of Ann Arbor use only.

Checklist and signature section. Includes 'Checked by:', 'Date:', 'Comments:', and 'Approved:' with checkboxes for 'Yes' and 'No'.

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Vertical sidebar containing: MIDWESTERN CONSULTING logo, CLIENT PETERS BUILDING COMPANY, address (172 S. INDUSTRIAL DRIVE, SALINE, MI 48176), PLANNED UNIT DEVELOPMENT TREE LIST, JOB No. 16070, DATE: 4/25/19, SHEET 05 OF 27, REV. DATE: 05/17/19, CADD: CTS, ENG: SGF, FM: TIC, TECH: JTC, SITE PLAN/8/20/16X1.

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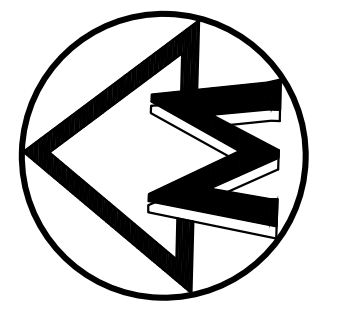
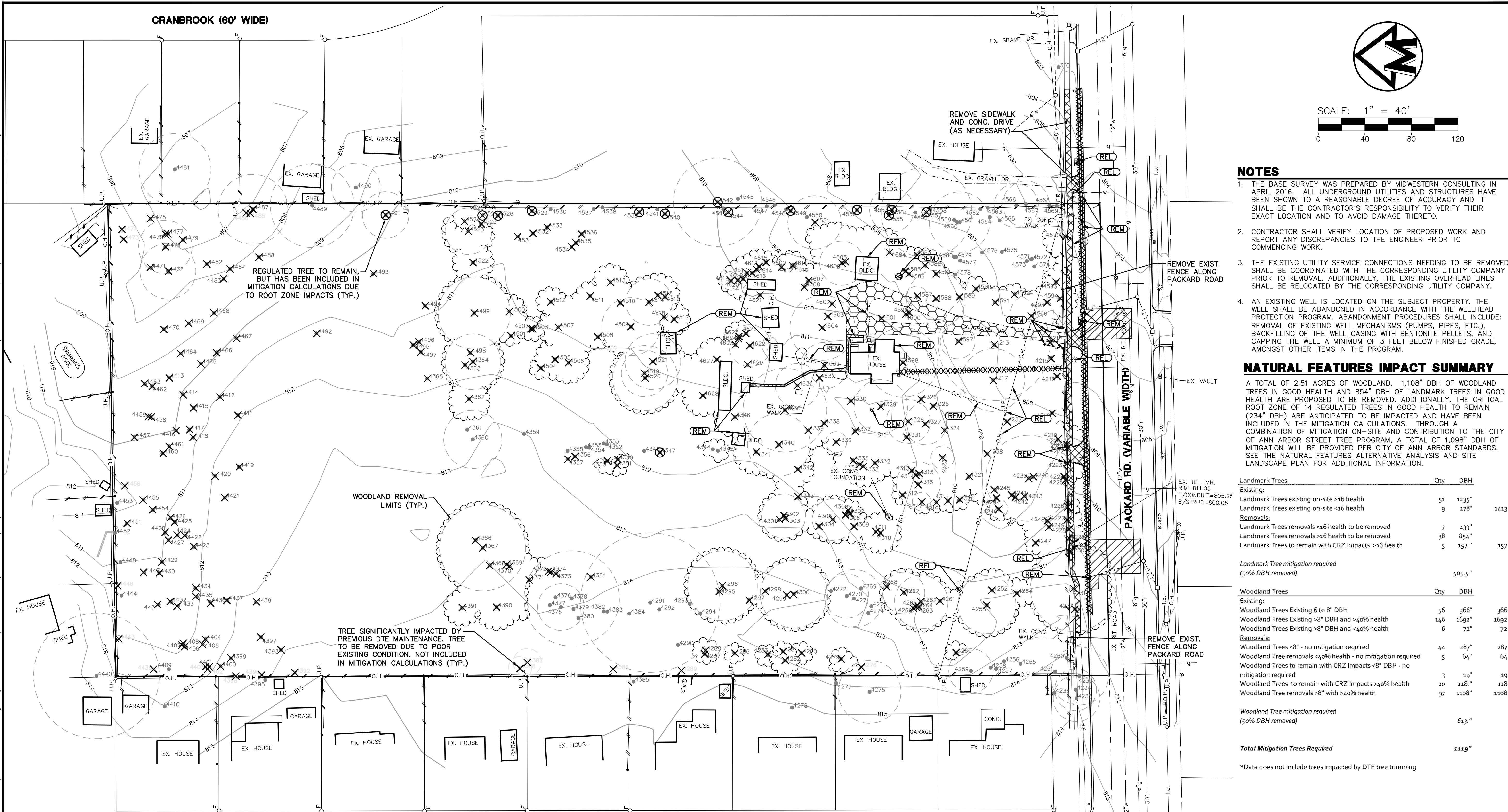
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734-429-4200

2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
SOIL PIT LOGS

06

JOB No. **16070**
REVISIONS: PER CITY REVIEW
DATE: 4/25/19
SHEET 06 OF 27
REV. DATE: 05/31/19
CADD: CTS
ENG: SGF
PM: TJC
TECH: TES
SITE PLAN/16070/06/1

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SCALE: 1" = 40'
0 40 80 120

- NOTES**
1. THE BASE SURVEY WAS PREPARED BY MIDWESTERN CONSULTING IN APRIL 2016. ALL UNDERGROUND UTILITIES AND STRUCTURES HAVE BEEN SHOWN TO A REASONABLE DEGREE OF ACCURACY AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND TO AVOID DAMAGE THERETO.
 2. CONTRACTOR SHALL VERIFY LOCATION OF PROPOSED WORK AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCING WORK.
 3. THE EXISTING UTILITY SERVICE CONNECTIONS NEEDING TO BE REMOVED SHALL BE COORDINATED WITH THE CORRESPONDING UTILITY COMPANY PRIOR TO REMOVAL. ADDITIONALLY, THE EXISTING OVERHEAD LINES SHALL BE RELOCATED BY THE CORRESPONDING UTILITY COMPANY.
 4. AN EXISTING WELL IS LOCATED ON THE SUBJECT PROPERTY. THE WELL SHALL BE ABANDONED IN ACCORDANCE WITH THE WELLHEAD PROTECTION PROGRAM. ABANDONMENT PROCEDURES SHALL INCLUDE: REMOVAL OF EXISTING WELL MECHANISMS (PUMPS, PIPES, ETC.), BACKFILLING OF THE WELL CASING WITH BENTONITE PELLETS, AND CAPPING THE WELL A MINIMUM OF 3 FEET BELOW FINISHED GRADE, AMONGST OTHER ITEMS IN THE PROGRAM.

NATURAL FEATURES IMPACT SUMMARY

A TOTAL OF 2.51 ACRES OF WOODLAND, 1,108" DBH OF WOODLAND TREES IN GOOD HEALTH AND 854" DBH OF LANDMARK TREES IN GOOD HEALTH ARE PROPOSED TO BE REMOVED. ADDITIONALLY, THE CRITICAL ROOT ZONE OF 14 REGULATED TREES IN GOOD HEALTH TO REMAIN (234" DBH) ARE ANTICIPATED TO BE IMPACTED AND HAVE BEEN INCLUDED IN THE MITIGATION CALCULATIONS. THROUGH A COMBINATION OF MITIGATION ON-SITE AND CONTRIBUTION TO THE CITY OF ANN ARBOR STREET TREE PROGRAM, A TOTAL OF 1,098" DBH OF MITIGATION WILL BE PROVIDED PER CITY OF ANN ARBOR STANDARDS. SEE THE NATURAL FEATURES ALTERNATIVE ANALYSIS AND SITE LANDSCAPE PLAN FOR ADDITIONAL INFORMATION.

Landmark Trees	Qty	DBH	
Existing:			
Landmark Trees existing on-site >16 health	51	1235"	1443
Landmark Trees existing on-site <16 health	9	178"	
Removals:			
Landmark Trees removals <16 health to be removed	7	133"	157
Landmark Trees removals >16 health to be removed	38	854"	
Landmark Trees to remain with CRZ Impacts >16 health	5	157"	
Landmark Tree mitigation required (50% DBH removed)		505.5"	
Woodland Trees	Qty	DBH	
Existing:			
Woodland Trees Existing 6 to 8" DBH	56	366"	366
Woodland Trees Existing >8" DBH and >40% health	146	1692"	
Woodland Trees Existing >8" DBH and <40% health	6	72"	
Removals:			
Woodland Trees <8" - no mitigation required	44	287"	287
Woodland Tree removals <40% health - no mitigation required	5	64"	
Woodland Trees to remain with CRZ Impacts <8" DBH - no mitigation required	3	19"	118
Woodland Trees to remain with CRZ Impacts >10% health	10	118"	
Woodland Tree removals >8" with >10% health	97	1108"	
Woodland Tree mitigation required (50% DBH removed)		613"	
Total Mitigation Trees Required		1129"	

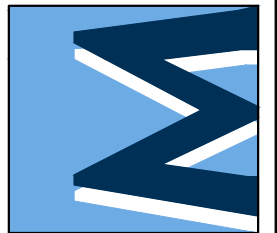
*Data does not include trees impacted by DTE tree trimming

LEGEND

813	EXIST. CONTOUR	---S---	EXIST. SANITARY SEWER	○ F	FOUND IRON PIPE
x 813.2	EXIST. SPOT ELEVATION	---S---	SIGN	● F	FOUND MONUMENT
○ U.P.	EXIST. UTILITY POLE	---S---	MAILBOX	○ F/R	FOUND IRON ROD
---	GUY WIRE	---S---	TELEPHONE RISER	×	TREE TO BE REMOVED
OH	EXIST. OVERHEAD UTILITY LINE	---S---	ELECTRIC METER	⊗	REGULATED TREE TO REMAIN BUT INCLUDED IN MITIGATION CALCULATIONS
*	EXIST. LIGHT POLE	---S---	GAS METER	⊗	ASPHALT TO BE REMOVED
t	EXIST. TELEPHONE LINE	---S---	TRAFFIC SIGNAL CONTROL BOX	⊗	CONCRETE TO BE REMOVED
e	EXIST. ELECTRIC LINE	---S---	POST	⊗	GRAVEL TO BE REMOVED
g	EXIST. GAS LINE	---S---	WELL	⊗	CURB TO BE REMOVED
f.o.	EXIST. FIBER OPTIC LINE	---S---	SINGLE TREE	⊗	PIPE TO BE REMOVED
w	EXIST. WATER MAIN	---S---	DTE IMPACTED TREE	⊗	ITEM TO BE REMOVED
h	EXIST. HYDRANT	---S---	TREE OR BRUSH LIMIT	⊗	ITEM TO BE RELOCATED
v	EXIST. GATE VALVE IN BOX	---S---	SECTION CORNER	⊗	WOODLAND TO BE REMOVED
o	EXIST. GATE VALVE IN WELL	---S---			
s	EXIST. CURB STOP & BOX	---S---			
r	EXIST. STORM SEWER	---S---			
c	EXIST. CATCH BASIN OR INLET	---S---			

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

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SALINE, MI 48176
JIM HAUSSLER
734-429-4200

2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
SITE REMOVAL PLAN

07

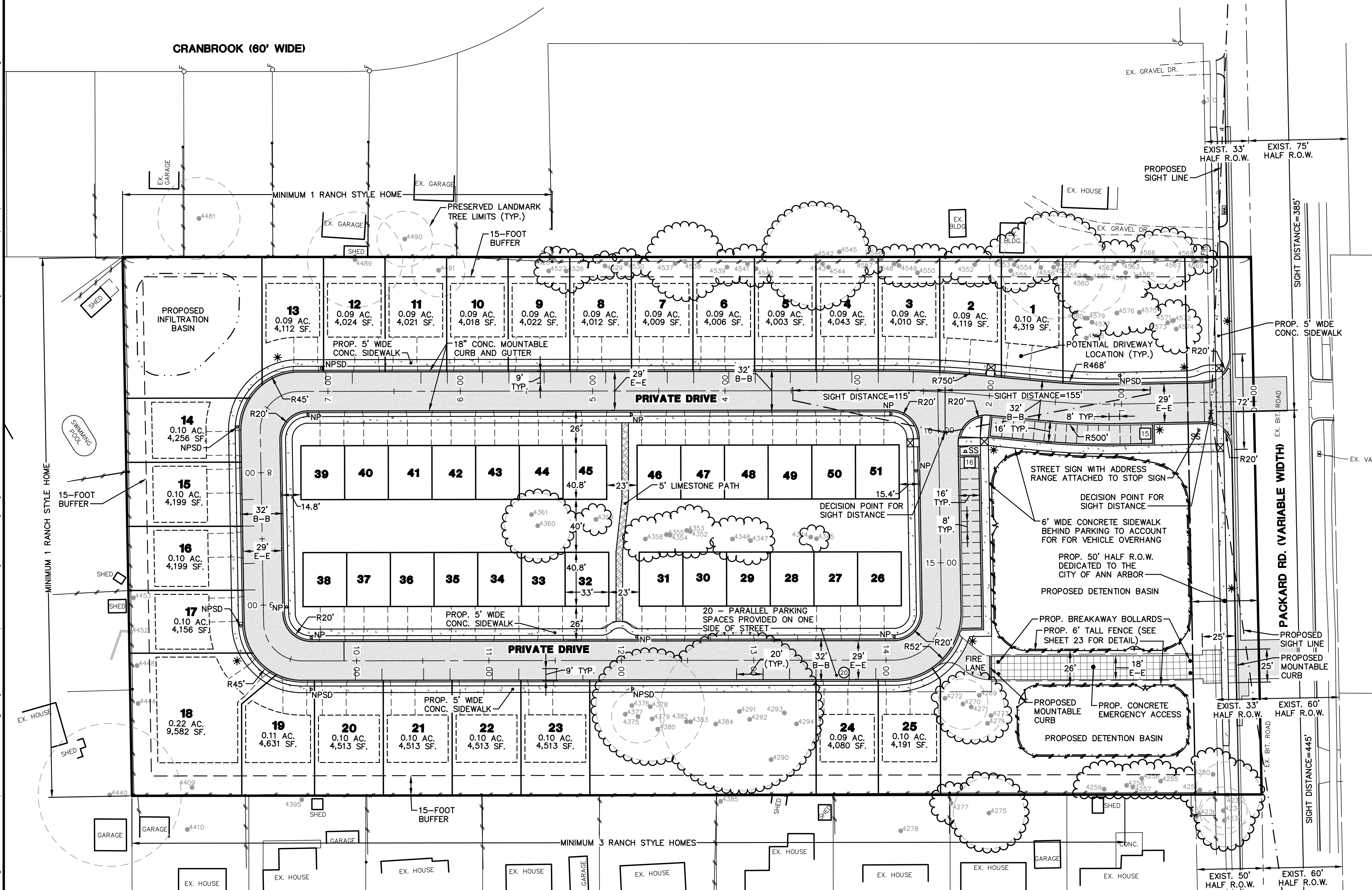
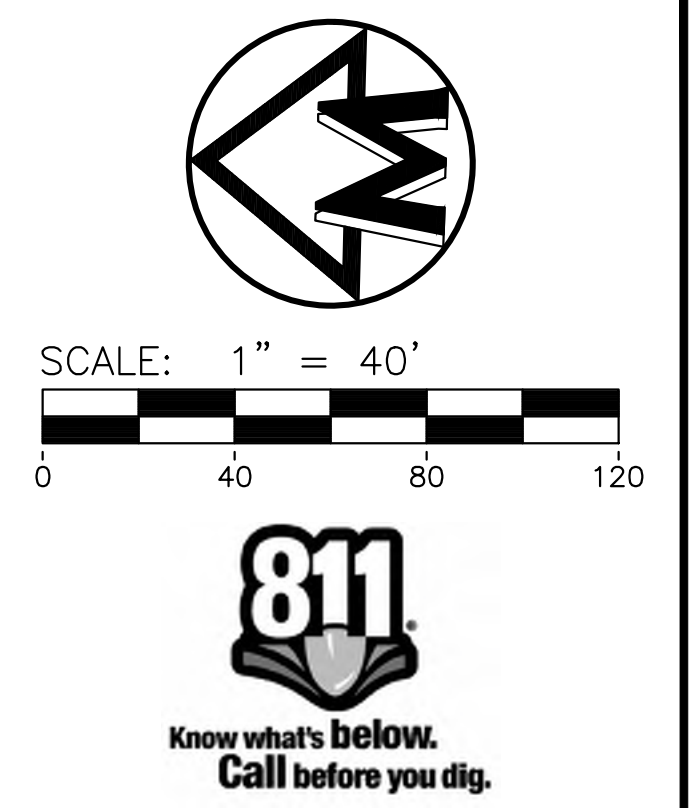
DATE: 4/25/19	SHEET 07 OF 27
REV. DATE: 05/17/19	CADD: GTS
PER CITY REVIEW: 06/14/19	ENG: SGF
PER CITY REVIEW:	PM: TJC
	TECH: TES
	SITE PLAN/16070.RVT

16070
JOB No.
811
Know what's below.
Call before you dig.

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LOT AREA TABLE

Number	Area (SF)	Area (AC)
1	4,319	0.10
2	4,119	0.09
3	4,010	0.09
4	4,043	0.09
5	4,003	0.09
6	4,006	0.09
7	4,009	0.09
8	4,012	0.09
9	4,022	0.09
10	4,018	0.09
11	4,021	0.09
12	4,024	0.09
13	4,112	0.09
14	4,256	0.10
15	4,199	0.10
16	4,199	0.10
17	4,156	0.10
18	9,582	0.22
19	4,631	0.11
20	4,513	0.10
21	4,513	0.10
22	4,513	0.10
23	4,513	0.10
24	4,080	0.09
25	4,191	0.10
Average	4,403	0.10



NOTES

1. PARKING WILL BE PERMITTED ONLY ON ONE SIDE OF ROADWAY.
2. ALL PEDESTRIAN SIDEWALKS WILL BE 5 FEET WIDE UNLESS OTHERWISE SPECIFIED.
3. CURB RADIUS DIMENSIONS ARE TO BACK OF CURB, UNLESS OTHERWISE NOTED. "E-E" DENOTES EDGE-TO-EDGE OF ASPHALT PAVEMENT (AKA EDGE-OF-METAL), AND "B-B" DENOTES BACK-TO-BACK OF CURB.
4. SITE LIGHTING WILL BE PROVIDED ON THE GARAGES OF EACH HOUSE.
5. THE PROPOSED 50 FEET OF HALF RIGHT-OF-WAY SHALL BE GRANTED TO THE CITY OF ANN ARBOR IN A MANNER TO BE DETERMINED BY THE CITY OF ANN ARBOR OFFICE ATTORNEY.

LEGEND

- PROP. ASPHALT PAVEMENT
- PROP. 4" CONCRETE SIDEWALK
- PROP. 6" CONCRETE PAVEMENT
- PROP. LIMESTONE PATH
- PROP. 6" CONCRETE PAVEMENT EMERGENCY ACCESS
- PRESERVED REGULATED WOODLANDS
- PRESERVED LANDMARK TREES
- EX. SIGN
- PROPOSED "MEDIAN RIGHT" SIGN (W6-1)
- PROPOSED "NO PARKING/FIRE LANE" SIGN
- PROPOSED "NO PARKING ON SERVICE DAYS" SIGN
- PROPOSED "STOP" SIGN (R1-1)
- PROPOSED LIGHT POLE
- NUMBER OF STANDARD PARKING SPACES IN ROW
- NUMBER OF SMALL CAR PARKING SPACES IN ROW

LEGAL DESCRIPTION

PROPOSED 50-FT WIDE ROAD RIGHT-OF-WAY DEDICATION

LEGAL DESCRIPTION OF A PARCEL OF LAND LOCATED IN THE SE 1/4 OF SECTION 3, T3S, R6E, CITY OF ANN ARBOR, WASHTENAW COUNTY, MICHIGAN

Commencing at the S 1/4 corner of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence N89°47'30"E 593.60 feet along the South line of said Section 3 to the Point of Beginning;

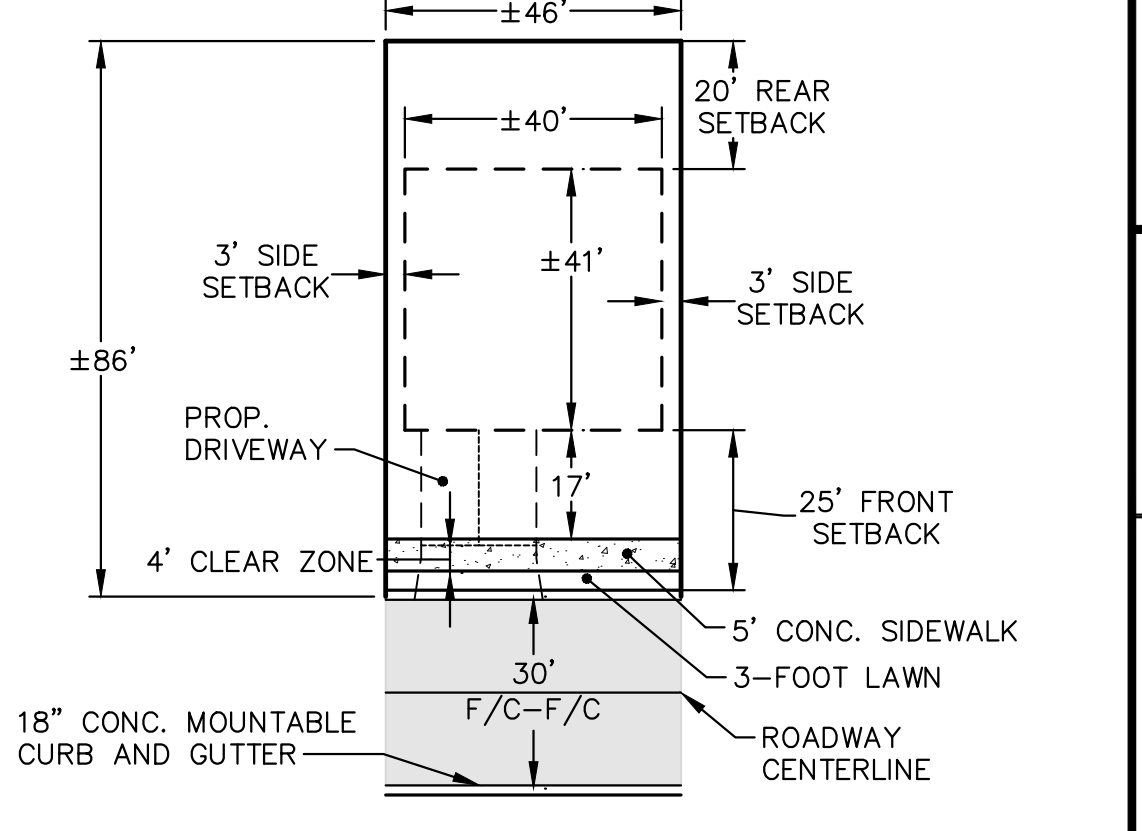
thence N00°51'30"E 55.01 feet;

thence N89°47'30"E 406.10 feet;

thence S00°55'00"W 55.01 feet;

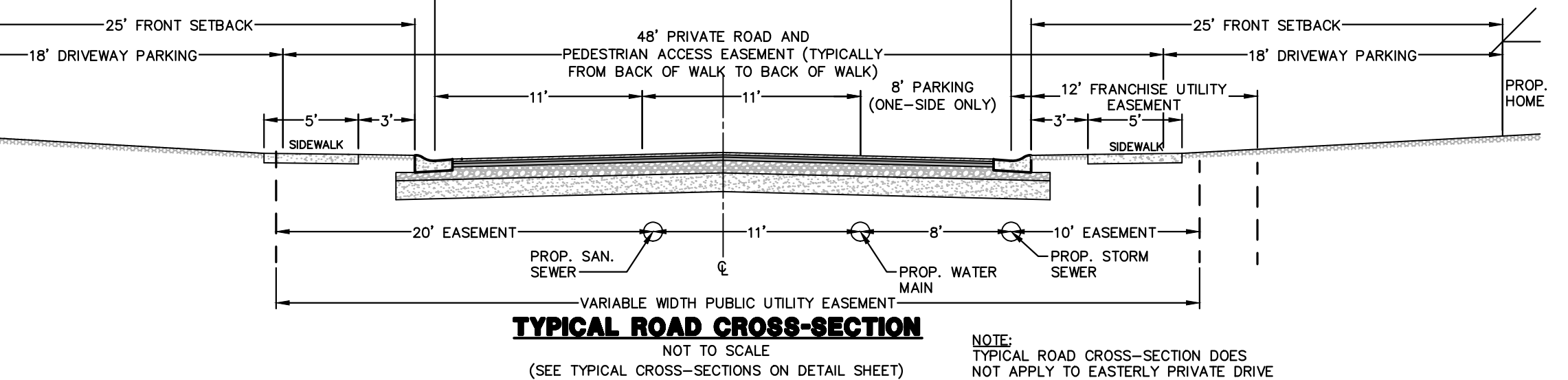
thence S89°47'30"W 406.03 feet along said South line of Section 3 to the Point of Beginning.

Being a part of the SE 1/4 of Section 3, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan, and containing 0.51 acres, more or less. Being subject to any restrictions or easements of record, if any.



NOTE: DWELLING WILL NOT EXCEED 2,000 SF OF FLOOR AREA. BASEMENT IS NOT INCLUDED IN FLOOR AREA CALCULATION. BASEMENT IS ALLOWED TO HAVE 8 FOOT CEILING; HOWEVER, BASEMENT IS PROHIBITED TO BE FINISHED INTO ORDINARY LIVING SPACE.

TYPICAL SINGLE FAMILY LOT DIMENSIONS
(4,000 SF MINIMUM, LOT DIMENSIONS VARY)



TYPICAL ROAD CROSS-SECTION
NOT TO SCALE
(SEE TYPICAL CROSS-SECTIONS ON DETAIL SHEET)

NOTE: TYPICAL ROAD CROSS-SECTION DOES NOT APPLY TO EASTERLY PRIVATE DRIVE

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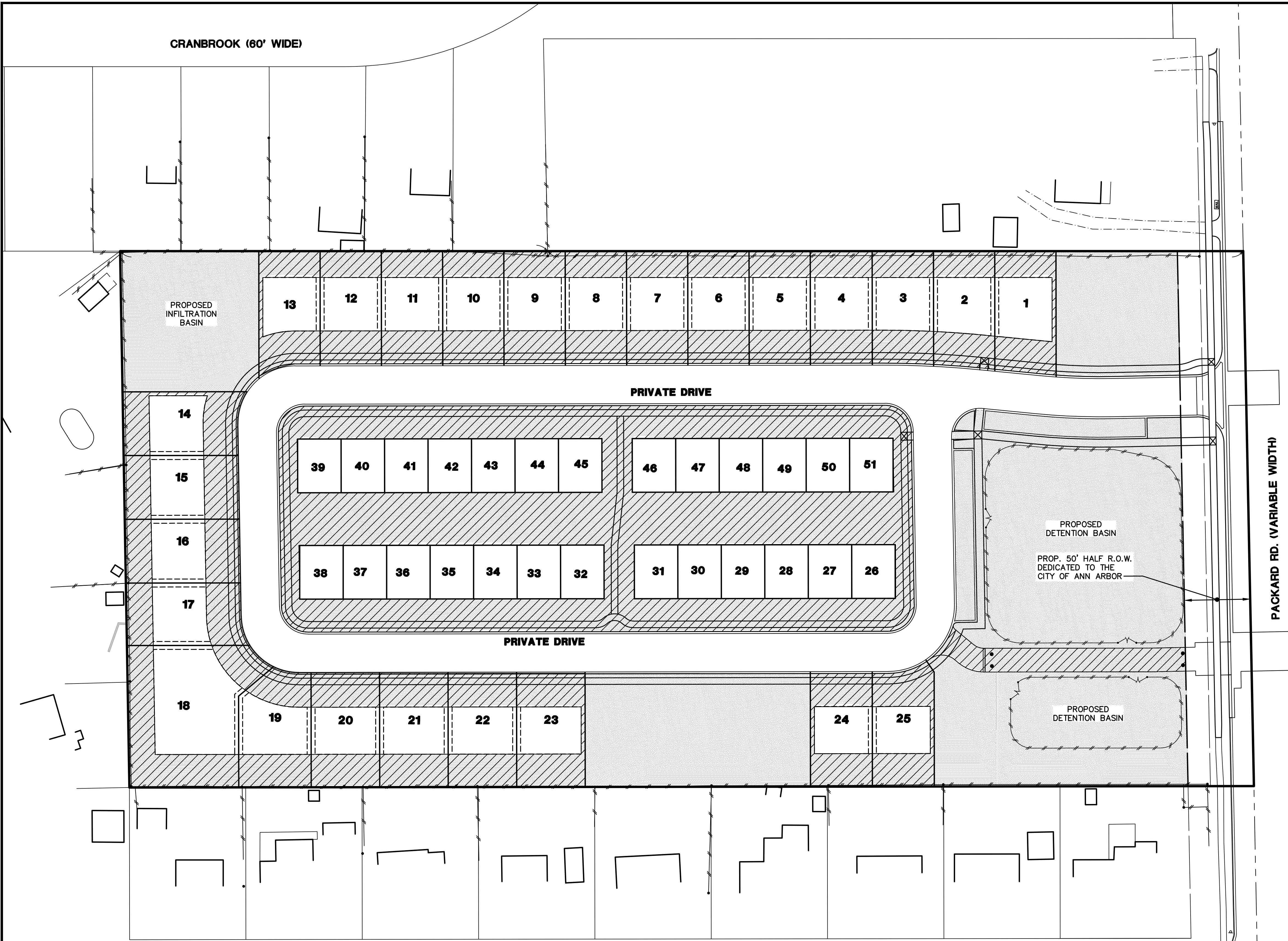
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2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
SITE LAYOUT PLAN

16070

DATE: 7/25/19
SHEET 08 OF 27
REV. DATE: 05/17/19 CADD: GTS
06/12/19 ENG: SGT
06/14/19 PM: JIC
07/17/19 TECH: TES
07/25/19 SITE PLAN/16070SP1

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CRANBROOK (60' WIDE)

SCALE: 1" = 40'

Know what's below.
Call before you dig.

LEGEND

	TOTAL OPEN SPACE:	4.38 AC.
		58% NET SITE AREA
	OPEN SPACE-ACTIVE:	2.50 AC.
		33% NET SITE AREA

TOTAL PEDESTRIAN OPPORTUNITIES:
SIDEWALK: 3,157 LF/0.60 MILES

NOTE: NO CITY REQUIREMENT FOR OPEN SPACE WITH SINGLE FAMILY DEVELOPMENT

PARKS CONTRIBUTION

PER CITY OF ANN ARBOR DEVELOPER CONTRIBUTIONS FOR PARK AND OPEN SPACE GUIDANCE, THE DEVELOPMENT WILL INCLUDE A CONTRIBUTION IN LIEU OF LAND TO THE CITY OF ANN ARBOR PARKS AND RECREATION AT A RATE OF 0.0125 ACRES PER RESIDENTIAL UNIT.

51 UNITS X 0.0125 ACRES = 0.6375 ACRES
0.6375 ACRES X \$50,000/ACRE = \$31,875.00

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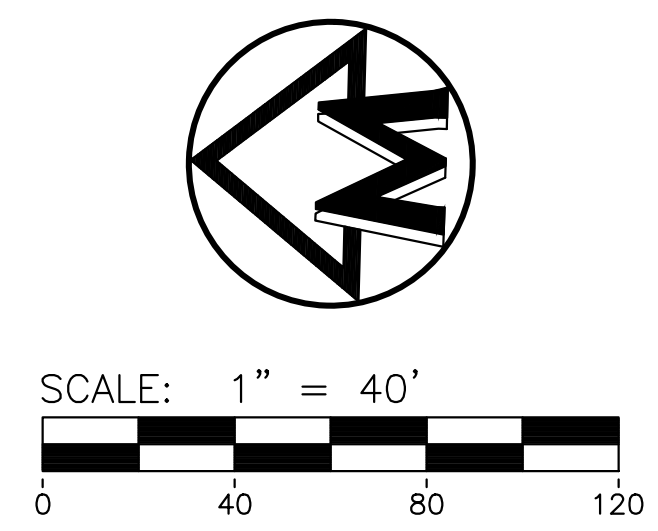
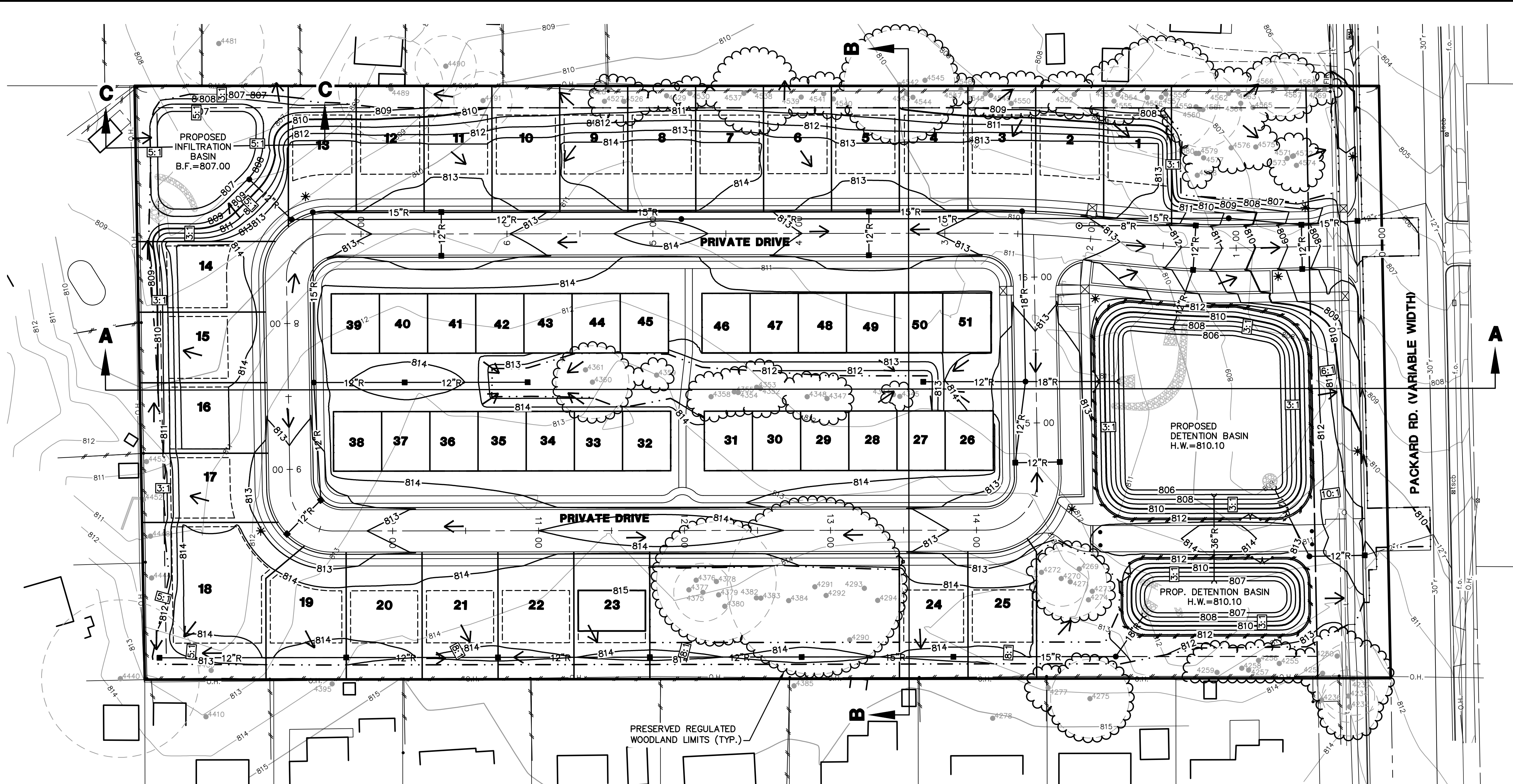
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2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
OPEN SPACE PLAN

09

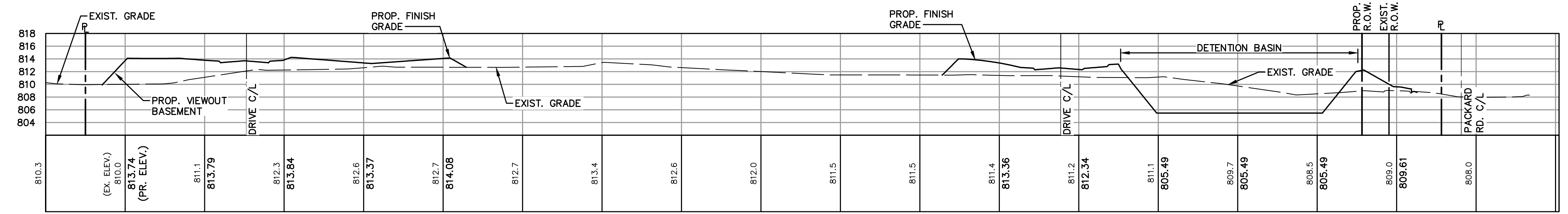
JOB No.	16070
DATE:	4/25/19
SHEET	09 OF 27
REV. DATE	05/31/19
PER CITY COMMENTS	
ADD: CTS	
ENG: SGF	
PK: TJC	
TECH: TES	
SITE PLAN/16070001	

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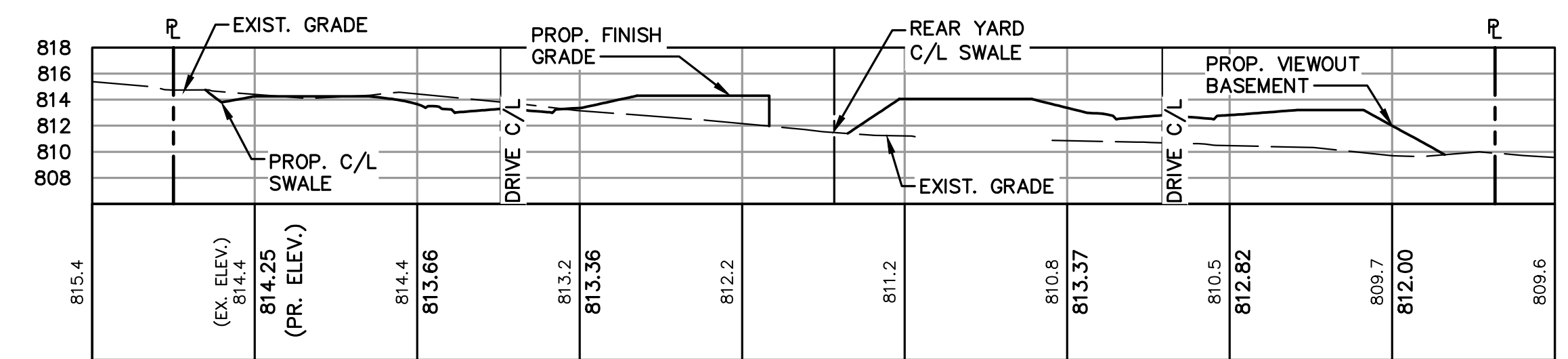
- LEGEND**
- 838 EXIST. CONTOUR
 - 838 PROP. CONTOUR
 - 836.2 EXIST. SPOT ELEVATION
 - 36.60x PROP. SPOT ELEVATION
 - EXIST. STORM SEWER
 - PROP. STORM SEWER
 - EXIST. CATCH BASIN OR INLET
 - PROP. CATCH BASIN OR INLET
 - PROP. END SECTION
 - PROPOSED DRAINAGE ARROWS
 - LIMITS OF DISTURBANCE

- CROSS-SECTION NOTES**
- NO PART OF THE DETENTION BASIN OR FENCE SHALL BE LOCATED WITHIN THE PACKARD ROAD RIGHT-OF-WAY OR WITHIN THE PUBLIC EASEMENTS.

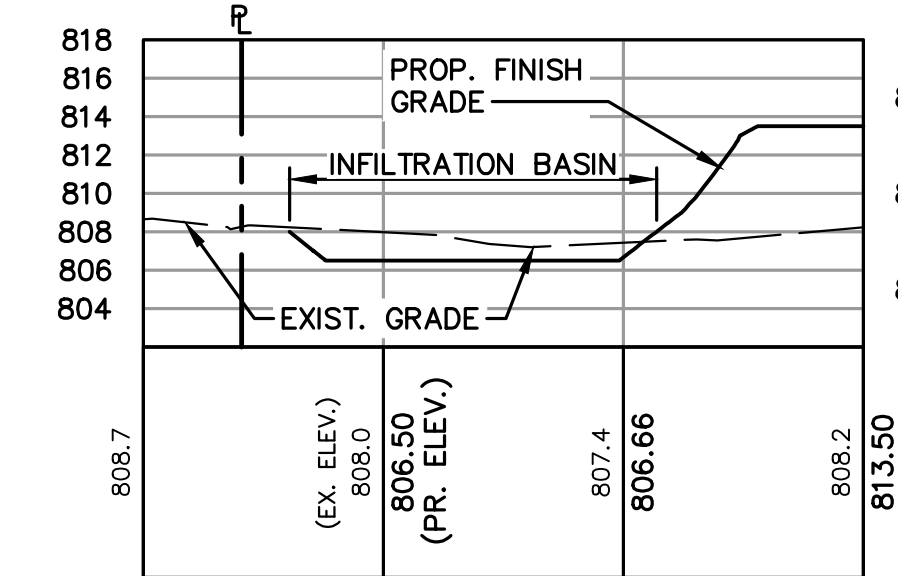


CROSS-SECTION A-A
 SCALE: 1"=40' HORZ.
 1"=20' VERT.

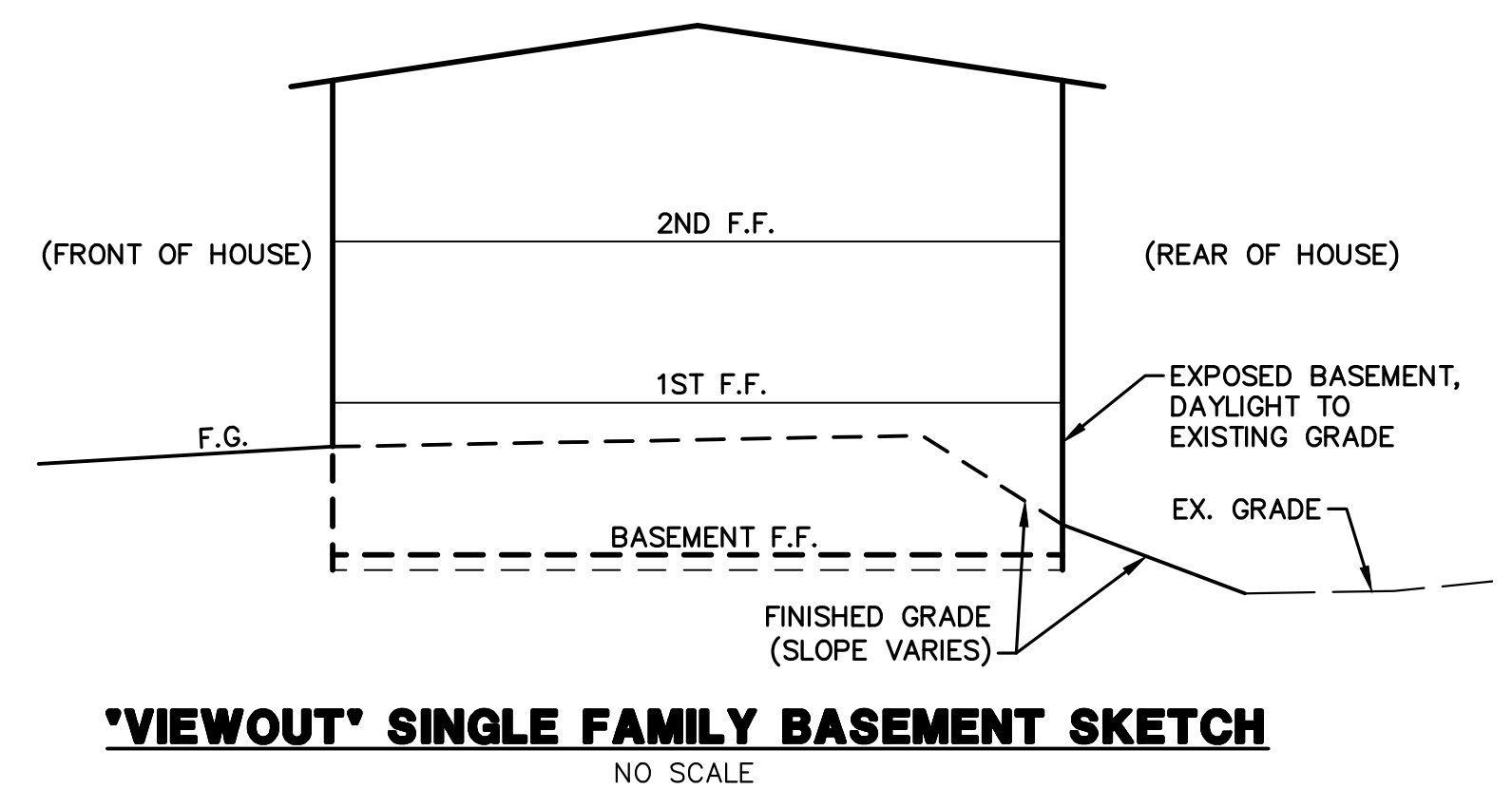
- CROSS-SECTION NOTES**
- THE TERM "VIEWOUT BASEMENT" (SHOWN IN THE CROSS-SECTION VIEWS) ALSO KNOWN AS A "DAYLIGHT BASEMENT" DESCRIBES THE DESIGNED EXPOSURE OF THE BASEMENT OF THE REAR OF A HOUSE.
- THE INTENDED PURPOSE IS TO ALLOW FOR MUCH LOWER ELEVATIONS AND SHALLOWER SLOPES IN THE REAR OF THE HOUSE COMPARED TO THE HIGHER ELEVATIONS IN THE FRONT OF THE HOUSE.
- REFER TO THE SKETCH BELOW.



CROSS-SECTION B-B
 SCALE: 1"=40' HORZ.
 1"=20' VERT.



CROSS-SECTION C-C
 SCALE: 1"=40' HORZ.
 1"=20' VERT.



'VIEWOUT' SINGLE FAMILY BASEMENT SKETCH
 NO SCALE

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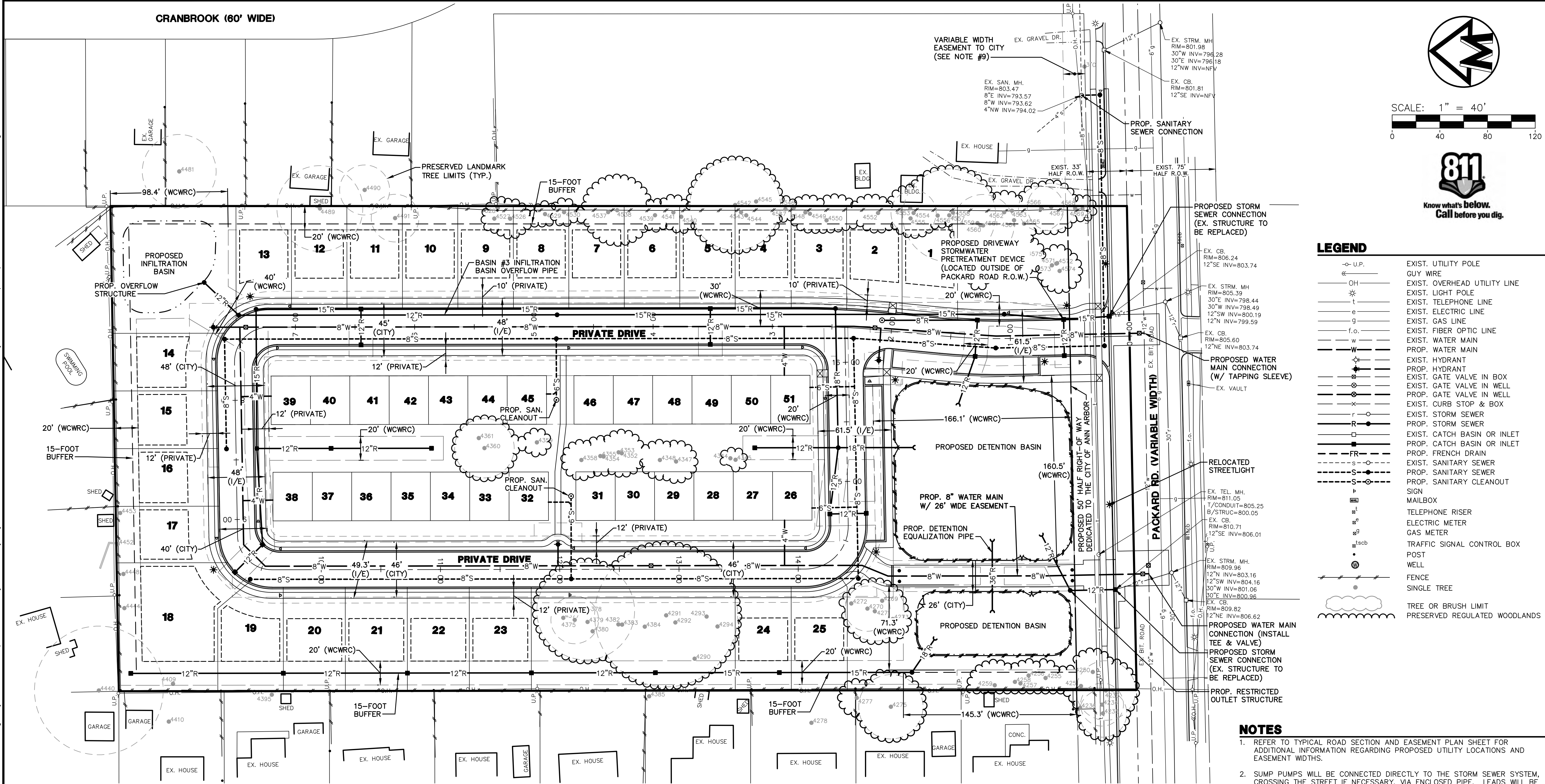
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2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 GRADING PLAN AND CROSS-SECTIONS

16070

DATE: 7/25/19
 SHEET 10 OF 27
 REV. DATE: 05/17/19
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 06/14/19
 ENG: SGT
 PM: JIC
 TECH: JIC
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LEGEND

- U.P. — EXIST. UTILITY POLE
- OH — EXIST. OVERHEAD UTILITY LINE
- t — EXIST. TELEPHONE LINE
- e — EXIST. ELECTRIC LINE
- g — EXIST. GAS LINE
- f.o. — EXIST. FIBER OPTIC LINE
- w — EXIST. WATER MAIN
- W — PROP. WATER MAIN
- H — EXIST. HYDRANT
- H — PROP. HYDRANT
- V — EXIST. GATE VALVE IN BOX
- V — EXIST. GATE VALVE IN WELL
- V — PROP. GATE VALVE IN WELL
- X — EXIST. CURB STOP & BOX
- r — EXIST. STORM SEWER
- R — PROP. STORM SEWER
- C — EXIST. CATCH BASIN OR INLET
- C — PROP. CATCH BASIN OR INLET
- FR — EXIST. FRENCH DRAIN
- s — EXIST. SANITARY SEWER
- S — PROP. SANITARY SEWER
- S — PROP. SANITARY CLEANOUT
- B — SIGN MAILBOX
- T — TELEPHONE RISER
- M — ELECTRIC METER
- G — GAS METER
- TCB — TRAFFIC SIGNAL CONTROL BOX
- P — POST
- W — WELL
- F — FENCE
- S — SINGLE TREE
- T — TREE OR BRUSH LIMIT
- W — PRESERVED REGULATED WOODLANDS

- NOTES**
- REFER TO TYPICAL ROAD SECTION AND EASEMENT PLAN SHEET FOR ADDITIONAL INFORMATION REGARDING PROPOSED UTILITY LOCATIONS AND EASEMENT WIDTHS.
 - SUMP PUMPS WILL BE CONNECTED DIRECTLY TO THE STORM SEWER SYSTEM, CROSSING THE STREET IF NECESSARY, VIA ENCLOSED PIPE. LEADS WILL BE SHOWN IN DETAILED ENGINEERING PLANS.
 - EXISTING SANITARY SEWER LEADS AT THE TERMINAL MANHOLE (MANHOLE LOCATED EAST OF SUBJECT PROPERTY) SHALL BE FIELD VERIFIED, AND TERMINATED AT THE MANHOLE, IF ABANDONED.
 - EACH ATTACHED RESIDENTIAL GROUPING WILL HAVE A SINGLE SANITARY AND WATER LEAD, LOCATIONS TO BE DETERMINED DURING DETAILED ENGINEERING PLAN PHASE.
 - NO FIREWALLS ARE PROPOSED. NO FIRE SUPPRESSION PROPOSED IN BUILDINGS.
 - ALL DIMENSIONS ARE PROPOSED EASEMENT WIDTHS, INCLUDING EASEMENT OWNERSHIP IN PARENTHESIS. SEE SHEET 12 FOR ADDITIONAL EASEMENT INFORMATION.
 - NO BOOSTER PUMPS ARE PROPOSED FOR BUILDING WATER SERVICE LEADS.
 - AN EASEMENT SHALL BE ESTABLISHED AND CONVEYED TO THE CITY OF ANN ARBOR FOR THE EXISTING OFF-SITE 8" SANITARY SEWER THAT FRONTS PARCEL 2873 PACKARD ROAD. THE EASEMENT SHALL BE CONVEYED TO THE CITY PRIOR TO THE ISSUANCE OF ANY PERMITS FOR THIS PROJECT.
 - THE FINAL LOCATION AND ALIGNMENT OF THE PROPOSED SANITARY SEWER LOCATED NEAR PACKARD ROAD WILL BE DETERMINED DURING THE DETAILED ENGINEERING PLAN PHASE.
 - INFILTRATION BASIN #3 (NORTHEAST CORNER OF PROPERTY) SHALL NOT BE LOCATED WITHIN ANY PORTION OF THE PUBLIC UTILITY EASEMENT.

SANITARY SEWER BASIS OF DESIGN

Quantity	Unit	Usage Rate	Unit	Proposed Flow
1	EA	300	GPCPD	300 GPD
25	Total Units		Total=	7500 GPD
	Daily Flow			7500 GPD
	Peaking Factor			0.012 CFS
	Average Peak Daily Flow			4
				0.046 CFS
1	EA	300	GPCPD	300 GPD
26	Total Units		Total=	7800 GPD
	Daily Flow			7800 GPD
	Peaking Factor			0.012 CFS
	Average Peak Daily Flow			4
				0.048 CFS
	Gross Average Peak Daily Flow			0.095 CFS
	Capacity of 8 inch pipe at 0.50% slope			1.007 CFS

SANITARY SEWER MITIGATION CALCULATIONS

Based on flow data in the City's "Table A" of the Sewage Flow Offset Mitigation Program Used to determine sewer pipe sizing and number of footing drain disconnects (FDD) required.

Sewer Design Flow - Single Family Units:
 Design Flow Rate per Unit (from Table A) = 300 GPD/Unit
 Number of Units = 25 Units
 Eq: (Flow Rate per House X Peaking Factor X # Units) = 30,000 GPD
 Eq: (Sewer Design Flow / 24 hr / 60 min) = 20.8 GPM
 System Recovery Factor for Mitigation = 1.1

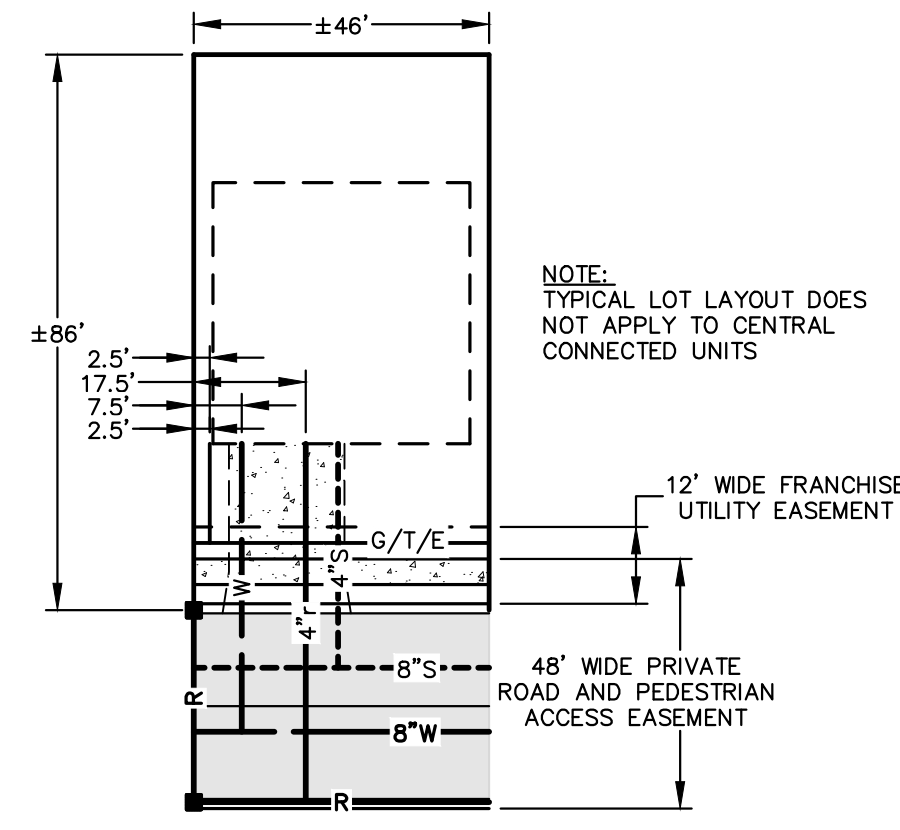
Mitigation Design Flow - Single Family Units:
 Eq: (Sewer Design Flow X System Recovery Factor) = 33,000 GPD
 Eq: (Mitigation Design Flow / 24 hr / 60 min) = 22.9 GPM

Sewer Design Flow - Attached (Townhouse) Units:
 Design Flow Rate per Unit (from Table A) = 300 GPD/Unit
 Peaking Factor = 4
 Number of Units = 26 Units
 Eq: (Flow Rate per House X Peaking Factor X # Units) = 31,200 GPD
 Eq: (Sewer Design Flow / 24 hr / 60 min) = 21.7 GPM
 System Recovery Factor for Mitigation = 1.1

Mitigation Design Flow - Attached (Townhouse) Units:
 Eq: (Sewer Design Flow X System Recovery Factor) = 34,320 GPD
 Eq: (Mitigation Design Flow / 24 hr / 60 min) = 23.6 GPM

Gross Mitigation Design Flow (To be mitigated): 46.8 GPM

Note: Pending field verification, there is no existing flow to the public sanitary sewer system from the subject property. Mitigation will be required for a flow of 47 gallons per minute, or equivalent alternate mitigation to equate to the additional peak.



TYPICAL LOT UTILITY LEADS

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

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2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 SITE UTILITY PLAN

11

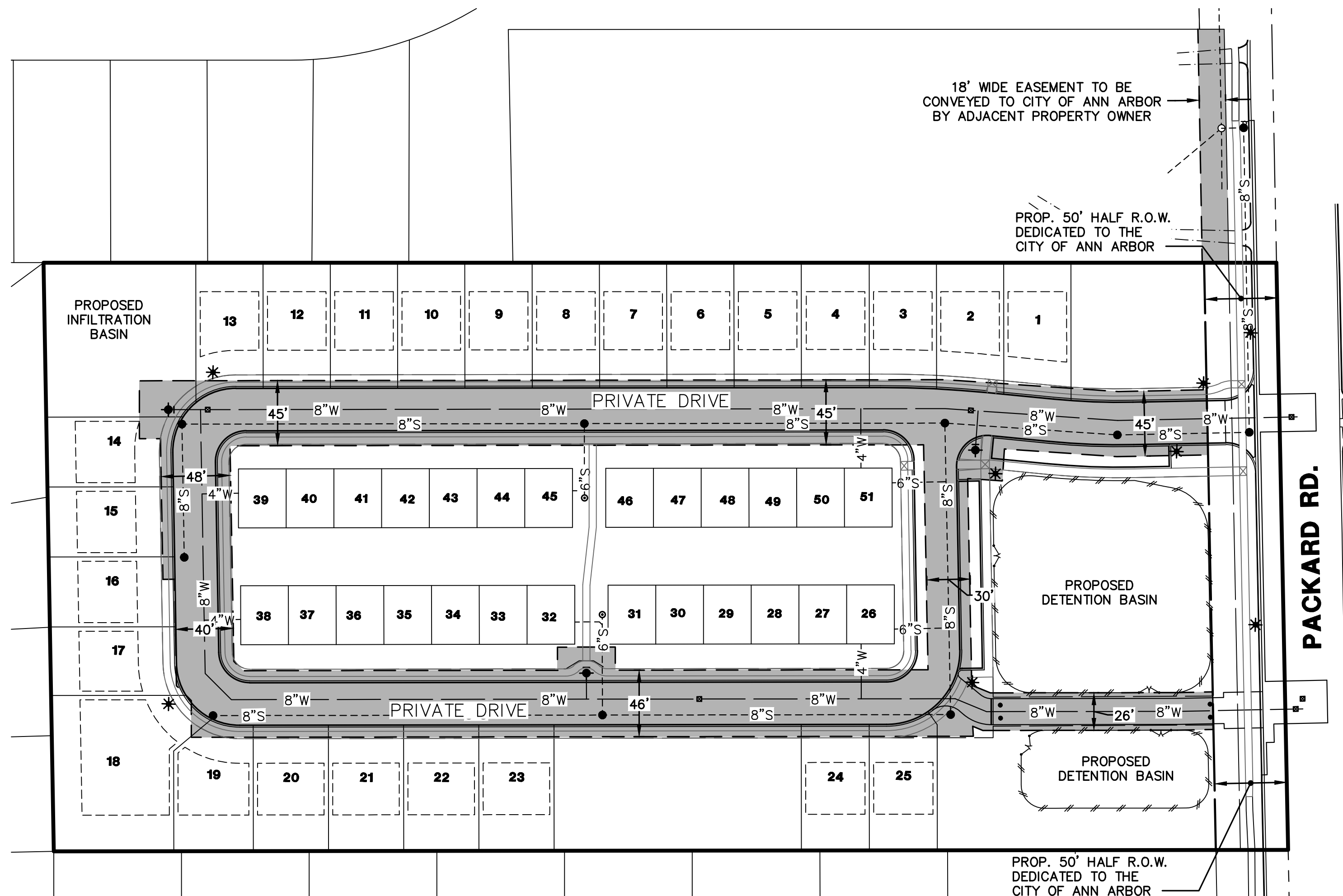
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DATE: 7/25/19
 SHEET 11 OF 27

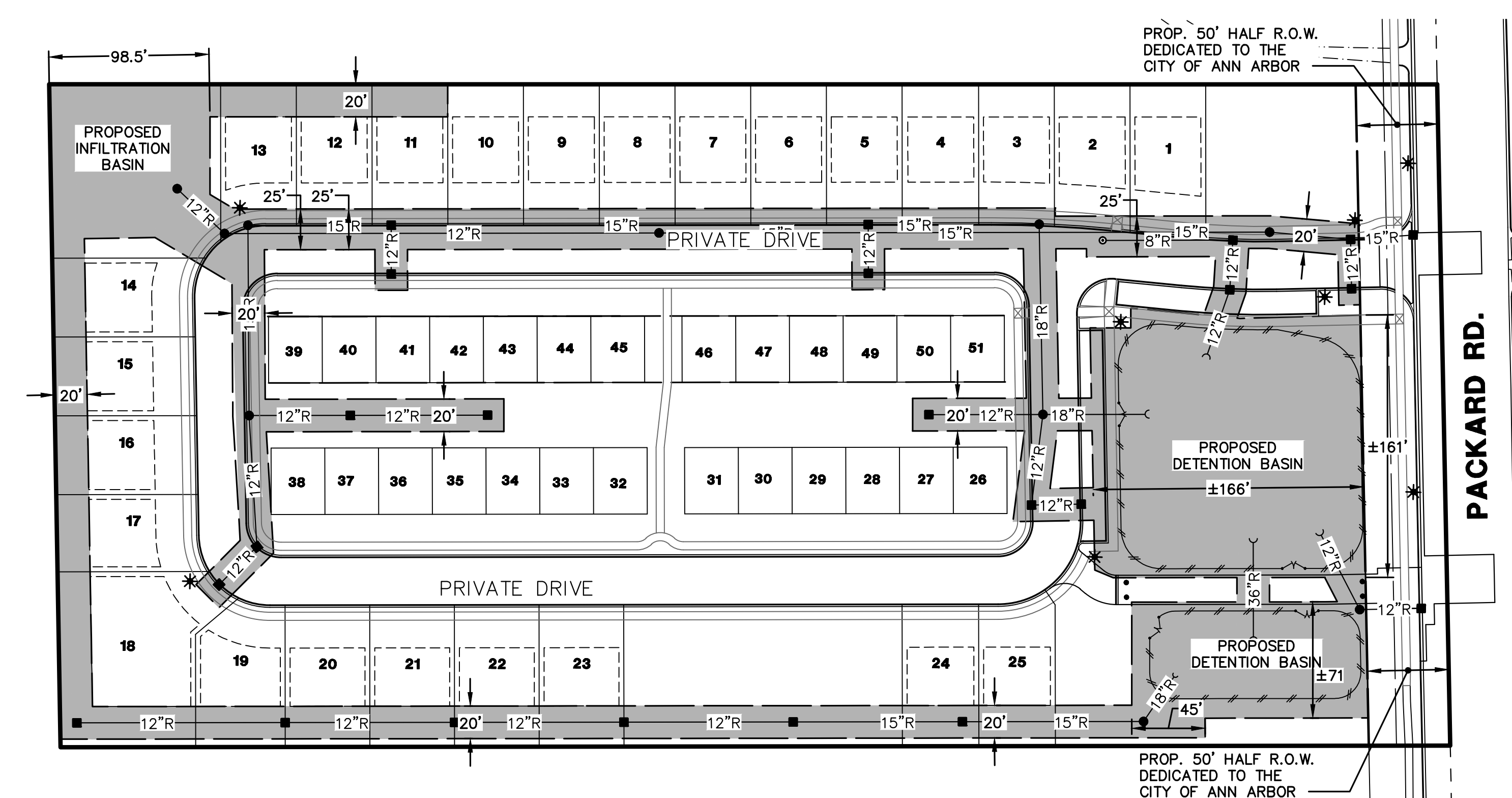
REV. NO.	DATE	BY	CHKD.	APP'D.
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2	06/14/19	ENG. SGF		
3	06/26/19	PM. TJC		
4	07/25/19	TECH. TES		
5	08/29/19	16070DUP.dwg		

JOB No. **16070**

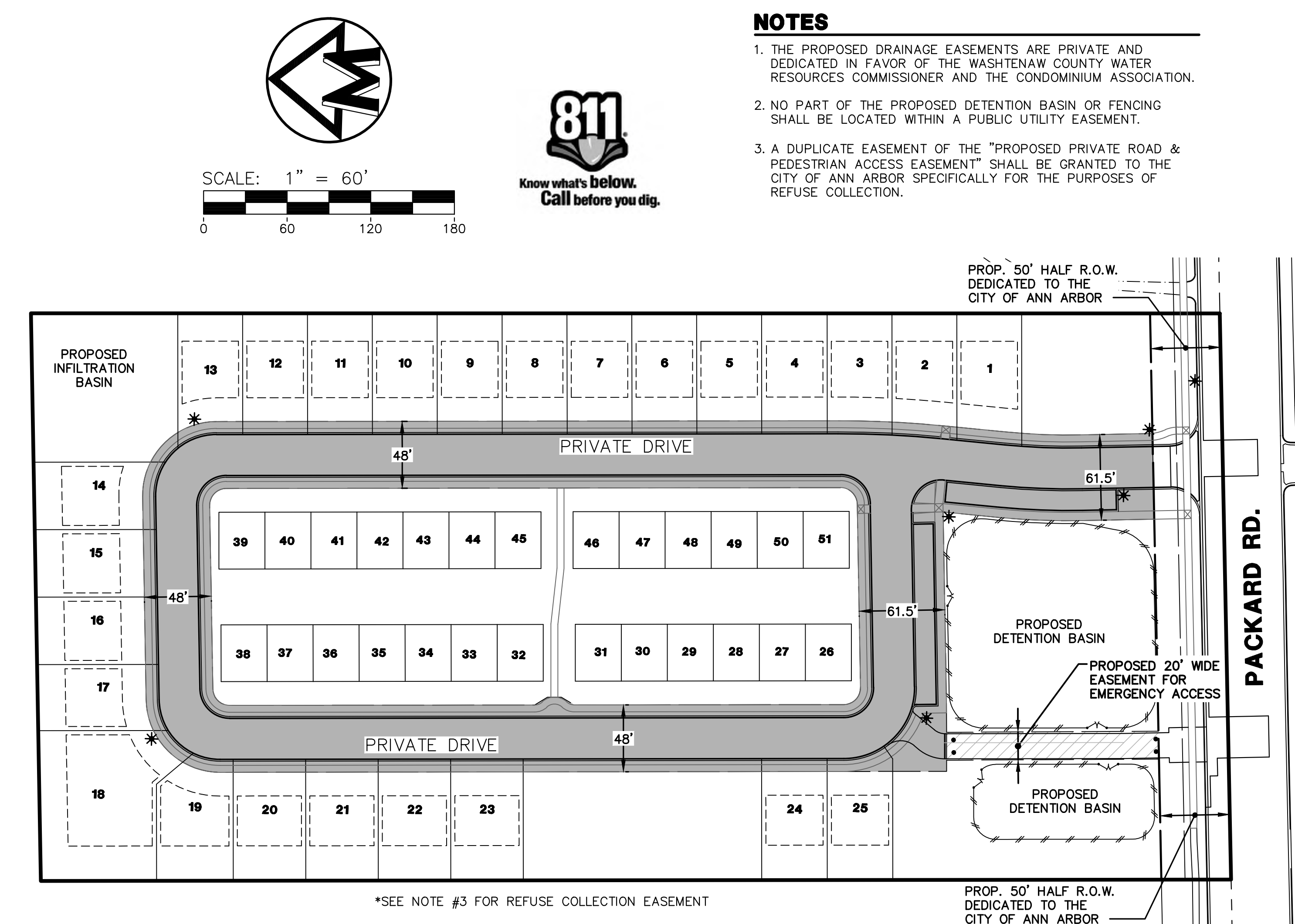
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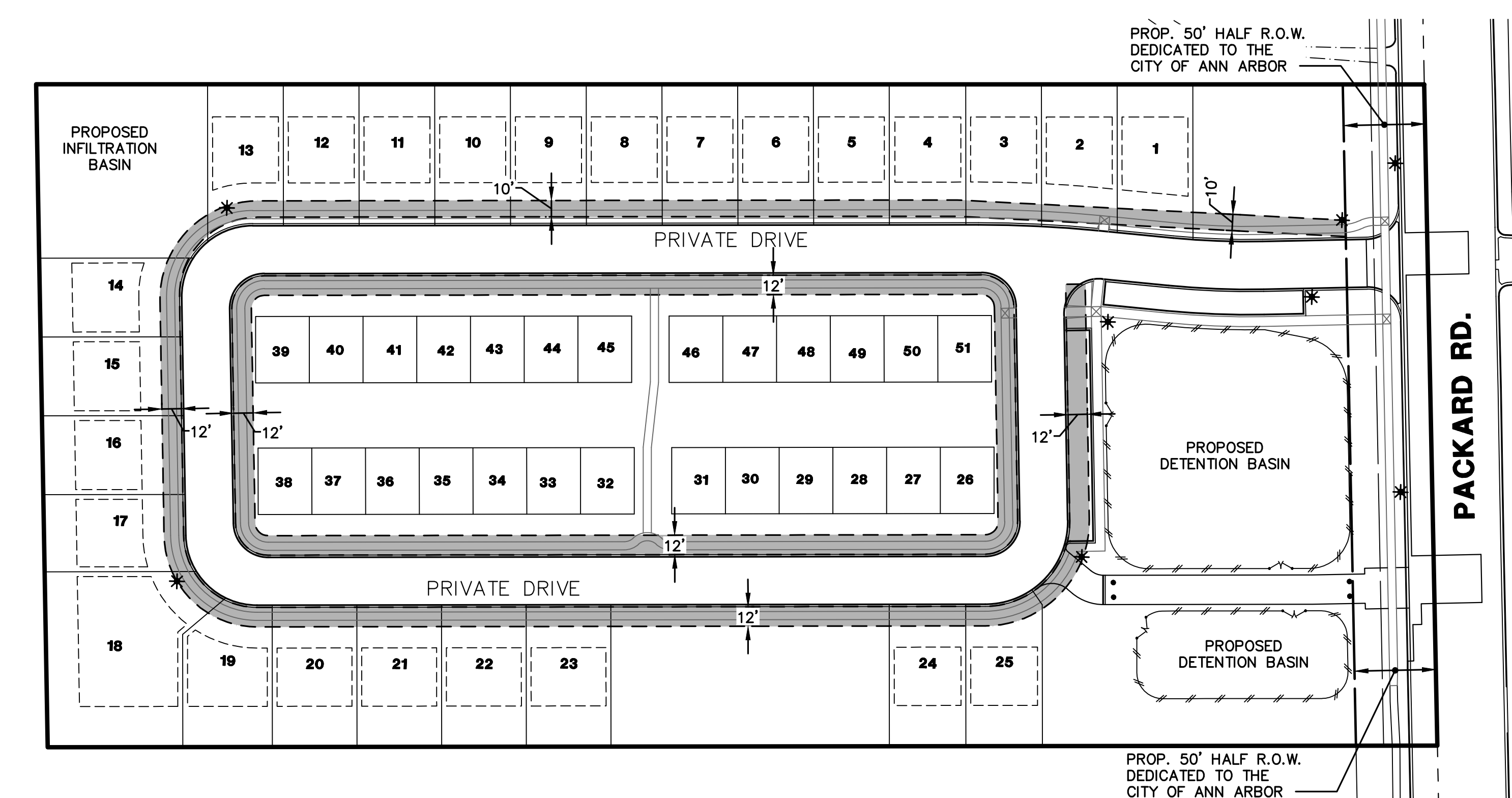
PROPOSED CITY OF ANN ARBOR PUBLIC UTILITY EASEMENT



PROPOSED WCWRC DRAINAGE EASEMENT



PROPOSED PRIVATE ROAD & PEDESTRIAN ACCESS EASEMENT



PROPOSED FRANCHISE UTILITY EASEMENT

- NOTES**
1. THE PROPOSED DRAINAGE EASEMENTS ARE PRIVATE AND DEDICATED IN FAVOR OF THE WASHTENAW COUNTY WATER RESOURCES COMMISSIONER AND THE CONDOMINIUM ASSOCIATION.
 2. NO PART OF THE PROPOSED DETENTION BASIN OR FENCING SHALL BE LOCATED WITHIN A PUBLIC UTILITY EASEMENT.
 3. A DUPLICATE EASEMENT OF THE "PROPOSED PRIVATE ROAD & PEDESTRIAN ACCESS EASEMENT" SHALL BE GRANTED TO THE CITY OF ANN ARBOR SPECIFICALLY FOR THE PURPOSES OF REFUSE COLLECTION.

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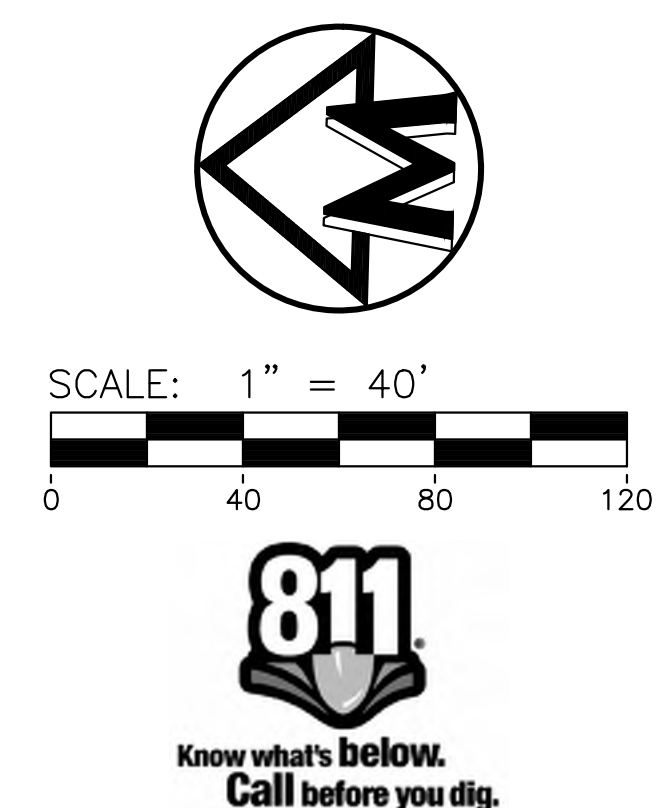
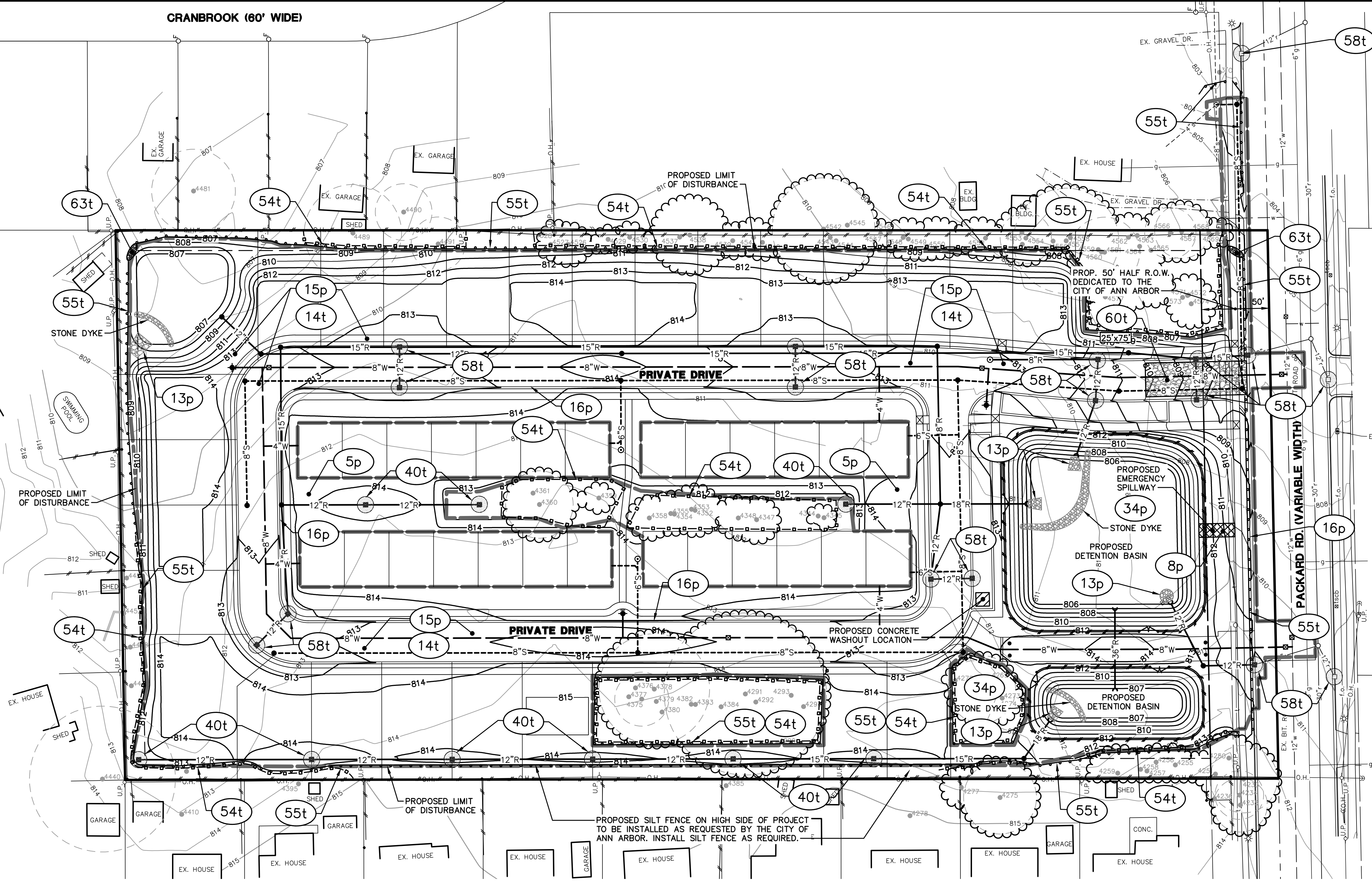
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2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 EASEMENT PLAN

12

JOB No. **16070**
 DATE: 7/25/19
 SHEET 12 OF 27
 REVISIONS:
 REV. DATE REV. DATE CADD: QTS
 PER CITY REVIEW 05/17/19 06/14/19 ENG: SFG
 PER CITY REVIEW 06/26/19 PM: TJC
 PER CITY REVIEW 08/20/19 TECH: TES
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LEGEND

- EXIST. CONTOUR
- PROP. CONTOUR
- PROP. WATER MAIN
- PROP. HYDRANT
- PROP. GATE VALVE IN WELL
- PROP. STORM SEWER
- PROP. CATCH BASIN OR INLET
- PROP. SANITARY SEWER
- LIMITS OF DISTURBANCE
- SILT FENCE
- TREE PROTECTION FENCE

SESC NOTES

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN THE SOIL EROSION CONTROL MEASURES AS SHOWN ON THE SESC PLANS AT ALL TIMES DURING CONSTRUCTION ON THIS PROJECT. FOLLOWING CONSTRUCTION, IT WILL BE THE RESPONSIBILITY OF THE CONDOMINIUM ASSOCIATION TO PERFORM THE MAINTENANCE. ANY MODIFICATIONS OR ADDITIONS TO THE SOIL EROSION CONTROL MEASURES DUE TO CONSTRUCTION OR CHANGED CONDITIONS, SHALL BE COMPLIED WITH AS REQUIRED OR DIRECTED BY THE OWNER, PROJECT ENGINEER, OR WASHENAW COUNTY.
2. DAILY INSPECTIONS SHALL BE MADE BY THE CONTRACTOR. PERIODIC INSPECTIONS MAY BE MADE BY THE OWNER/PROJECT ENGINEER/CITY TO DETERMINE THE EFFECTIVENESS OF EROSION AND SEDIMENTATION CONTROL MEASURES. ANY NECESSARY CORRECTIONS SHALL BE MADE WITHOUT DELAY BY THE ONSITE RESPONSIBLE INDIVIDUAL.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND REMOVAL OF SOME UPON AUTHORIZED COMPLETION OF PROJECT. COMPLETION OF PROJECT WILL NOT BE AUTHORIZED UNTIL ALL SITE WORK, HOME BUILDING, ROAD WORK, AND UTILITY CONSTRUCTION IS COMPLETE AND ALL SOILS ARE STABILIZED.
4. ALL SILT FENCE SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. IF AT ANY TIME THE DEPTH OF SILT AND SEDIMENT COMES TO WITHIN 12" OF THE TOP OF ANY SILT FENCE, ALL SILT AND SEDIMENT SHALL BE REMOVED TO ORIGINAL GRADE.
5. ALL TEMPORARY GRAVEL FILTERS SHOULD BE ADJUSTED AS TO LOCATION PER ACTUAL FIELD CONDITIONS. THE REMOVAL OF TRAPPED SEDIMENT AND THE CLEAN OUT OR REPLACEMENT OF CLOGGED STONE MAY BE NECESSARY AFTER EACH STORM EVENT DURING THE PROJECT.
6. ONLY UPON STABILIZATION OF ALL DISTURBED AREAS MAY THE SILT FENCE, AND TEMPORARY GRAVEL FILTERS BE REMOVED. ALSO, ALL STORM SEWERS MUST BE CLEANED OF ALL SEDIMENT.
7. INTERNAL AND EXTERNAL STREETS WILL BE CLEANED OF ANY TRACKED MUD IMMEDIATELY FOLLOWING EACH MUD-TRACKING OCCURRENCE.
8. SEE SITE DETAILS SHEET FOR ALL SESC DETAILS, CONSTRUCTION NOTES AND MAINTENANCE NOTES.
9. ESTIMATED COST OF STABILIZATION IF CONSTRUCTION OPERATIONS CEASED = \$40,000
10. LIMIT OF DISTURBANCE = 258,000 SF (5.92 ACRES)
11. ONLY USE HAND TOOLS FOR EARTHWORK WITHIN LIMITS OF TREE PROTECTION FENCE.
12. END SECTIONS SHALL BE BURIED IN 1.5 CYD OF MDOT 6A WASHED STONE.
13. ANY DIRT OR DEBRIS TRACKED ONTO INTERNAL OR EXTERNAL ROADS WILL BE IMMEDIATELY CLEANED UP FOLLOWING ANY MUD-TRACKING EVENT AND ON A DAILY BASIS AT A MINIMUM.
14. USE ONLY HAND TOOLS FOR GRADING WITHIN TREE PROTECTION FENCE LIMITS.
15. STONE DYKE SHALL CONSIST OF 6" TO 8" NATURAL STONE RIP PLACED TO SPECIFIED DEPTH PER PLAN.
16. PER CHAPTER 55, SECTION 5.22.3.D, DETENTION FACILITIES MUST BE INSTALLED PRIOR TO THE ISSUANCE OF BUILDING PERMITS.
17. PER THE REQUIREMENTS OF THE NPDES PERMIT, INSPECTIONS MUST BE PERFORMED BY A CERTIFIED MDEQ STORM WATER OPERATOR AT LEAST ONCE A WEEK AND IMMEDIATELY FOLLOWING EACH PRECIPITATION EVENT. THE WRITTEN REPORTS MUST BE MAINTAINED ONSITE.
18. PER CHAPTER 55, SECTION 5.22.4.J, PERMANENT SOIL EROSION CONTROLS ARE REQUIRED TO BE INSTALLED WITHIN FIVE (5) DAYS AFTER FINAL GRADING OR FINAL EARTH CHANGE.
19. ESTIMATED EARTHWORK:
 CUT: 35,820 CYD
 FILL: 27,790 CYD

CONSTRUCTION SEQUENCE

CONSTRUCTION SEQUENCE	OPERATION TIME SCHEDULE - BEGINNING AUGUST 2019							
	AUG.	SEP.	OCT.	NOV.	DEC.	JAN.	FEB.	MARCH
INSTALL AND MAINTAIN SOIL EROSION CONTROL MEASURES AS REQUIRED								
SITE REMOVALS								
TRAFFIC CONTROL PACKARD ROAD								
R.O.W. REMOVALS								
R.O.W. UTILITIES								
R.O.W. PAVING								
STRIP AND STOCKPILE TOPSOIL								
DETENTION BASIN CONSTRUCTION								
MASS GRADING AND INSTALL PUBLIC UTILITIES								
CONSTRUCT/PAVE PRIVATE DRIVE								
CONSTRUCT FOUNDATIONS FOR HOMES (AS PURCHASED)								
INSTALL FRANCHISE UTILITIES								
CONSTRUCT SIDEWALK								
CONSTRUCT ACCESS DRIVES AND FINAL PAVE MAIN ROAD								
PLACE LANDSCAPING, TOPSOIL AND LAWNS								
FINAL CLEAN-UP & REMOVAL OF SOIL EROSION CONTROLS								

SOIL EROSION CONTROL MEASURES

t = temporary p = permanent

5		16		54	
8		34		55	
13		40		58	
14		49		60	
15		51		63	

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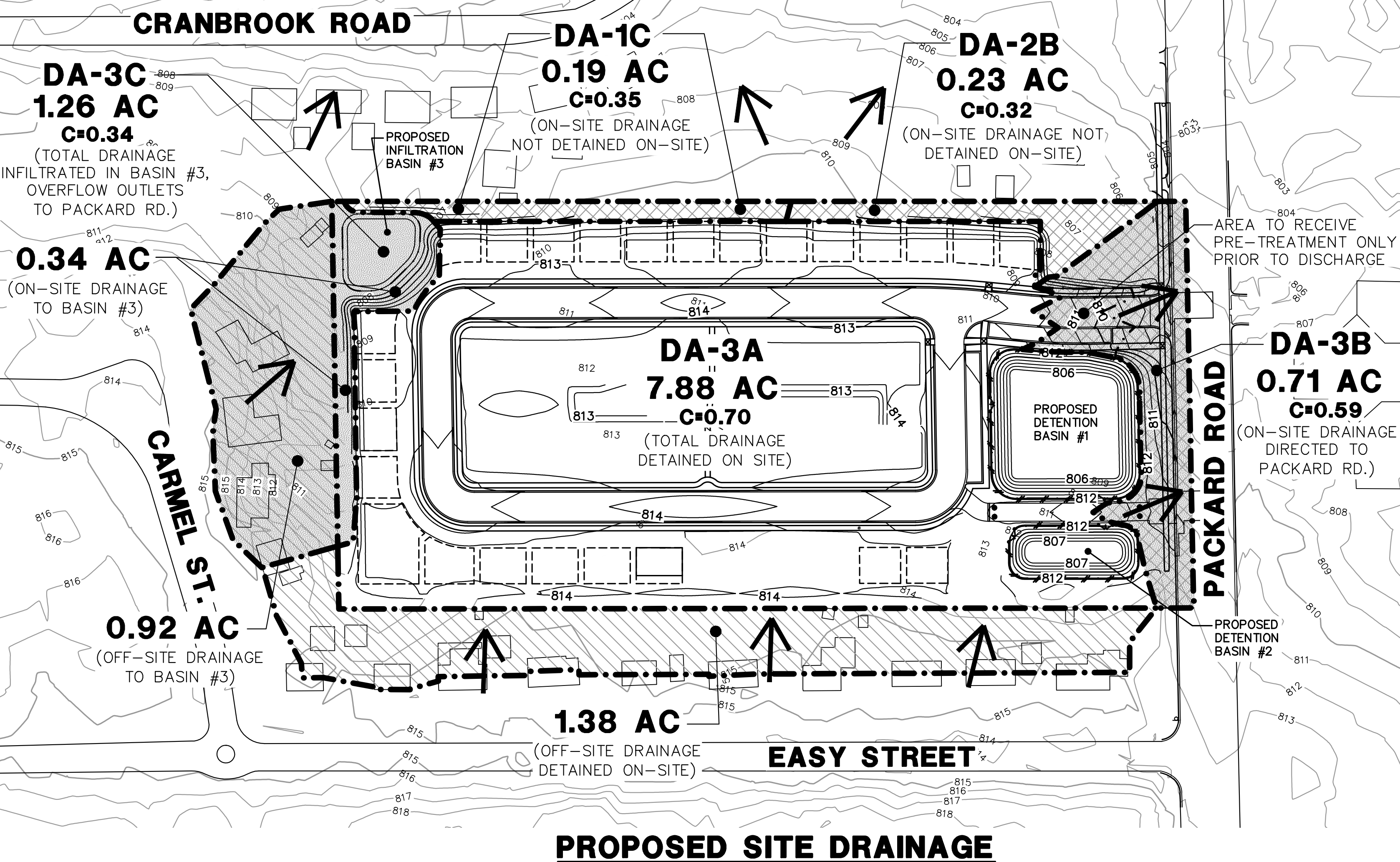
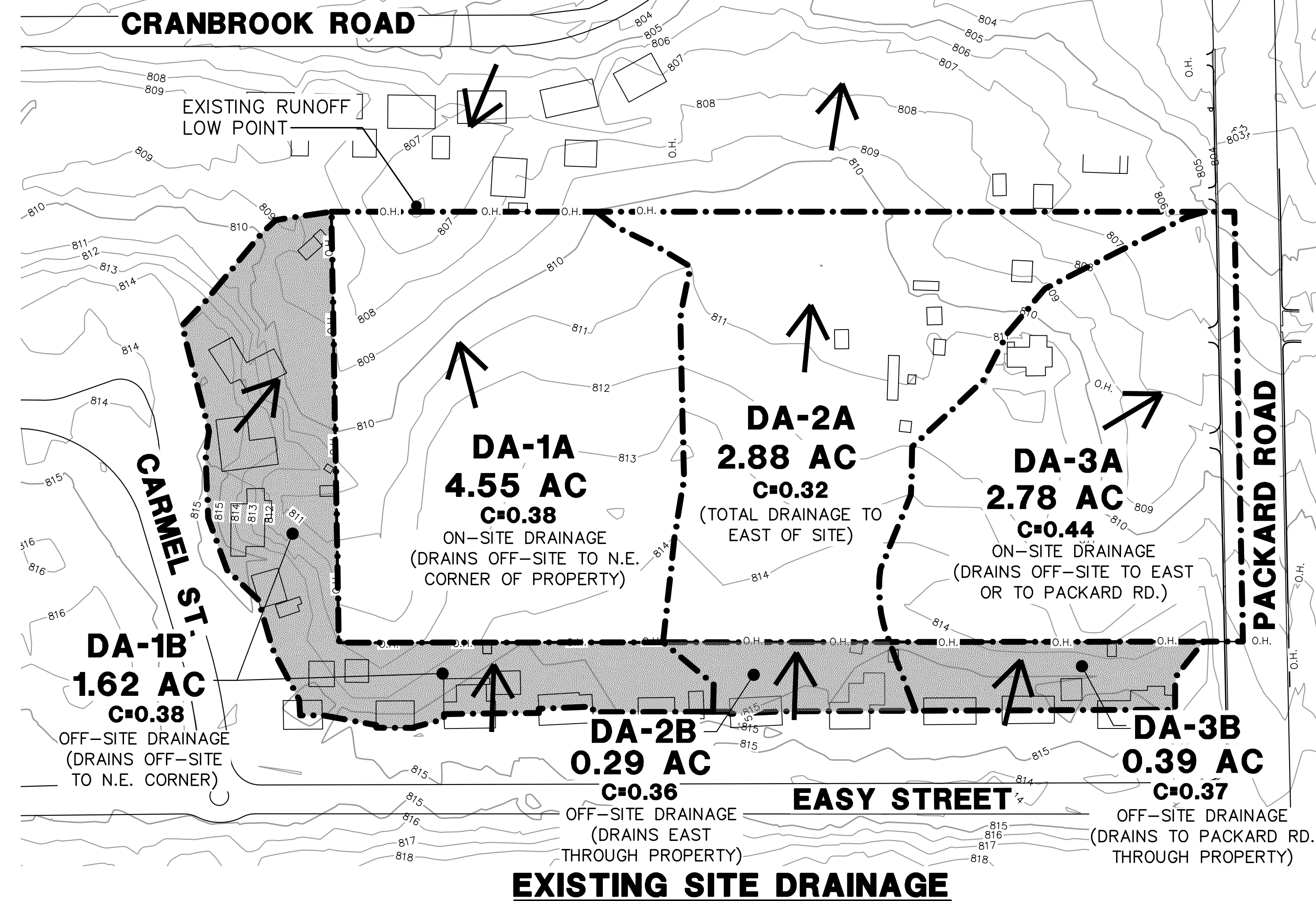
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2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 SOIL EROSION & SEDIMENTATION CONTROL PLAN

13

JOB No. **16070**
 DATE: 7/25/19
 SHEET 13 OF 27
 REVISIONS:
 PER CITY REVIEW
 PER CITY REVIEW
 PER CITY REVIEW
 REV. DATE: 05/17/19
 CADD: GTS
 ENG: SFG
 PM: TJC
 TECH: TES
 DATE: 7/25/19
 BY:

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DRAINAGE COMPARISON

Equations:
 100 Year Peak Discharge Rate = $Q_{100} = C_{avg} \times i_{100} \times \text{Area}$ [ft³/s]
 First Flush Volume = $V_f = C_{avg} \times \text{Area} \times 1''$ [ft³]
 100 Year Peak Volume = $V_{100} = C_{avg} \times \text{Area} \times 5.11''$ [ft³]

Assumptions:
 Required 100 Year Storage Volume (per WCRC) = $V_{100(wcwc)} = 97,162$ cf
 Required Infiltration Volume (per WCRC) = $V_{inf(wcwc)} = 33,655$ cf

Existing Conditions							
Drainage Area #	Area (sf)	Area (acre)	C _{avg}	Q ₁₀₀ (cfs)	V _f (cf)	V ₁₀₀ (cf)	See Note #
DA-1A (On-Site NE)	198,404	4.55	0.38	11,899	6,283	32,105	
DA-1B (Off-Site NE)	70,590	1.62	0.38	4,234	2,235	11,423	
DA-2A (On-Site East)	125,502	2.88	0.32	6,338	3,347	17,102	
DA-2B (Off-site East)	12,649	0.29	0.36	0,719	379	1,939	
DA-3A (On-Site South)	121,285	2.78	0.44	8,423	4,447	22,725	
DA-3B (Off-Site South)	17,085	0.39	0.37	0,998	527	2,692	

Proposed Conditions							
Drainage Area #	Area (sf)	Area (acre)	C _{avg}	Q ₁₀₀ (cfs)	V _f (cf)	V ₁₀₀ (cf)	See Note #
DA-1C (NE) Total	8,077	0.19	0.35	0,446	236	1,204	
DA-2B (East) Total	10,134	0.23	0.32	0,612	270	1,381	
DA-3A (Packard Rd)	343,301	7.88	0.70	1,182	0	63,507	1, 2, 3
DA-3B (Packard Rd)	30,818	0.71	0.59	2,870	1,515	7,743	
DA-3C (Packard Rd)	54,765	1.26	0.34	2,965	0	8,637	
DA-3 Total	374,119	8.59	-	7,017	1,515	61,121	

Note 1:
 For DA-3A, the entire first flush volume (V_f) is designed to be infiltrated into the soil horizon in the central detention basin, therefore no volume is discharged to Packard Road.
Note 2:
 For DA-3A, Q₁₀₀ = 0.15 (cfs/acre) X Area (acres) ... [Maximum Post-development Discharge Rate per WCRC]
Note 3:
 For DA-3A, V₁₀₀ = V_{100(prop)} - V_{off(prop)} = 97,162 - 33,655 = 63,507 cf

		Existing	Proposed	Difference	% Difference	Incr/Dec	See Note #
		DA-1	Q ₁₀₀ (cfs)	11,899	0,446	11,453	-95%
	V _f (cf)	6,283	236	6,047	-96%	Decrease	
	V ₁₀₀ (cf)	32,105	1,204	30,901	-96%	Decrease	

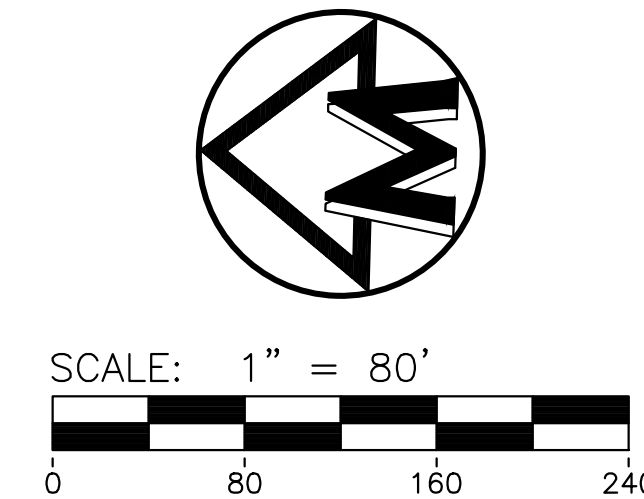
Summary:
 There is a significant reduction in drainage to the northeast corner the site, which has been historically reported to flood some adjacent properties in this area. All flows to this corner should be reduced by the redirection and management of existing flows to the proposed detention basin.

DA-2	Q ₁₀₀ (cfs)	6,338	0,512	5,827	-92%	Decrease	
	V _f (cf)	3,347	270	3,076	-92%	Decrease	
	V ₁₀₀ (cf)	17,102	1,381	15,721	-92%	Decrease	

Summary:
 There is a significant reduction in drainage east across the site, which is managed by the detention basins instead of flowing to the adjacent property to the east like it has historically done.

DA-3	Q ₁₀₀ (cfs)	8,423	7,017	1,405	-17%	Decrease	
	V _f (cf)	4,447	1,515	2,932	-66%	Decrease	
	V ₁₀₀ (cf)	22,725	61,121	-38,396	169%	Increase	1

Note 1:
 The stormwater systems applied to the site and surrounding area will decrease the first flush volume directed to Packard Road by 66%. Although more stormwater volume will contribute to Packard Road (shown by the V₁₀₀ increase) the existing flooding to the surrounding parcels will be significantly alleviated. The stormwater will be detained within basins over time and therefore will result in a combined peak flow rate reduction to Packard Road by 17%, which will not overload the existing stormwater system.

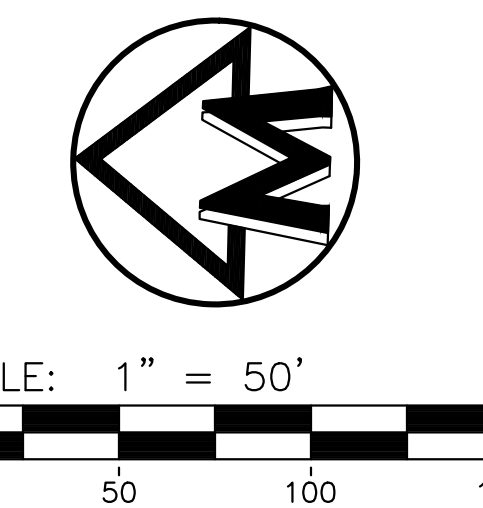
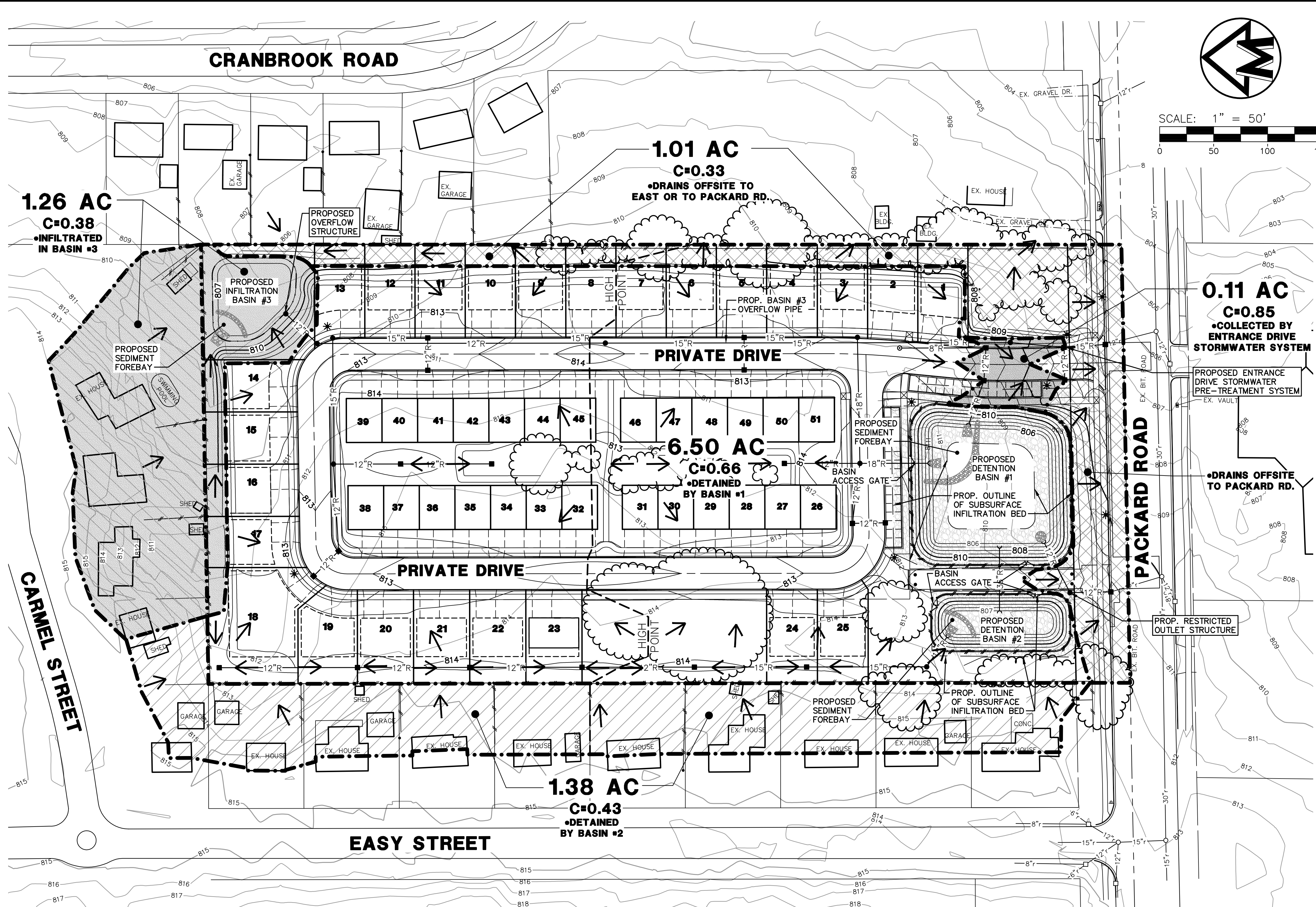


LEGEND

- 7.25 AC DRAINAGE AREA BOUNDARY
- DRAINAGE AREA IN ACRES
- C=0.40 DRAINAGE AREA RUNOFF COEFFICIENT
- OFFSITE DRAINAGE TO BE DETAINED
- ONSITE DRAINAGE NOT TO BE DETAINED
- DRAINAGE ARROW



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STORMWATER DRAINAGE NARRATIVE

The proposed site is located along Packard Road between Easy Street and Chesterfield Drive. The site is located in the Southeast 1/4 of Section 3 of Pittsfield Township and is bounded by residential neighborhoods to the north, east and west, and by Packard Road to the south.

Summary:

The proposed drainage area is designed to redirect and manage a large majority of the existing drainage patterns to improve runoff conditions to the surrounding parcels. Existing drainage patterns result in recurring flooding events in the northeast corner of the site. A total of 6.41 acres drain toward the northeast corner from the west of the site, while 3.17 acres drain directly across the site to the adjacent property to the east. Lastly, 3.17 acres drain directly to Packard Road. The proposed stormwater management systems will improve the flooding conditions in the northeast corner of the site by redirecting all subject property drainage, and nearly all of the off-site drainage passing through the site, away from this corner, and toward the detention/infiltration systems on the subject property. The management systems outlet to Packard Road at controlled rates during typical stormwater events.

Detention Basins #1 and #2:

The proposed detention system will be designed to meet the current Washtenaw County Water Resources Commission requirements, dated October 17, 2016. The detention system will meet infiltration volume requirements and the remaining stormwater will be a controlled release of 0.15 cfs/acre to Packard Road. Detention volume will be provided by the use of the detention basins located on the south side and at the southwest corner of the site. The basins are vertically offset so the first flush and bankfull events are infiltrated in Basin #1 alone. In storm events more severe than bankfull, stormwater will travel to Basin #2 for storage and infiltration via the equalization pipe. See the "Detention Basin Profile Sketch" located on the "Stormwater Calculations - Basins #1 & #2" sheet for a visual depiction of how the infiltration and storage process will occur. Subsurface infiltration beds will be utilized (located at the extents of the detention basins) to meet infiltration area requirements. Runoff along the west extents of the site and the middle lots will be directed to catch basins which are directed to Basin #1.

There will be small portions of the site that will not be detained on the site. Said areas are along the east extents of the site where the elevations are too low relative to the detention basin to be collected and along the southern portion of the detention basin. These isolated areas will follow the existing drainage patterns and will not adversely impact the adjacent parcels or Packard Road as the volumes and flow rates for these direct-release areas will be decreasing, and the total flow rates to Packard Road will be decreasing.

Infiltration Basin #3:

An infiltration basin is proposed in the northeast corner of the site, which is designed to overflow to Packard Road separately from Basins #1 and #2. This basin is designed to infiltrate the first flush and bankfull storms entirely for stormwater collected from the north extents of the property and off-site drainage from the north that heads east historically to the low point. In the event of a 100 year storm, the infiltration basin will overflow south to the pre-treatment system and outlet to Packard Road. The existing storm sewer system in Packard Road will not be overburdened because there is a calculated net 17% reduction in the 100 year storm flow rate compared to existing.

Pre-treatment:

A small portion of the entrance drive to the site will drain offsite since it cannot be collected by the detention system, including a small portion of the emergency access path. For the main driveway entrance, intermediate catch basins will be located such that a portion of the flow directed toward Packard Road will be collected by a pre-treatment system. The system will be designed to collect and pre-treat runoff via a hydrodynamic separator so stormwater can be discharged to the existing storm sewer system. Historically, a large area of the site drained directly towards Packard Road, which will be mitigated with the aforementioned management systems. The peak flow rate to Packard Road will decrease 66% and the 100 year runoff volume will decrease by 17%. The existing low point in the northeast corner of the site will also see a 96% decrease in total first flush and 100 year storm volumes, therefore a significant improvement. Also worth note, the adjacent property to the east will see a 92% decrease in first flush and 100 year volumes.

With the methods proposed for stormwater management on this site, there will be no negative downstream impacts as a result of this development and will improve overall existing drainage conditions.

Outlet Certification:

Based upon the data and criteria outlined above, I hereby certify that the existing storm sewer is the only reasonably achievable stormwater outlet for the proposed stormwater management system. The existing storm sewer has sufficient capacity to serve as an adequate outlet for the proposed system, without detriment to or diminution of the drainage serve that the existing outlet presently provides.

Signed: _____
 Scott G. Fisher, P.E. #58473

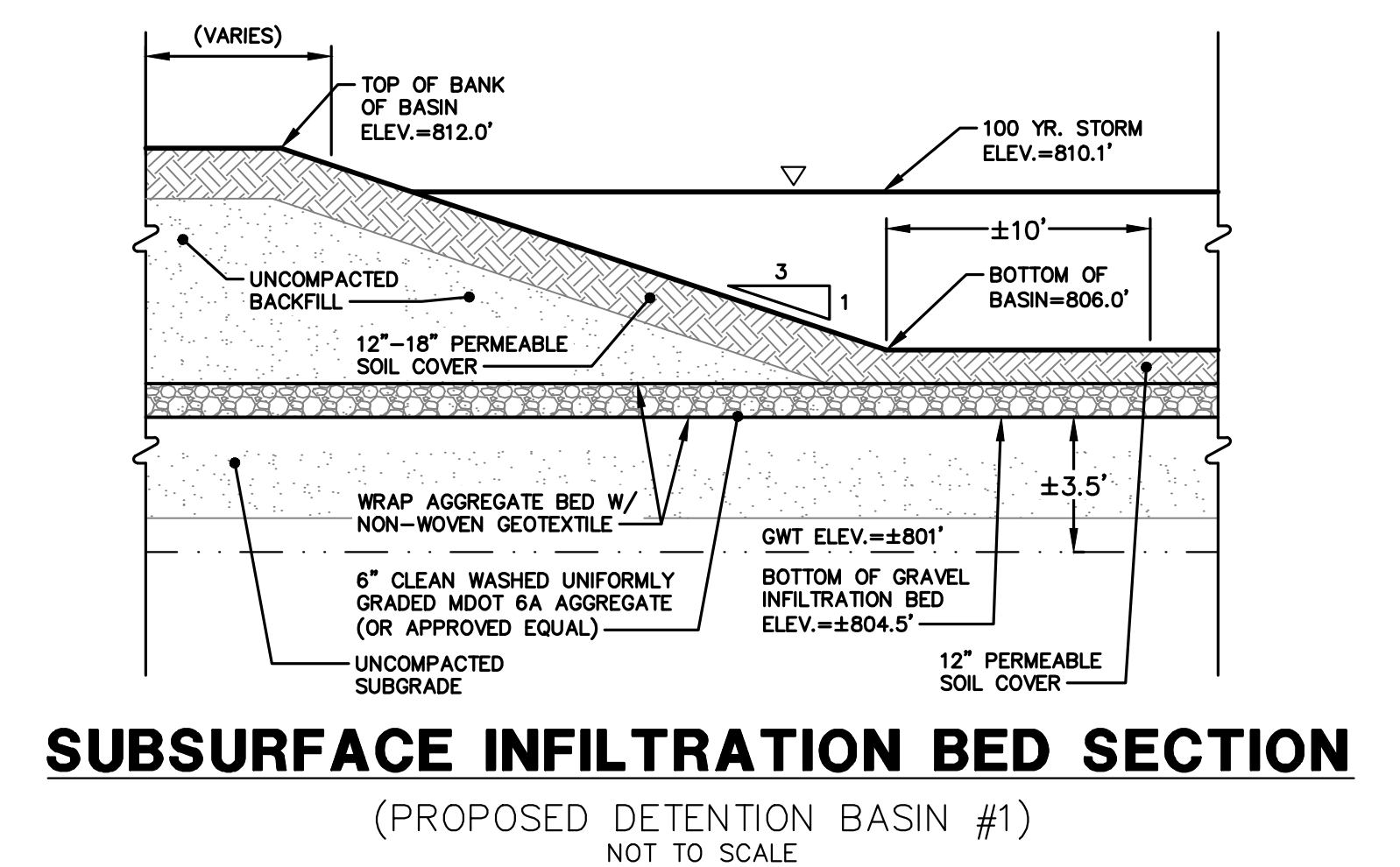
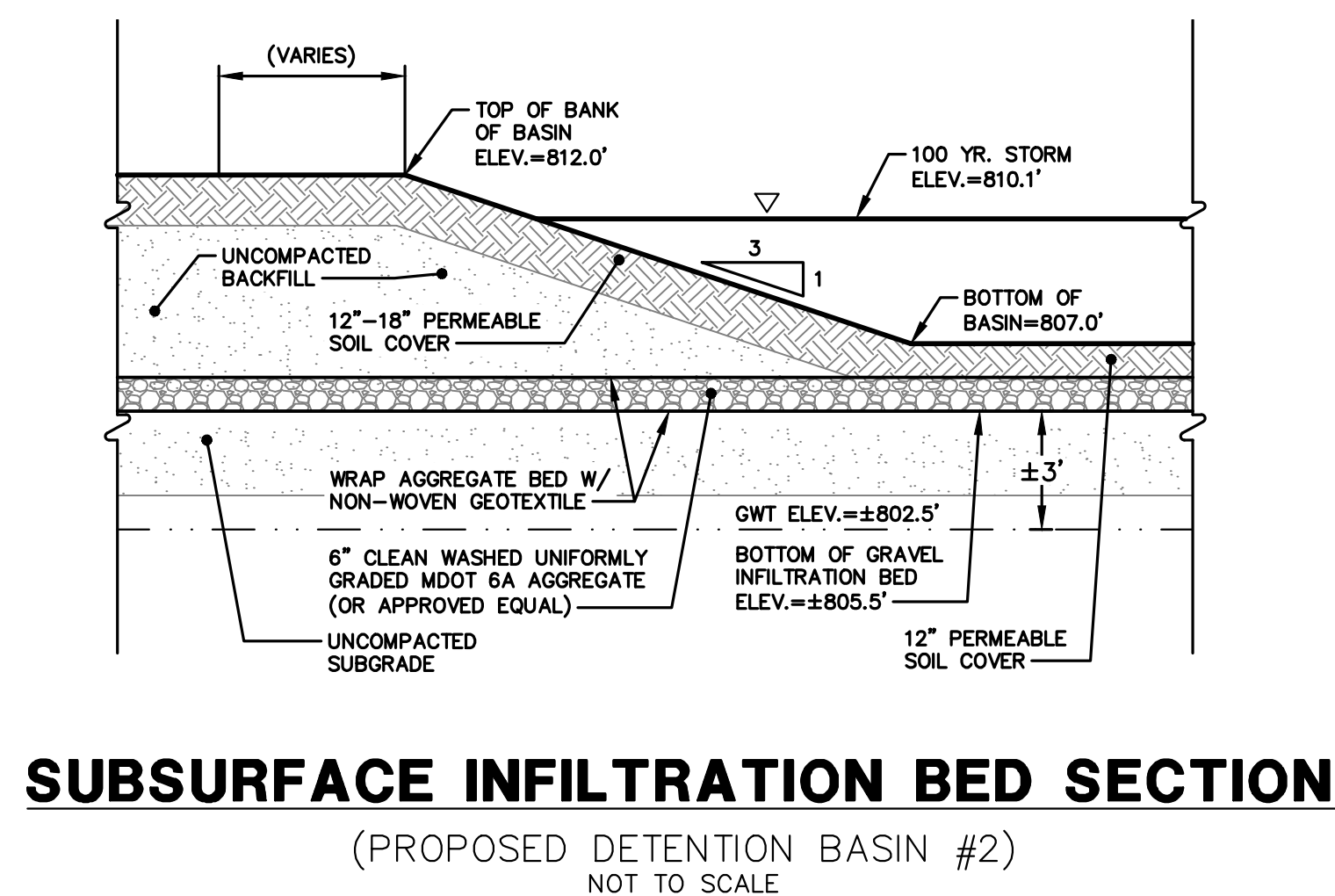
NOTE:

ROOF DRAINAGE LINES AND SUMP DISCHARGES WILL BE CONNECTED DIRECTLY TO STORM SEWER SYSTEM ALONG FRONTAGE OR REAR OF PROPERTIES VIA ENCLOSED PIPE.

LEGEND

- | | | | | |
|-----------|-------|----------------------------------|----------|---|
| - - - - - | 838 | EXIST. CONTOUR | [Symbol] | OFFSITE DRAINAGE TO BE DETAINED |
| - - - - - | 836.2 | EXIST. SPOT ELEVATION | [Symbol] | ONSITE DRAINAGE NOT TO BE DETAINED |
| [Symbol] | | EXIST. STORM SEWER | [Symbol] | DRAINAGE AREA TO HYDRODYNAMIC SEPARATOR |
| [Symbol] | | EXIST. CATCH BASIN OR INLET | [Symbol] | SUBSURFACE INFILTRATION (GRAVEL BED) |
| [Symbol] | | EXIST. BEEHIVE INLET | [Symbol] | |
| [Symbol] | | END SECTION | [Symbol] | |
| [Symbol] | | HEAD WALL | [Symbol] | |
| [Symbol] | | CULVERT | [Symbol] | |
| [Symbol] | | SINGLE TREE | [Symbol] | |
| [Symbol] | | TREE OR BRUSH LIMIT | [Symbol] | |
| [Symbol] | | DRAINAGE AREA BOUNDARY | [Symbol] | |
| [Symbol] | | DRAINAGE AREA IN ACRES | [Symbol] | |
| [Symbol] | | DRAINAGE AREA RUNOFF COEFFICIENT | [Symbol] | |
| [Symbol] | | PROPOSED DRAINAGE ARROW | [Symbol] | |

7.25 AC
C=0.40



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2857 PACKARD ROAD
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 STORMWATER MANAGEMENT PLAN

15

JOB No. 16070

DATE: 4/25/19	REV. DATE: 06/14/19	REV. DATE: 06/14/19	REV. DATE: 06/14/19
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STORMWATER CALCULATIONS - BASIN #3

Infiltration Basin
W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Total Site Area (Infiltration Basin Zone, includes runoff from off-site) **1.26 ac**
 Total Site Area Excluding "Self-Crediting" BMPs* (Main Basin Zone) **1.26 ac**

Rational Method Variables (for first flush)	Cover Type	Soil Type	Area (sf)	Area (ac)	Runoff Coeff. (C)	(C) (Area)
0.25 for pervious surfaces, Soil Type B	House Roofs	B	6,781	0.16	0.95	0.15
0.50 for pervious surfaces, Soil Type D	Driveways	B	500	0.01	0.95	0.01
0.95 for house roofs, driveways, and roadways	Roadways	B	0	0.00	0.95	-
1.00 for water surfaces (2-year pond elevation)	Landscaping	B	47,484	1.09	0.25	0.27
	Water Surface	B	0	0.00	1.00	-
	Total		54,765	1.26	0.34	0.43

Total - Sum(C)/Area 0.43 ac
 Area Total 1.26 ac
 Weighted C - (Sum(C)(Area))/(Area Total) 0.34

NRCS Variables	Pervious	Cover Type	Soil Type	Area (sf)	Area (ac)	Curve Number	(CN) (Area)
	Landscaping	B	47,484	1.09	61	0.66	
	Total		47,484	1.09	61	0.66	

Total - Sum(C)/Area 0.66 ac
 Area Total 1.09 ac
 Weighted C - (Sum(C)(Area))/(Area Total) 61.0

NRCS Variables (for bankfull and 100-year calculations)	Impervious	Cover Type	Soil Type	Area (sf)	Area (ac)	Curve Number	(CN) (Area)
98 for House Roofs	House Roofs	B	6,781	0.16	98	0.15	
98 for Driveways and Roadways	Driveways	B	500	0.01	98	0.01	
98 for water surfaces (2-year pond elevation)	Roadways	B	0	0.00	98	0.00	
	Water Surface	B	0	0.00	98	0.00	
	Total		7,281	0.17	98	0.16	

Total - Sum(C)/Area 0.16 ac
 Area Total 0.17 ac
 Weighted C - (Sum(C)(Area))/(Area Total) 98.0

W2 - First Flush Runoff Calculations (Vff)

A. Vff = 1" x 1/12" x 43560 sf/ac x A x C **1,566 cft**
0.04 ac-ft

W3 - Pre-Development Bankfull Runoff Calculations (Vbf-pre)

A. 2 year / 24 hour storm event: P= **2.35 in**
 B. Pre-Development CN **58**
 (Good Cover Woods, Type B Soils)
 C. S = (1000 / CN) - 10 **7.241 in**
 D. Q = [(P-0.2S)²] / [P+0.8S] **0.100 in**
 E. Total Site Area excluding "Self-Crediting" BMPs **54,765 sf**
 F. Vbf-pre = Q x (1/12) x Area **456 cft**
0.01 ac-ft

W4 - Pervious Cover Post-Development Bankfull Runoff Calculations (Vbf-per-post)

A. 2 year / 24 hour storm event: P= **2.35 in**
 B. Pervious Cover CN From Worksheet 1 **61**
 C. S = (1000 / CN) - 10 **6.393 in**
 D. Q = [(P-0.2S)²] / [P+0.8S] **0.154 in**
 E. Pervious Cover Area from Worksheet 1 **47,484 sf**
 F. Vbf-per-post = Q x (1/12) x Area **608 cft**
0.01 ac-ft

W5 - Impervious Cover Post-Development Bankfull Runoff Calculations (Vbf-imp-post)

A. 2 year / 24 hour storm event: P= **2.35 in**
 B. Impervious Cover CN From Worksheet 1 **98**
 C. S = (1000 / CN) - 10 **0.204 in**
 D. Q = [(P-0.2S)²] / [P+0.8S] **2.122 in**
 E. Impervious Cover Area from Worksheet 1 **7,281 sf**
 F. Vbf-imp-post = Q x (1/12) x Area **1,287 cft**
0.03 ac-ft

W6 - Pervious Cover Post-Development 100-Year Runoff Calculations (V100-per-post)

A. 100 year / 24 hour storm event: P= **5.11 in**
 B. Pervious Cover CN From Worksheet 1 **61**
 C. S = (1000 / CN) - 10 **6.393 in**
 D. Q = [(P-0.2S)²] / [P+0.8S] **1.436 in**
 E. Pervious Cover Area from Worksheet 1 **47,484 sf**
 F. V100-per-post = Q x (1/12) x Area **5,681 cft**
0.13 ac-ft

W7 - Impervious Cover Post-Development 100-Year Runoff Calculations (V100-imp-post)

A. 2 year / 24 hour storm event: P= **5.11 in**
 B. Impervious Cover CN From Worksheet 1 **98**
 C. S = (1000 / CN) - 10 **0.204 in**
 D. Q = [(P-0.2S)²] / [P+0.8S] **4.873 in**
 E. Impervious Cover Area from Worksheet 1 **7,281 sf**
 F. V100-imp-post = Q x (1/12) x Area **2,957 cft**
0.07 ac-ft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration **0.25 hr**

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets
 First Flush Volume (Vff) **1,566 cft**

Pre-Development Bankfull Runoff Volume (Vbf-pre) **456 cft**
 Pervious Cover Post-Development Bankfull Volume (Vbf-per-post) **608 cft**
 Impervious Cover Post-Development Bankfull Volume (Vbf-imp-post) **1,287 cft**
Total BF Volume (Vbf-post) 1,896 cft

Pervious Cover Post-Development 100-Year Volume (V100-per-post) **5,681 cft**
 Impervious Cover Post-Development 100-Year Volume (V100-imp-post) **2,957 cft**
Total 100-Year Volume (V100) 8,637 cft**
****[Not required to be detained for this infiltration basin per WCWRC email dated June 28, 2017]**

B. Determine Onsite Infiltration Requirement
 Subtract the Pre-Development Bankfull from the Post-Development Bankfull Volume
 Total Post-Development Bankfull Volume (Vbf-post) **1,896 cft**
 Pre-Development Bankfull Runoff Volume (Vbf-pre) **456 cft**
Bankfull Volume Difference 1,440 cft

Compare to First Flush Volume (Vff) **1,566 cft**

Greater of Bankfull Volume or First Flush Volume 1,566 cft
 To be infiltrated

W10 - Detention/Retention Requirement

Detention
 A. Qp = 238.6 Tc^{-0.82} **743.63 cfs (in x sq. mi)**
 B. Total Site Area excluding "Self-Crediting" BMPs **1.26 ac**
 C. Q100 = Q100-per + Q100-imp **6.309 in**
 (from W6 and W7, respectively)
 D. Peak Flow (PF) = Qp x Q100 x Area / 640 **9.22 cfs**
 E. Delta = PF - 0.15 x Area (ac) **9.03 cfs**
 (0.15 x Area (ac)) **0.19 cfs**
 F. Vdet** = Delta / PF x V100 **8,461 cft**
 Required Detention not including infiltration credit or penalty.
****[Not required to be detained for this infiltration basin per WCWRC email dated June 28, 2017]**
 Minimum Forebay Volume (5% of V100) **432 cft**
 Forebay Provided **121 cft**

W11 - Determine Applicable BMPs and Associated Volume Credits

Two test pits with infiltration tests were performed in the location of the detention basin: 2 had 2.5 in/hour infiltration
 Therefore the design infiltration value is 2.5 in/hour

	Area (sf)	Volume (cft)	Design Infiltration Rate (in/hr)	Infiltration Volume in 6-hr storm (cft)**	Max. Allowable 48-hr drawdown (cft)	Total Volume Reduction (cft)
Proposed Basin	3,838	1,776	2.50	4,798	38,380	1,776

Max. Allowable 48-hour drawdown must be greater than storage volume used for infiltration credit reduction.

Total Storage Volumes (Subtracting out 6-hour infiltration volumes)

1" Event **- cft**
 2-year Event **- cft**
 100-year Event-N/A **N/A cft**
****Entire 2-Year Storm Volume to be infiltrated in 6 hrs**

Total Infiltration Area **3,838 sf**
 Total Detention Area **0 sf**
Total Area Loading Ratio N/A**
Impervious Area Loading Ratio N/A

Total Volume Reduction Credit by Proposed Structural BMPs (cft) **1,776**
 Runoff Volume Infiltration Requirement (Vinf) from Worksheet 9 (cft) **1,566**
 Runoff Volume Credit (cft) **211**

W12 - Natural Features Inventory N/A

W13 - Site Summary of Infiltration & Detention

A. Stormwater Management Summary		
Minimum Onsite Infiltration Requirement (Vinf)		1,566 cft
Designed/Provided Infiltration Volume		1,776 cft
% Minimum Required Infiltration Provided		113% %
Total Calculated Detention Volume, Vdet		8,461 cft
Net Required Detention Volume (Vdet - Designed/Provided Infiltration Volume)		6,684 cft
B. Detention Volume Increase for sites where the required infiltration volume cannot be achieved.		
% Required Infiltration NOT Provided (100% - % Minimum Required Infiltration Provided)		0.0%
Net % Penalty (20% x % Required Infiltration NOT Provided)		0.0%
Total Required Detention Volume, including penalty		6,684 cft
[(100% + Net % Penalty) x Net Required Detention Volume]		

Storage-Elevation Data

Basin Storage Information (includes forebay areas)

Elevation (ft)	Height (ft)	Area (sf)	Volume (cft)	Cum. Volume (cft)	Cum. Depth Volume (cft)
806.5	0.0	3,275	-	-	-
807.0	0.5	3,838	1,776	1,776	-
808.0	1.0	5,080	-	-	-
Total Storage				1,776	

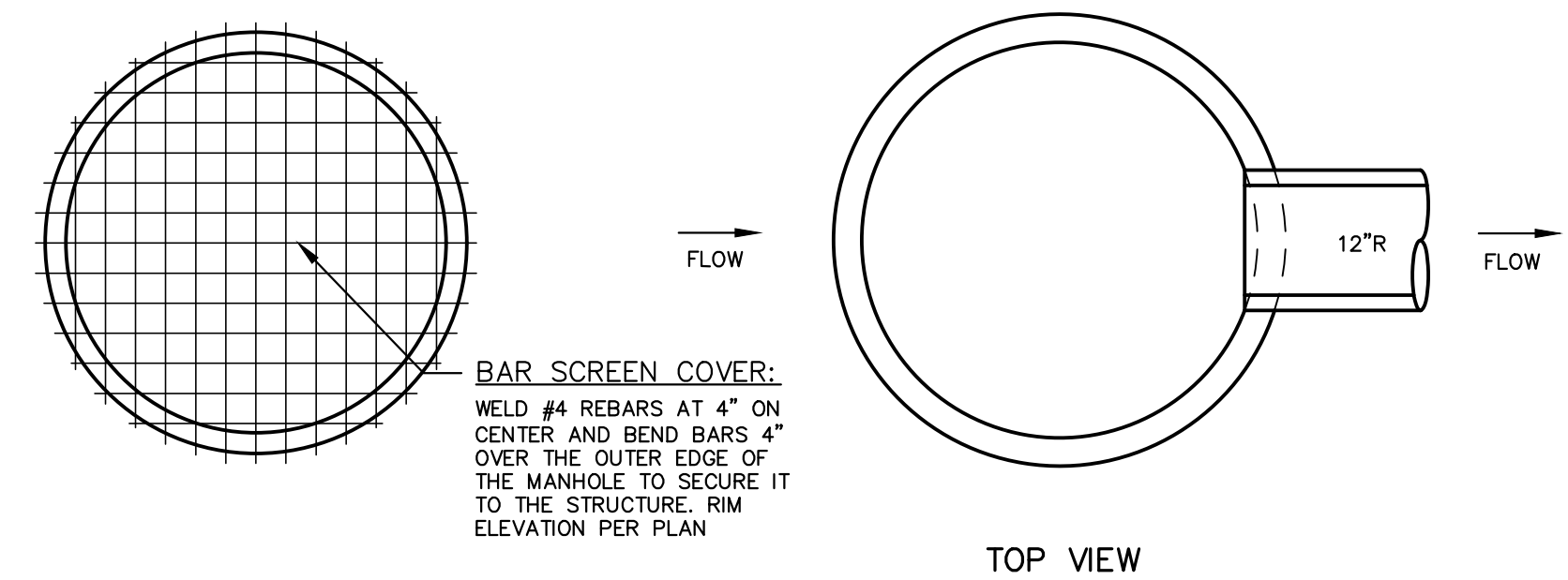
B/ Basin (GWT Elev = ±803)
 Lowest Outlet Orifice (BF Elev)
 1-foot Freeboard & Overflow Structure (T/ Basin)

Forebay Storage Information (Forebays for inlet pipes, Forebay #1)

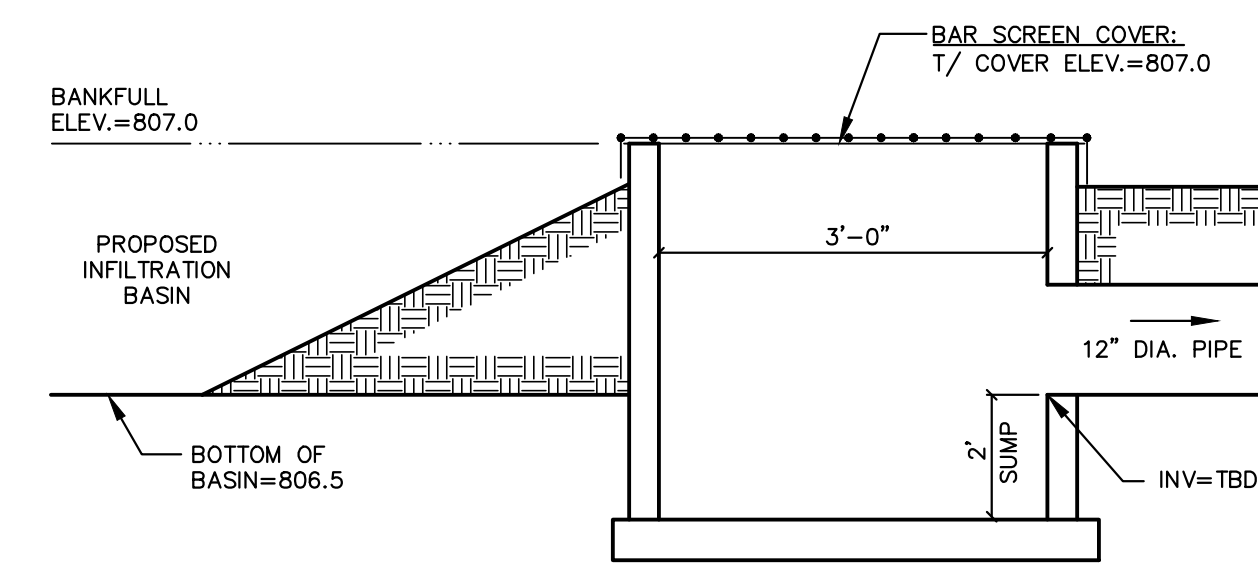
Elevation (ft)	Height (ft)	Area (sf)	Volume (cft)	Cum. Volume (cft)
806.5	-	200	-	-
807.0	0.5	285	121	121
Forebay Storage Total				121 cft
Required Forebay Storage Volume (5% Total Infil. Vol. Required)				95 cft

Storage Elevations

(adjust formulas to proper rows on basin elevations)
 Elevation for 1" event **806.95 Elevation**
 Elevation for 2-year event **807.03 Elevation**
 Elevation for 100-year event - N/A **808.79 Elevation**



FREE BOARD ELEV.=808.0



OVERFLOW STRUCTURE MANHOLE DETAIL FOR INFILTRATION BASIN

NOT TO SCALE

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2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 STORMWATER CALCULATIONS - BASIN 3

17

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NOTE
1. CONTRACTOR MAY USE CDS2015-4-C PRETREATMENT DEVICE OR APPROVED EQUAL.

PLAN VIEW B-B
N.T.S.

ELEVATION A-A
N.T.S.

CDS2015-4-C DESIGN NOTES

THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION	
GRATED INLET ONLY (NO INLET PIPE)	
GRATED INLET WITH INLET PIPE OR PIPES	
CURB INLET ONLY (NO INLET PIPE)	
CURB INLET WITH INLET PIPE OR PIPES	
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)	
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS	

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*		
INLET PIPE 2	*		
OUTLET PIPE	*		

RIM ELEVATION: *

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:
* PER ENGINEER OF RECORD

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO M 2830 (AASHTO M 308) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS2015-4-C
INLINE CDS
STANDARD DETAIL

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD BASED ON AN AVERAGE PARTICLE SIZE OF 110 MICRONS					
PEA Project ANN ARBOR, MI for SYSTEM:					
Area	0.216	acres	CDS Model	2015-4	
Weighted C	0.85		Particle size	110	microns
Tc	10	minutes	1" First Flush	0.26	cfs

Rainfall Intensity ¹ (in/hr)	Percent Rainfall Volume ²	Cumulative Rainfall Volume	Total Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	12.53%	12.53%	0.00	100.00	12.53
0.04	11.32%	23.85%	0.01	100.00	11.32
0.06	10.08%	33.93%	0.01	100.00	10.08
0.08	7.49%	41.42%	0.01	100.00	7.49
0.10	7.44%	48.86%	0.02	100.00	7.44
0.12	5.31%	54.17%	0.02	100.00	5.31
0.14	4.18%	58.35%	0.03	100.00	4.18
0.16	4.82%	63.17%	0.03	100.00	4.82
0.18	3.40%	66.57%	0.03	100.00	3.40
0.20	2.89%	69.46%	0.04	100.00	2.89
0.25	6.22%	75.68%	0.05	99.82	6.21
0.30	4.12%	79.80%	0.06	99.51	4.10
0.35	3.37%	83.17%	0.06	99.20	3.34
0.40	2.90%	86.07%	0.07	98.9	2.9
0.45	2.65%	88.72%	0.08	98.6	2.6
0.50	1.68%	90.40%	0.09	98.3	1.7
0.75	5.11%	95.51%	0.14	96.7	4.9
1.00	2.18%	97.69%	0.18	95.1	2.1
1.42	0.00%	97.69%	0.26	92.6	0.0
1.50	1.50%	99.19%	0.28	92.0	1.4
2.00	0.50%	99.69%	0.37	88.9	0.4
2.10	0.31%	100.00%	0.39	88.3	0.3
					99.36

Removal Efficiency Adjustment² = 6.5%
Predicted % Annual Rainfall Treated = 93.5%
Predicted Net Annual Load Removal Efficiency = 92.9%

1 - Based on 26 Years of Rainfall Data from NCDC Station Ann Arbor University of Michigan
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Project: Weber Property
Location: Ann Arbor, MI
Prepared For: Midwestern Consulting

Purpose: To calculate the first flush runoff flow rate (WQF) over a given site area. In this situation the WQV to be analyzed is the runoff produced by the first 1" of rainfall.

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

Given:

Structure Name	A (acres)	A (miles ²)	Runoff Coefficient	Percent Imp. (%)	t _c (min)	t _c (hr)
CDS	0.22	0.00034	0.85	91.67	10.0	0.167
		0.00000		-50.00		0.000
		0.00000		-50.00		0.000

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

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

- Compute WQV in watershed inches using the following equation:
$$WQV = P \cdot R$$

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

Structure Name	Percent Imp. (%)	R	P (in)	WQV (in)	WQV (CF)
CDS	91.67	0.875	1	0.875	698.78
0	-50.00	-0.400		0.000	
0	-50.00	-0.400		0.000	
- Compute the NRCS Runoff Curve Number (CN) using the following equation, or graphically using Figure 2-1 from TR-55 (USDA, 1986):
$$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{0.5}]$$

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

Structure Name	Q (in)	CN
CDS	0.875	98.87
0	0.000	100.00
0	0.000	100.00

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

Structure Name	I _a (in)	I/P
CDS	0.041	0.041
0		#DIV/0!
0		#DIV/0!

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

Structure Name	t _c (hr)	A (miles ²)
CDS	0.167	0.00034
0	0.167	0.00000
0	0.167	0.00000

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

Structure Name	t _c (hr)	I/P	q _u (csm/in)
CDS	0.167	0.041	856
0	0.167	#DIV/0!	
0	0.167	#DIV/0!	

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

$$WQF = (q_u)^2(A)^2(Q)$$

where: WQF = water quality flow (cfs)
q_u = unit peak discharge (cfs/m²/inch)
A = drainage area (mi²)
Q = runoff depth (watershed inches)

Structure Name	q _u (csm/in)	A (miles ²)	Q (in)	WQF (cfs)
CDS	856	0.00034	0.875	0.26
0	0	0.00000	0.000	0.00
0	0	0.00000	0.000	0.00

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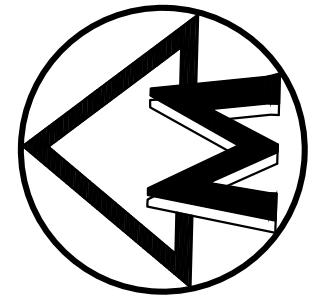
CLIENT
PETERS BUILDING COMPANY
172 S. INDUSTRIAL DRIVE
SALINE, MI 48176
JIM HAEUSSLER
734-429-4200

2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
STORMWATER PRETREATMENT DETAIL AND NOTES

18

DATE: 7/25/19	SHEET 18 OF 27	REV. DATE:	
JOB No. 16070	ADD: CDS	ENG: SFG	
REVISIONS:	PM: TJC	TECH: TES	
		1607001.dwg	

CRANBROOK (60' WIDE)

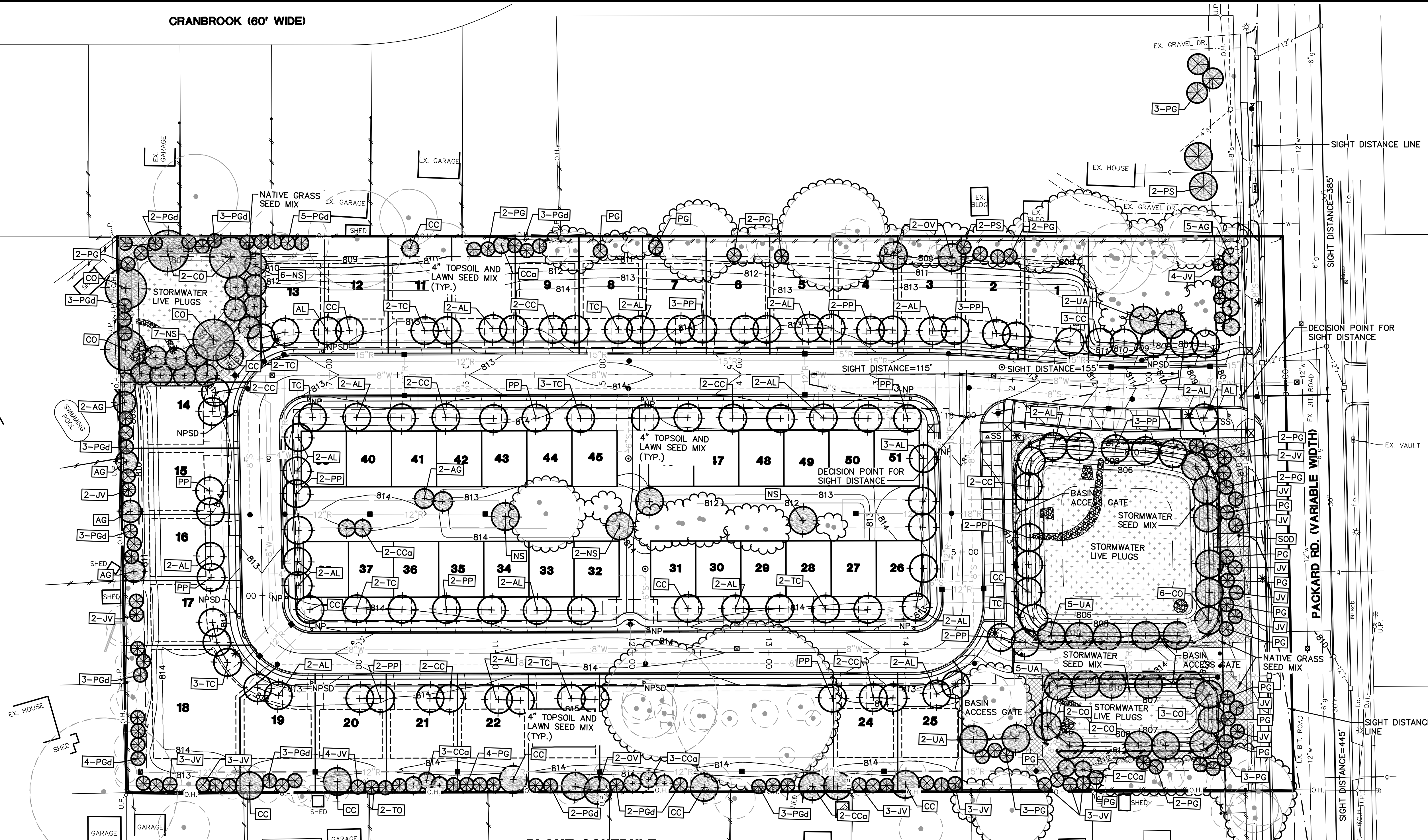


SCALE: 1" = 40'



LEGEND

- PROPOSED DECIDUOUS STREET TREE
- PROPOSED MITIGATION DECIDUOUS TREE
- PROPOSED MITIGATION EVERGREEN TREE
- PROPOSED NATIVE GRASS SEED MIX
- PROPOSED STORMWATER SEED MIX
- PROPOSED STORMWATER PLUGS
- PROPOSED SOD
- CRITICAL ROOT ZONE OF LANDMARK TREES TO REMAIN
- PRESERVED REGULATED WOODLANDS



PLANT SCHEDULE

Total	Street Tree	Screening/ Mitigation	Code	Scientific Name	Common Name	Root	Size	Spacing	Notes
Deciduous Trees									
12		12	AG	<i>Amelanchier grandiflora</i> 'brilliantissima'	Autumn Brilliance Serviceberry	B&B	8' ht	15' o.c.	Tree form (assume 2.5" cal. Eq.)
39	39		AL	<i>Amelanchier laevis</i> 'JFS Arb'	Spring Flurry Serviceberry	B&B	2" cal.	15' o.c.	Tree form
28	22	6	CC	<i>Carpinus caroliniana</i>	American Hornbeam	B&B	2.5" cal.	15' o.c.	
18		18	CO	<i>Celtis occidentalis</i>	Northern Hackberry	B&B	3"	As shown	
13		13	Cca	<i>Cercis canadensis</i> 'Ace of Hearts'	Ace of Hearts Eastern Redbud	B&B	8' ht	12' o.c.	Tree form (assume 2.5" cal. Eq.)
17		17	NS	<i>Nyssa sylvatica</i> 'Wildfire'	Wildfire Tupelo	B&B	2.5" cal.	20' o.c.	Single Stem
4		4	OV	<i>Ostrya virginiana</i>	Hop Hornbeam	B&B	2.5" cal.	20' o.c.	Single Stem
14		14	UA	<i>Ulmus americana</i> 'Frontier'	Frontier Elm	B&B	3" cal.	20' o.c.	
26	26		PP	<i>Parrotia persica</i>	Persian Parrotia	B&B	2.5" cal.	15' o.c.	
19	19		TC	<i>Tilia cordata</i> 'Chancellor'	Chancellor Linden	B&B	2" cal.	15' o.c.	
190	106	84	Total						
Evergreen Trees									
35		35	JV	<i>Juniperus virginiana</i>	Eastern Red Cedar	B&B	8' ht	10' o.c.	Full
39		39	PG	<i>Picea glauca</i>	White Spruce	B&B	8' ht	10' o.c.	Full
39		39	PGd	<i>Picea glauca</i> 'densata'	Black Hills Spruce	B&B	8' ht	10' o.c.	Full
4		4	PS	<i>Pinus strobus</i>	Eastern White Pine	B&B	8' ht	10' o.c.	Full
117	0	117	Total						

Stormwater Live Plantings - Species to be planted as a mixed composition at bottom of basin to first flush elevation

Qty	SE Basin (11,080 sf)	SW Basin (2,090 sf)	Infiltration Basin (5,075 sf)	Species	Common Name	Plant	Spacing	Notes
760	462	87	211	<i>Aster novae-angliae</i>	New England Aster	Plug	24" o.c.	Quantity per flat varies by supplier
1351	820	155	376	<i>Carex hystericina</i>	Porcupine Sedge	Plug	18" o.c.	Quantity per flat varies by supplier
1351	820	155	376	<i>Carex vulpinoidea</i>	Fox Sedge	Plug	18" o.c.	Quantity per flat varies by supplier
211	0	0	211	<i>Eupatorium maculatum</i>	Joe pye weed	Plug	24" o.c.	Quantity per flat varies by supplier
549	462	87	0	<i>Glyceria striata</i>	Fowl Manna Grass	Plug	24" o.c.	Quantity per flat varies by supplier
760	462	87	211	<i>Helenium autumnale</i>	Sneezeweed	Plug	24" o.c.	Quantity per flat varies by supplier
1351	820	155	376	<i>Juncus effusus</i>	Soft Rush	Plug	18" o.c.	Quantity per flat varies by supplier
6331	Total							

NATURAL FEATURES MITIGATION SUMMARY

MITIGATION FOR TREE AND WOODLAND REMOVALS ARE PROPOSED WITHIN THE 15 FOOT LANDSCAPE BUFFER ALONG THE PERIMETER OF THE SITE TO PROVIDE ADDITIONAL SCREENING BETWEEN THE DEVELOPMENT AND ADJACENT RESIDENTS, IN THE REAR YARD OF THE HOMES IN THE CENTRAL PORTION OF THE SITE TO PROVIDE SCREENING, AND WITHIN OPEN SPACES ON THE SITE. APPROXIMATELY 51.6% OF THE REQUIRED MITIGATION IS PROPOSED ON-SITE WITH THE REMAINDER OF THE MITIGATION TO BE PROVIDED THROUGH CONTRIBUTION TO THE CITY OF ANN ARBOR STREET TREE PLANTING FUND.

NATURAL FEATURES MITIGATION TIMING SCHEDULE

MITIGATION PLANTINGS WILL BE INSTALLED UPON COMPLETION OF CONSTRUCTION OF THE DEVELOPMENT AND PRIOR TO CONSTRUCTION OF INDIVIDUAL HOMES. STORMWATER MANAGEMENT BASINS SHALL BE CONSTRUCTED PRIOR TO INSTALLATION OF THE MITIGATION PLANTINGS.

LANDSCAPE CALCULATIONS

	Required	Proposed	
Mitigation Trees	1139'	3" cal. Deciduous = 32 trees 2.5" cal. Deciduous = 52 trees 8' ht Evergreen (3" eq) = 117 trees	96" 130." 351."
		Total	577."
		Proposed mitigation through contribution to City Street Tree Planting Fund	
		Required Mitigation (1139' - 577')	\$41,5
		2" caliper trees	271
		271 trees x \$200 per tree	\$54,200
Street Trees	1 per 30 lf (3,158lf)	Total 106 trees	
Conflicting Land Use Buffer	Not Applicable		
Vehicle Use Area	Not Applicable		
Refuse/Recycling Screening	Not Applicable - individual containers - assume stored in garages		

STREET TREE ESCROW CALCULATIONS

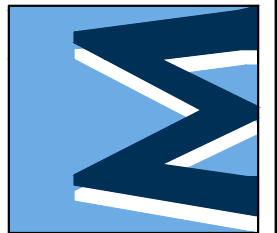
Street Tree Escrow	Packard Road - 604 linear feet x \$1.30 per linear foot = \$785.20
--------------------	--

2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
LANDSCAPE PLAN

19

JOB No. **16070**
DATE: 7/15/19
SHEET 19 OF 27
REV. DATE: 05/17/19
REV. DATE: 06/14/19
REV. DATE: 07/10/19
ADD. QTS./TES
ENG. SGT
PM. TJC
TECH. TRF
16070/PL/19wg

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M:\Civil\3d_Proj\16070\Site Plan\16070_P1.dwg, 8/29/2019 4:23 PM, Tyler E. Smith, MLLC PDF, p.3
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LANDSCAPE NOTES

- Plant materials shall be selected and installed in accordance with standards established by the Ann Arbor City Parks and Recreation Department.
- All diseased, damaged or dead material shown on the site plan as proposed plantings shall be replaced by the end of the following growing season.
- Restore disturbed areas with a minimum of four (4) inches of topsoil and then seed/fertilize/mulch.
- All disturbed areas not to be seeded with native seed mix shall be lawn areas. Fertilizer for the initial installation of lawns shall provide not less than one (1) pound of actual nitrogen per 1,000 sq ft of lawn area and shall contain not less than two percent (2%) potassium and four percent (4%) phosphoric acid.
- Lawn (turfgrass) seed mix shall consist of:
 - 15% Rugby Kentucky Bluegrass
 - 10% Park Kentucky Bluegrass
 - 40% Ruly Creeping Red Fescue
 - 15% Pennine Perennial Ryegrass
 - 20% Scalds Hard Fescue
- Seed shall be applied at a rate of five pounds (5 lbs) per 1000 sq ft. Mulch within 24 hours with two (2) tons of straw per acre, or 71 bales of excelsior mulch per acre. Anchor straw mulch with spray coating of adhesive material applied at the rate of 150 gals / acre.
- After the first growing season, only fertilizers that contain NO phosphorus shall be used on the site.
- Detention basin side slopes shall be seeded with Wet-Mastic Prairie Mix from Native Connections, or equivalent as approved by landscape architect, as noted on Landscape Plan. Seeding rates and installation techniques shall be confirmed with supplier. Seed shall be installed per manufacturer's specification via hand broadcast.
- Bottom of detention basin shall have live plantings (plugs) installed as specified on the Grading Plans. Native plugs shall be planted between March 1 and June 1 or mid-September through Mid-October. If planted outside specified time period, irrigation is required for plant establishment. Contractor shall contact nursery early in construction process to allow necessary time for nursery to grow/stock appropriate quantities of plants. (Preferred nursery - Wildtype design native plants and seeds, Ltd. Mason, MI - 517-244-1140).
- Upon installation of native plugs, vegetative establishment must be documented and approved as per the soil erosion and sedimentation control permit.
- Areas identified as Native Grass Seed Mix on the Landscape Plan shall be seeded with native grass seed mulch. Mulch within 24 hours with two (2) tons of straw per acre, or 71 bales of excelsior mulch per acre. Anchor straw mulch with spray coating of adhesive material applied at the rate of 150 gals / acre.

Botanical Name	Common Name	Application
<i>Andropogon gerardi</i>	Big Blue Stem	8 oz/acre
<i>Carex vaginosa</i>	Fox Sedge	4 oz/acre
<i>Elymus canadensis</i>	Canada Wild Rice	8 oz/acre
<i>Koeleria cristata</i>	Prairie June Grass	1 lbs/acre
<i>Panicum virgatum</i>	Switch Grass	2 lbs/acre
<i>Schizachyrium scoparium</i>	Little Blue Stem	1.5 lbs/acre
<i>Lolium multiflorum</i>	Annual Rye	200 lbs/acre

- A bi-annual, movable, semi-natural, cool-season seed mix suited for basin bottom and side slopes.
- All seeded areas with slopes less than 1:3 (one vertical foot for every 3 horizontal feet) shall be mulched with straw mulch at the rate of two (2) bales per 1,000 square feet. All seeded areas with slopes greater than 1:3 shall be seeded and biodegradable erosion control blanket North American Green SC150, or equivalent, shall be applied with biodegradable stakes.
- Deciduous plants shall be planted between March 1 and May 15 and from October 1 until the prepared soil becomes frozen. Evergreen plants shall be planted between March 1 and June 1 and from August 15 to September 15.
- Native seeding areas shall be seeded after May 1, when soil is free of frost and in workable condition, but before June 15 or after October 1, but before November 30 (or prior to ground freezing) or as approved by Landscape Architect. Annual cover crop shall be seeded until appropriate permanent seeding time.
- All planting beds are to receive four (4) inches of shredded bark mulch.
- All trees to be located a minimum of 10 feet from public utilities.
- All single trunk, deciduous trees shall have a straight and a symmetrical crown with a central leader. One sided trees or those with thin or open crowns shall not be accepted.
- All evergreen trees shall be branched fully to the ground, symmetrical in shape and have not been sheared in the last three (3) growing seasons.
- All compacted subgrade soils in proposed landscape areas shall be tilled to a minimum 12-inch depth prior to placement of topsoil, geotextile fabric, or other planting media as specified.
- Proposed deciduous trees will be planted a minimum of 15 feet apart. Proposed evergreen trees will be planted a minimum of 8 feet apart. All tree plantings shall be located a minimum of 5 feet from all utilities.
- Planting Soil: Existing, in-place or stockpiled topsoil. Supplement with imported topsoil as needed. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, soil clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments to produce planting soil.
 - Ratio of Loose Compost to Topsoil by Volume: 1:4.
 - Weight of Lime per 1000 Sq. Ft.: Amend with lime only on recommendation of soil test to adjust soil pH.
 - Weight of Sulfur or Aluminum Sulfate per 1,000 Sq. Ft.: Amend with sulfur or aluminum sulfate only on recommendation of soil test to adjust soil pH.
 - Volume of Sand: Amend with sand only on recommendation of Landscape Architect to adjust soil texture.
 - Weight of Slow-Release Fertilizer per 1,000 Sq. Ft.: Amend with fertilizer only on recommendation of soil test to adjust soil fertility.
- At the time of plant and seed delivery for the detention basins, including native seed and live plantings, a Washtenaw County Water Resource Commissioner landscape reviewer must be present. Contact: Cassie Wytchak at wytchakc@washtenaw.org or 734-222-6813 to coordinate.
- During the establishment period for the installed deciduous mitigation trees (1-2 years as to be determined by certified arborist):
 - The trunk of young trees shall be wrapped in late autumn and wrap shall be removed in early spring.
 - Burlap screening or wrapping shall be installed on the southwest and windward sides from late autumn to early spring.
 - Trees shall be watered in spring and autumn and during dry conditions at a frequency determined by certified arborist.
 - Mulching around trees shall be maintained at a depth of 2 to 3 inches.



Native Connections

17080 Hoshal Rd, Three Rivers, MI 49093
 (P) 269.580.4765 • (F) 269.273.1367
info@nativeconnections.net
www.nativeconnections.net

Stormwater Mix

An economical mix designed to tolerate the low water quality and highly variable conditions often associated with stormwater features. Most species will tolerate mesic to wet hydrology with others thriving in the wettest and driest ends of the spectrum. Approximately half of the species are salt tolerant. The high seed count and heavy cover crop in this mix ensures full and aggressive establishment in a wide range of soils.

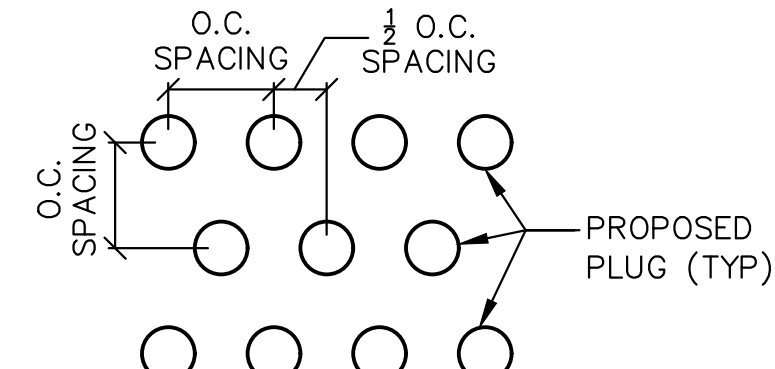
Total Seeding Rate: 40 lbs per acre
 2.5 lbs grasses • 1.5 lbs forbs
 101 seeds per sq ft
 30 lbs seed oats • 6 lbs annual ryegrass

1/4 acre\$400
 1/2 acre\$505
 1 acre\$796

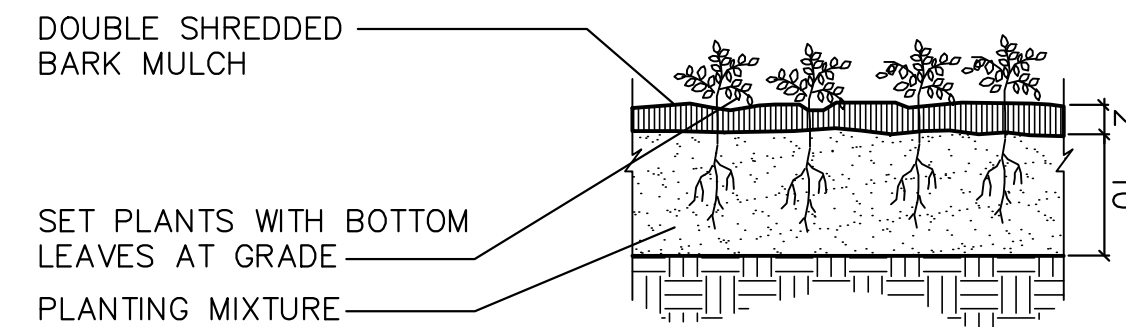
Grasses, Sedges & Rushes	PLS Ounce/Acre	
<i>Carex bebbii</i>	Bebb's oval sedge	1.75
<i>Carex vulpinoidea</i>	Fox Sedge	2.00
<i>Eleocharis palustris</i>	Great Spike Rush	1.00
<i>Elymus virginicus</i>	Virginia Wild Rye	16.00
<i>Juncus effusus</i>	Soft Rush	0.50
<i>Juncus tenuis</i>	Path Rush	0.50
<i>Juncus torreyi</i>	Torrey's Rush	0.25
<i>Panicum virgatum</i>	Switchgrass	8.00
<i>Scirpus pungens</i>	Three square Rush	1.00
<i>Scirpus validus</i>	Soft-stem Bulrush	1.00
<i>Sorghastrum nutans</i>	Indian Grass	8.00
Total PLS Oz per Acre		40.00

Forbs	PLS Ounce/Acre	
<i>Alisma subcordatum</i>	Common Water Plantain	1.00
<i>Asclepias incarnata</i>	Swamp Milkweed	1.50
<i>Aster novae-angliae</i>	New England Aster	0.50
<i>Aster umbellatus</i>	Flat-topped Aster	0.50
<i>Bidens cernua</i>	Nodding Bur Marigold	1.00
<i>Echinacea purpurea</i>	Purple Coneflower	2.50
<i>Helenium autumnale</i>	Sneezeweed	1.00
<i>Liatris spicata</i>	Marsh Blazingstar	1.00
<i>Lycopus americanus</i>	Water Horehound	0.50
<i>Mimulus ringens</i>	Monkey Flower	0.25
<i>Monarda fistulosa</i>	Wild Bergamot	0.60
<i>Oenothera biennis</i>	Common Evening Primrose	2.20
<i>Pentstemon sedoides</i>	Ditch Stonecrop	0.40
<i>Physostegia virginiana</i>	Obedient Plant	0.50
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	1.25
<i>Rudbeckia hirta</i>	Black-eyed Susan	2.50
<i>Verbena hastata</i>	Blue Vervain	2.80
<i>Zizia aurea</i>	Golden Alexander	4.00
Total PLS Oz per Acre		24.00

NOTE: ECHINACEA PURPUREA SHALL BE REMOVED FROM THE SEED MIX.



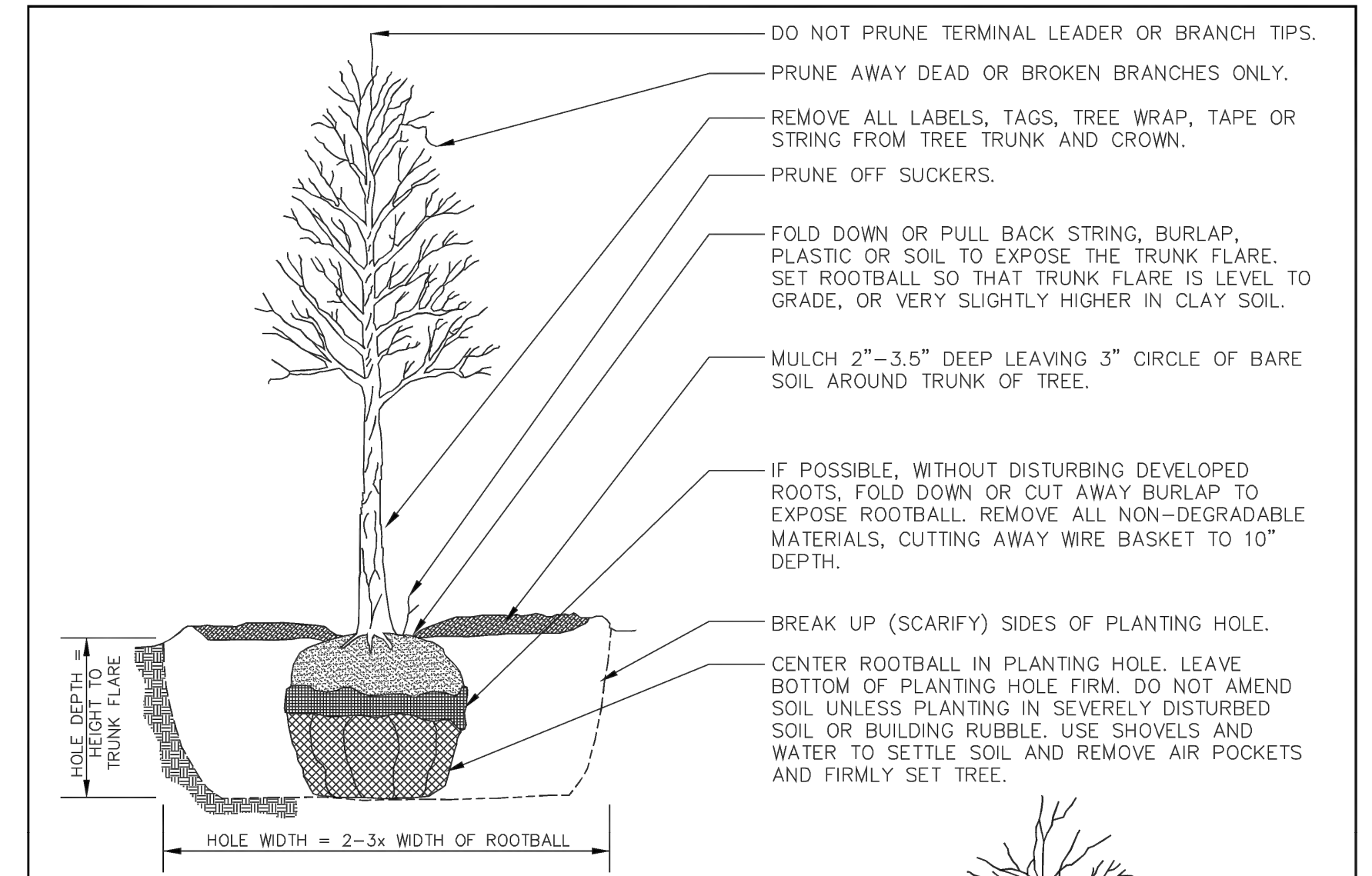
PLANT PLUG SPACING DETAIL



- HERBACEOUS PLANTS SHOULD BE PEAT POT GROWN. PLANT PLUG WITH PEAT POT INTACT.
- HERBICIDES SHALL NOT BE USED WITHIN THE BIO-RETENTION AREA TO REMOVE EXISTING WEED GROWTH.
- FERTILIZERS SHALL NOT BE USED WITHIN THE BIO-RETENTION AREA.
- PLANTING SHALL TAKE PLACE IMMEDIATELY AFTER PREPARATION.
- LAYOUT OF SPECIES SHALL BE A MIXED COMPOSITION THROUGHOUT THE SPECIFIED PLANTING AREA. SEE PLANT SCHEDULE FOR SPACING FOR EACH SPECIES.
- PLANTING MIXTURE SHALL CONSIST OF 30% COMPOST MIXED WITH EXISTING, IN-PLACE OR STOCKPILED TOPSOIL. COMPOST SHALL BE PURCHASED FROM WEARE ORGANICS OR EQUIVALENT. PERMEABLE SOIL SHALL MEET INFILTRATION REQUIREMENTS SET FORTH BY WASHTENAW COUNTY WATER RESOURCES COMMISSIONER OFFICE.

PLUG PLANTING DETAIL

NOT TO SCALE

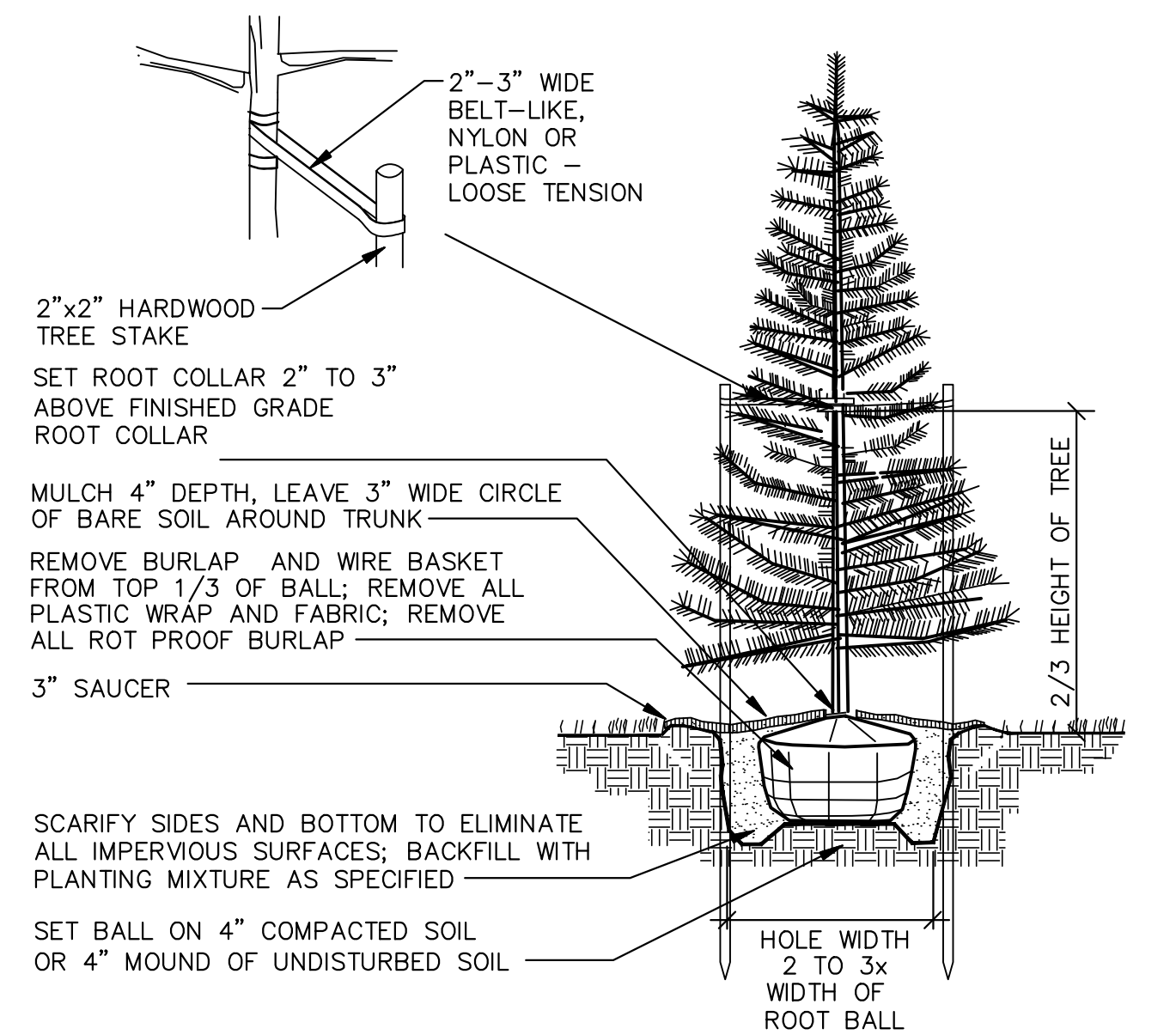


DO NOT STAKE UNLESS IN HEAVY CLAY SOIL, WINDY CONDITIONS, 3" OR GREATER DIAMETER TREE TRUNK OR LARGE CROWN. IF STAKING IS NEEDED DUE TO THESE CONDITIONS:

- STAKE WITH 2 x 2 HARDWOOD STAKES, OR APPROVED EQUIV., DRIVEN 6"-8" OUTSIDE OF ROOTBALL.
- LOOSELY STAKE TREE TRUNK TO ALLOW FOR TRUNK FLEXING.
- STAKE TREES JUST BELOW FIRST BRANCH WITH 2"-3" WIDE BELT-LIKE, NYLON OR PLASTIC STRAPS (2 PER TREE ON OPPOSITE SIDES OF TREE, CONNECT FROM TREE TO STAKE HORIZONTALLY. DO NOT USE ROPE OR WIRE THROUGH A HOSE.)
- REMOVE ALL STAKING MATERIALS AFTER 1 YEAR.

REVISIONS				
REV. NO.	DR. BY	CH. BY	DATE	
PUBLIC SERVICES DEPARTMENT				
CITY OF ANN ARBOR				
TREE PLANTING DETAIL				
DR. BY	ARG	CH. BY	CSS	DRAWING NO.
SCALE	NONE	DATE	7-23-10	SD-L-3
INCH				SHEET NO. OF

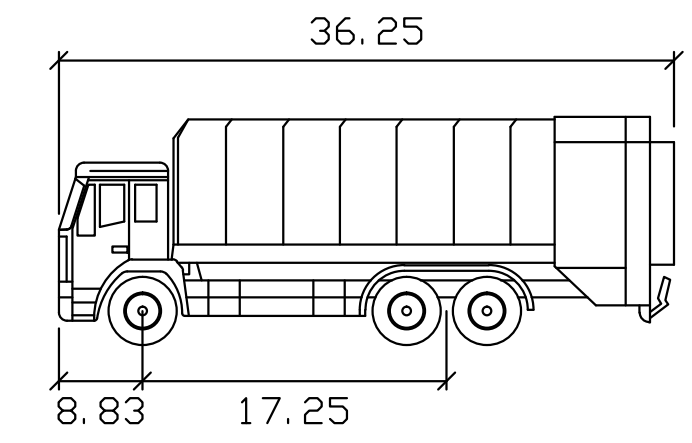
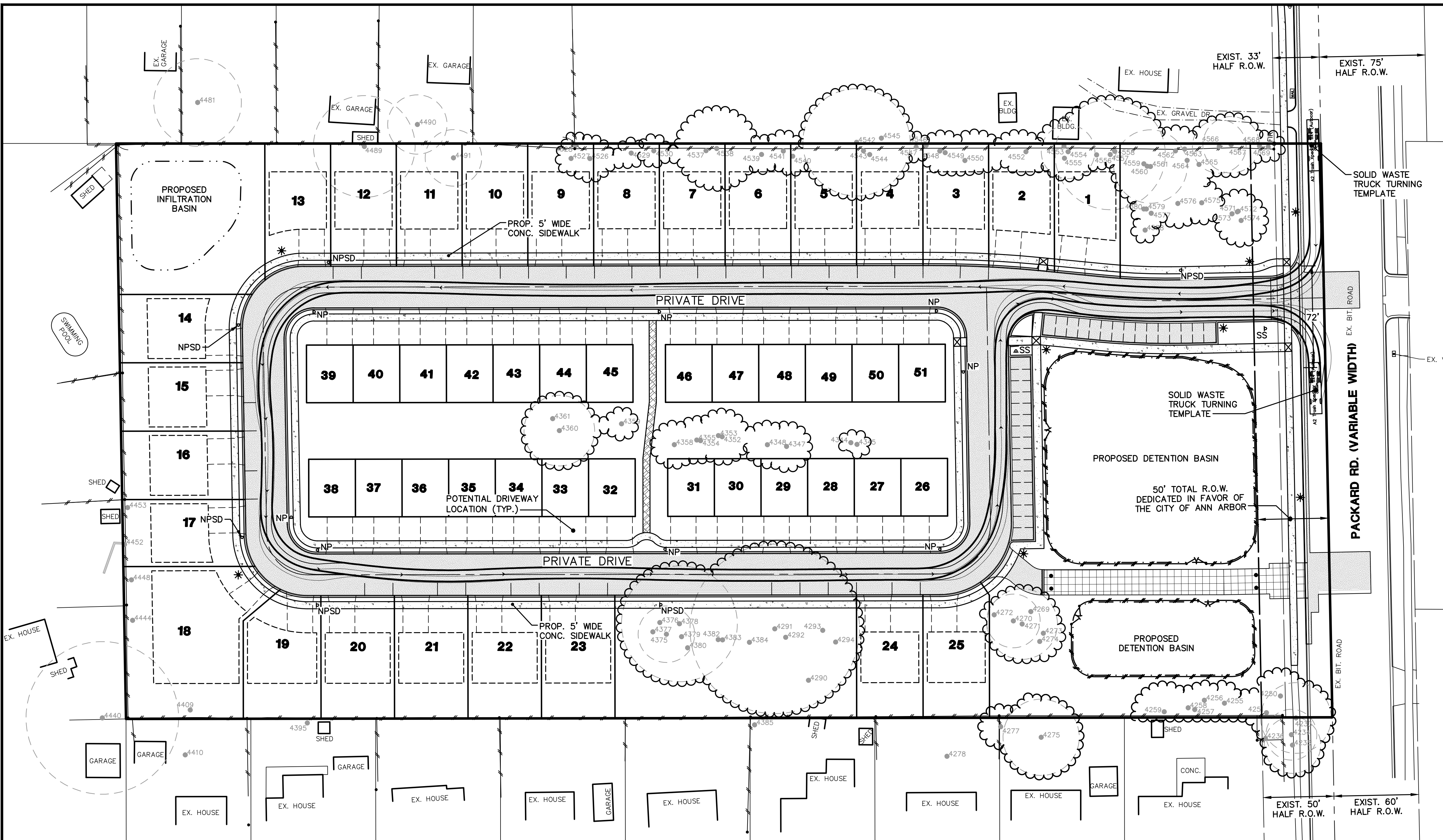
NOTE: REMOVE STAKING/GUYING MATERIAL AFTER ONE YEAR.



EVERGREEN TREE PLANTING DETAIL

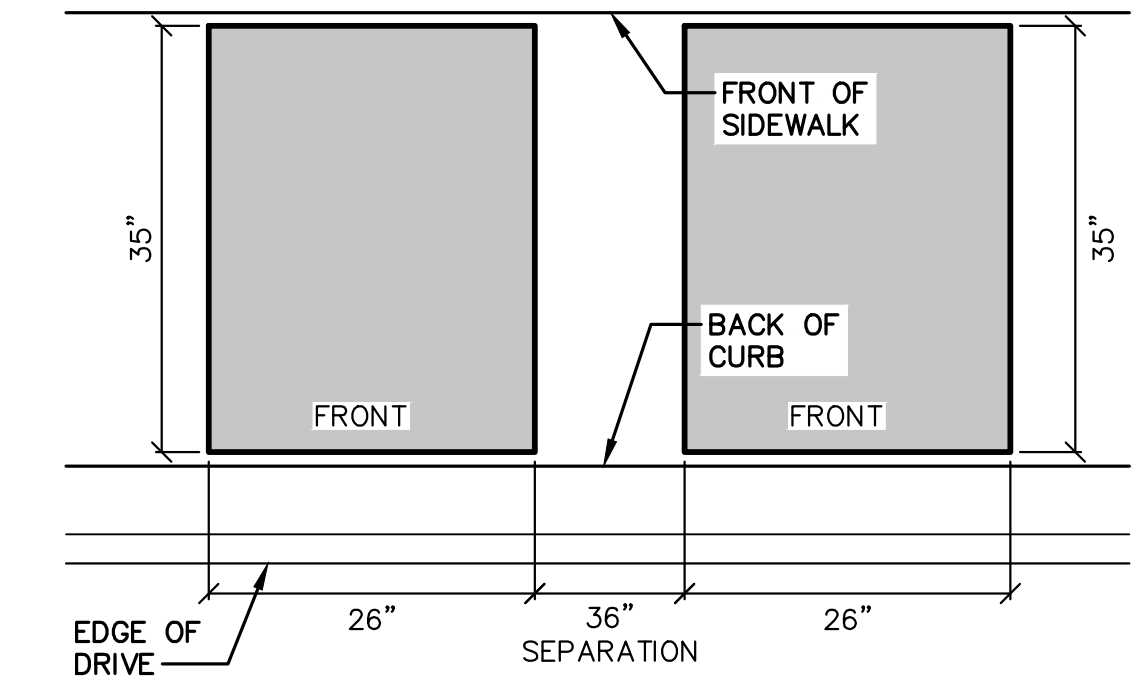
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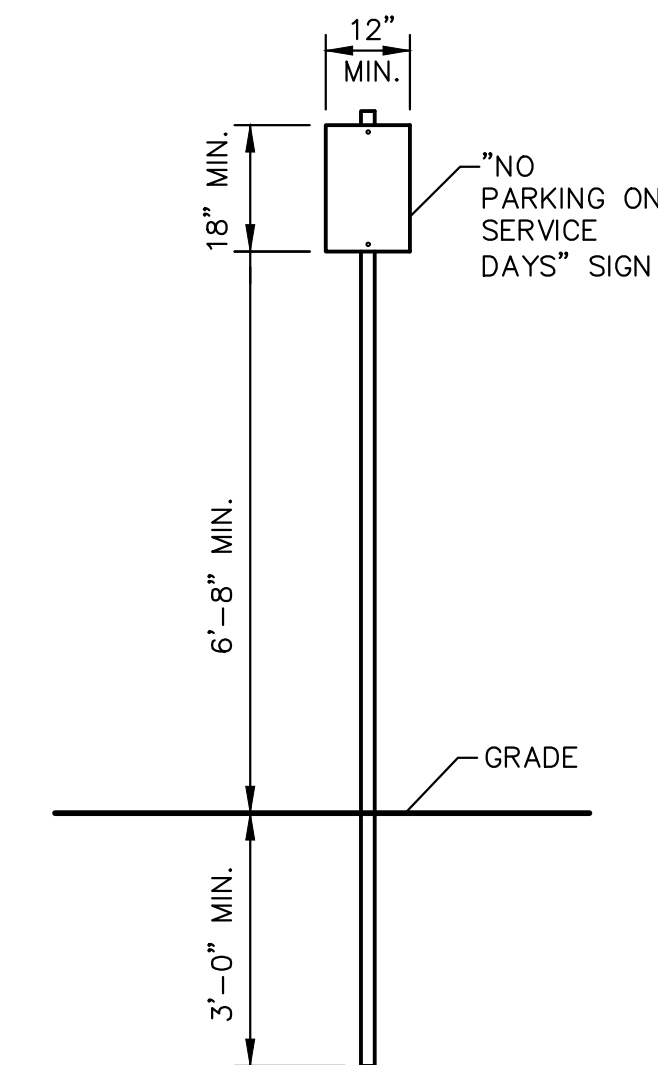
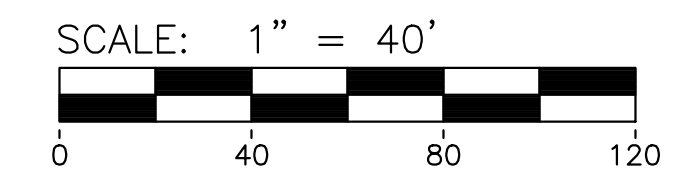
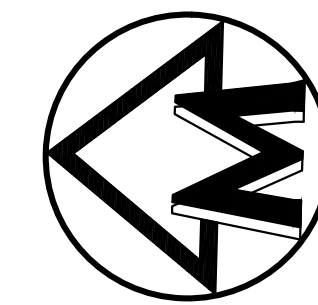


Refuse Vehicle
feet
Width : 8.42
Track : 8.00
Lock to Lock Time : 6.0
Steering Angle : 31.8

SOLID WASTE TRUCK DETAIL
(NOT TO SCALE)



TYPICAL REFUSE CONTAINERS POSITIONED ALONG CURB FOR PICKUP
(NOT TO SCALE)



NO PARKING ON SERVICE DAYS SIGN DETAIL

NOT TO SCALE

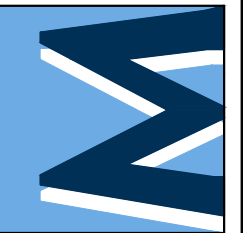
NOTES

- TRASH AND RECYCLING WILL BE PICKED UP PER INDIVIDUAL HOME BY WASTE AND RECYCLING SERVICES.
- "NO PARKING ON SERVICE DAYS" SIGN SHALL BE INSTALLED ON PARALLEL SIDE OF STREET.

LEGEND

- PROP. ASPHALT PAVEMENT
- PROP. 4" CONCRETE SIDEWALK
- PROP. 6" CONCRETE PAVEMENT
- PROP. 6" CONCRETE PAVEMENT FOR EMERGENCY ACCESS
- PRESERVED REGULATED WOODLANDS
- PRESERVED LANDMARK TREES
- PROPOSED "NO PARKING/FIRE LANE" SIGN
- PROPOSED "STOP" SIGN (R1-1)
- PROPOSED "NO PARKING ON SERVICE DAYS" SIGN
- PROPOSED LIGHT POLE
- NUMBER OF STANDARD PARKING SPACES IN ROW
- NUMBER OF SMALL CAR PARKING SPACES IN ROW

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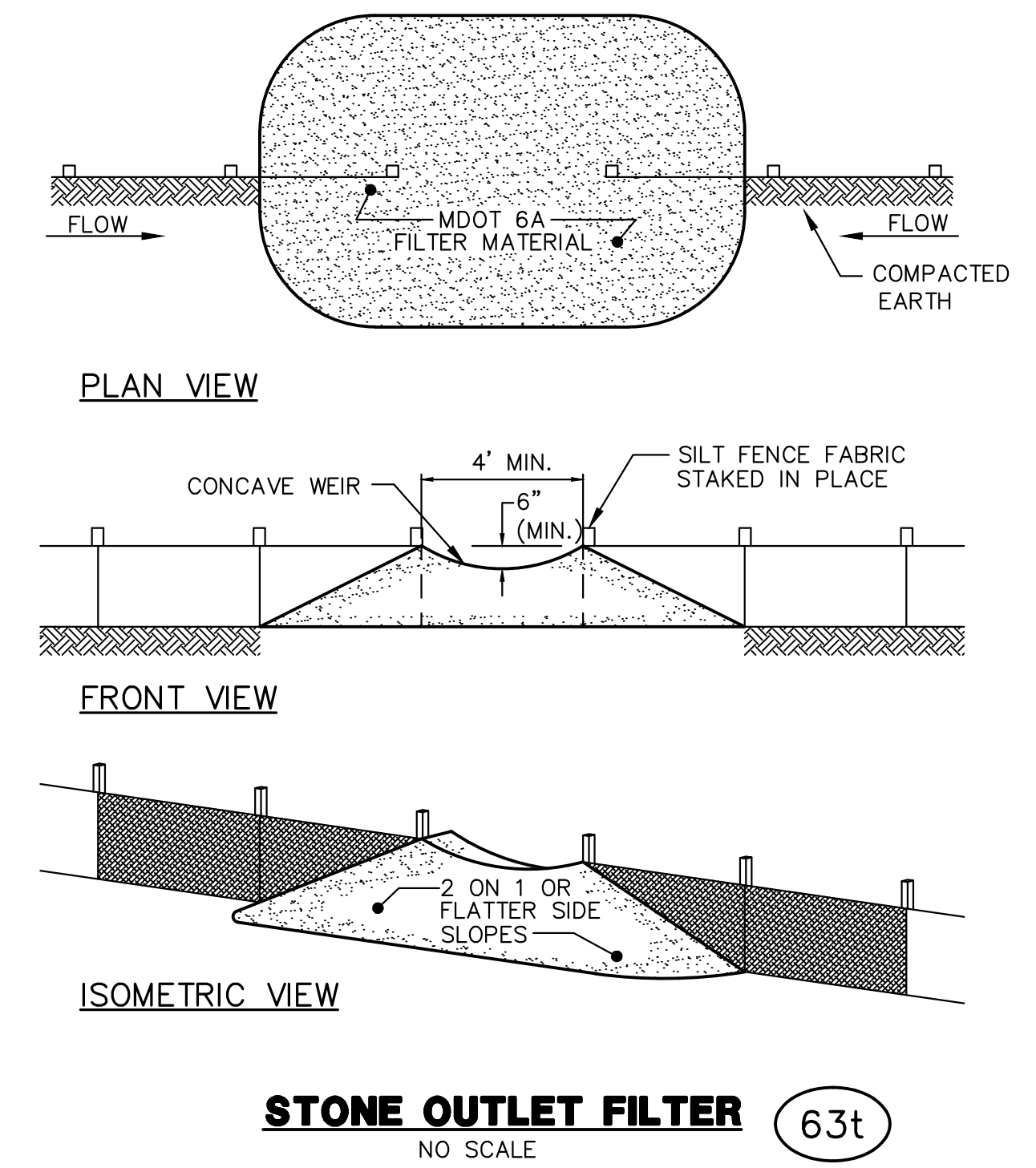
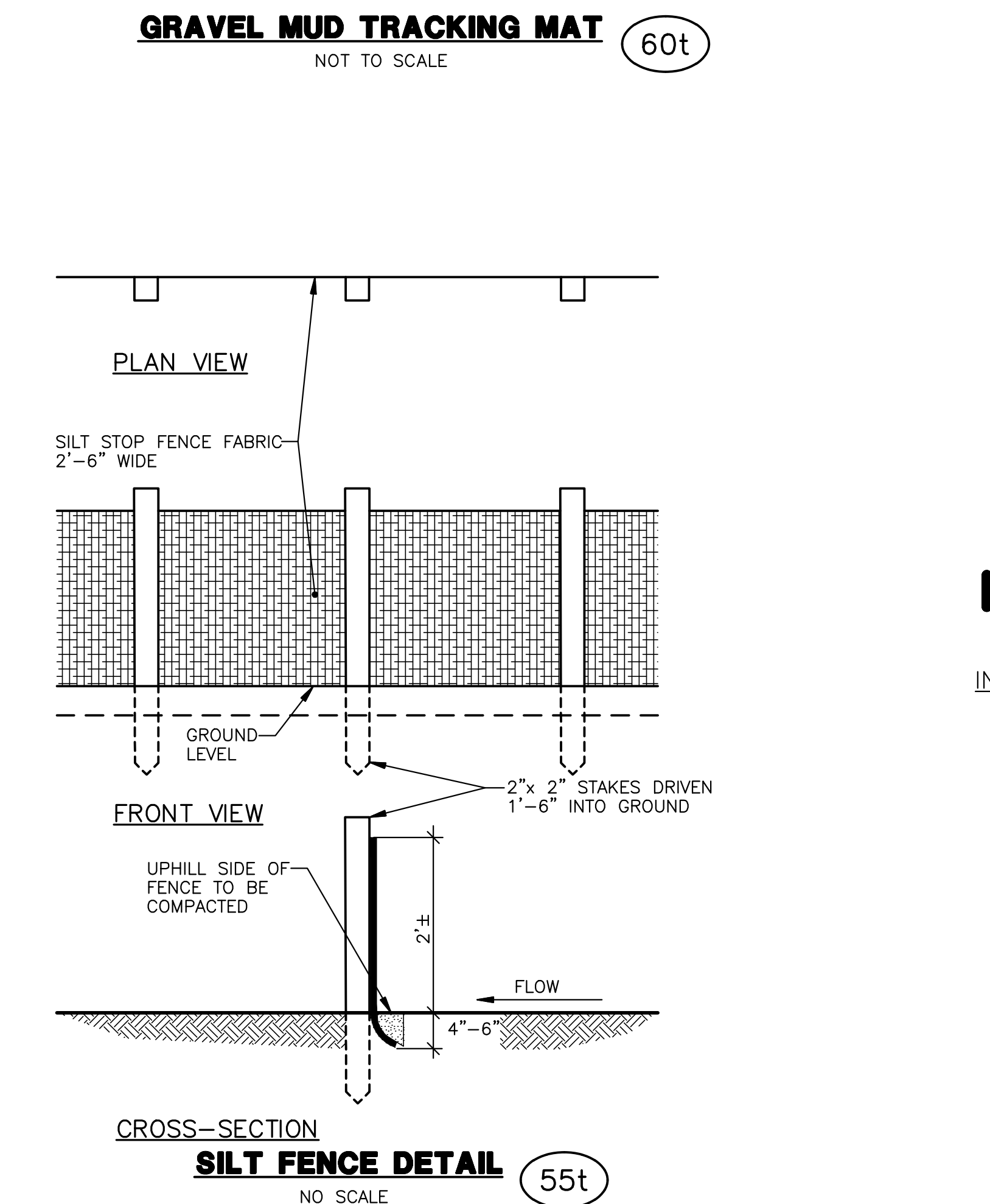
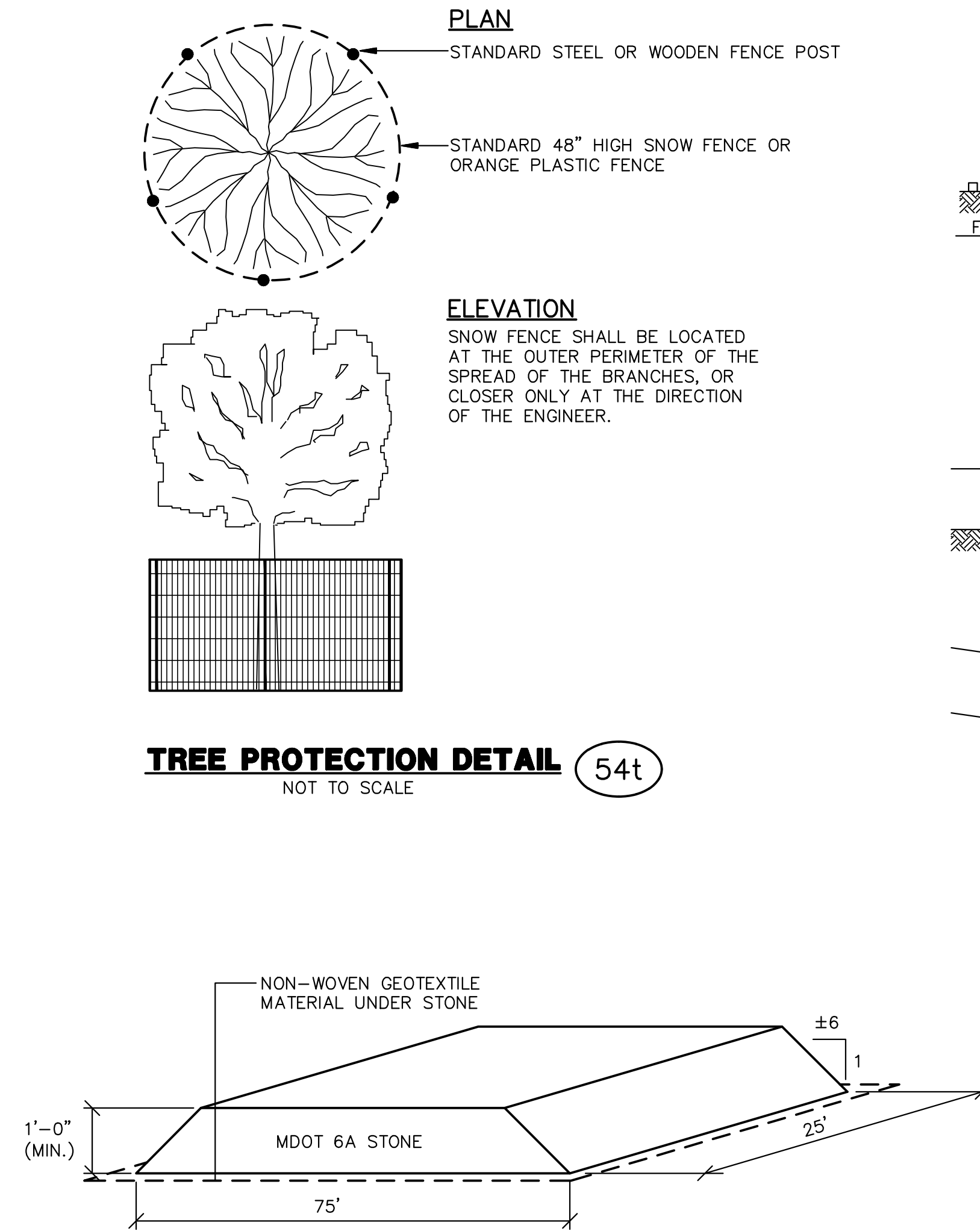
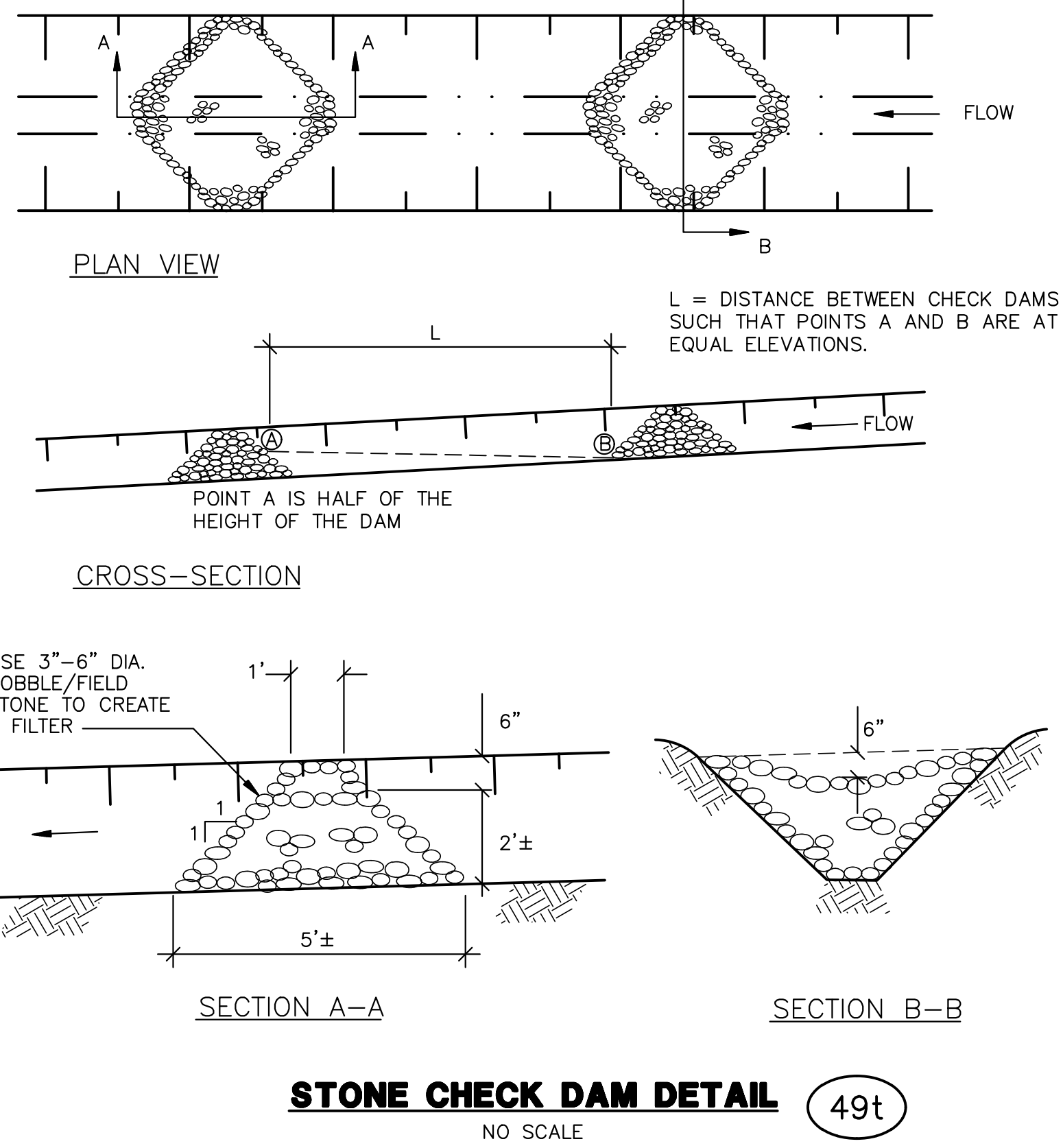
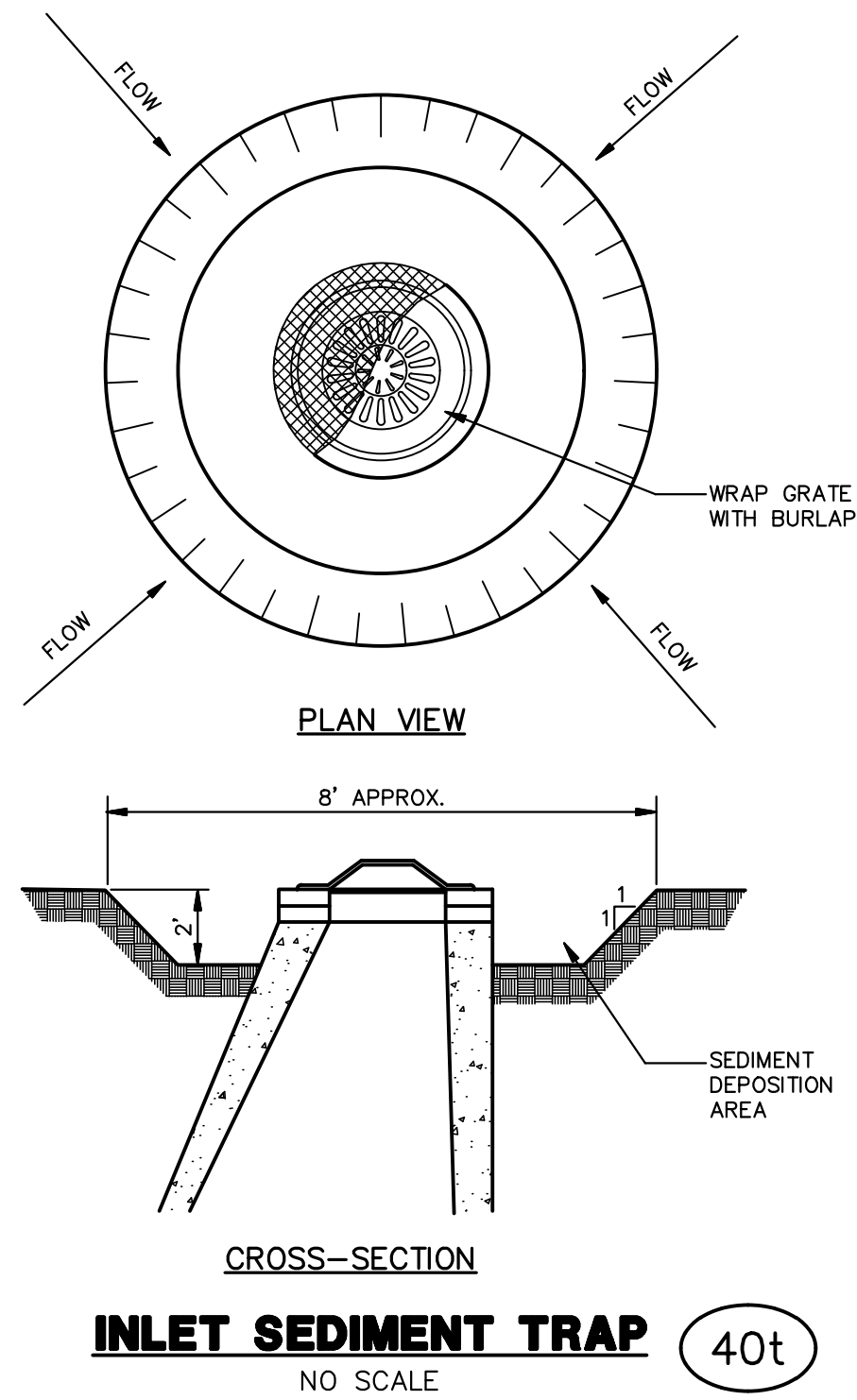
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2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
SOLID WASTE PLAN

22

JOB No.	16070
DATE	4/25/19
SHEET	22 OF 27
REV. DATE	
ADD: CTS	
ENG: SGT	
PM: TJC	
TECH: TES	
16070SW1.dwg	

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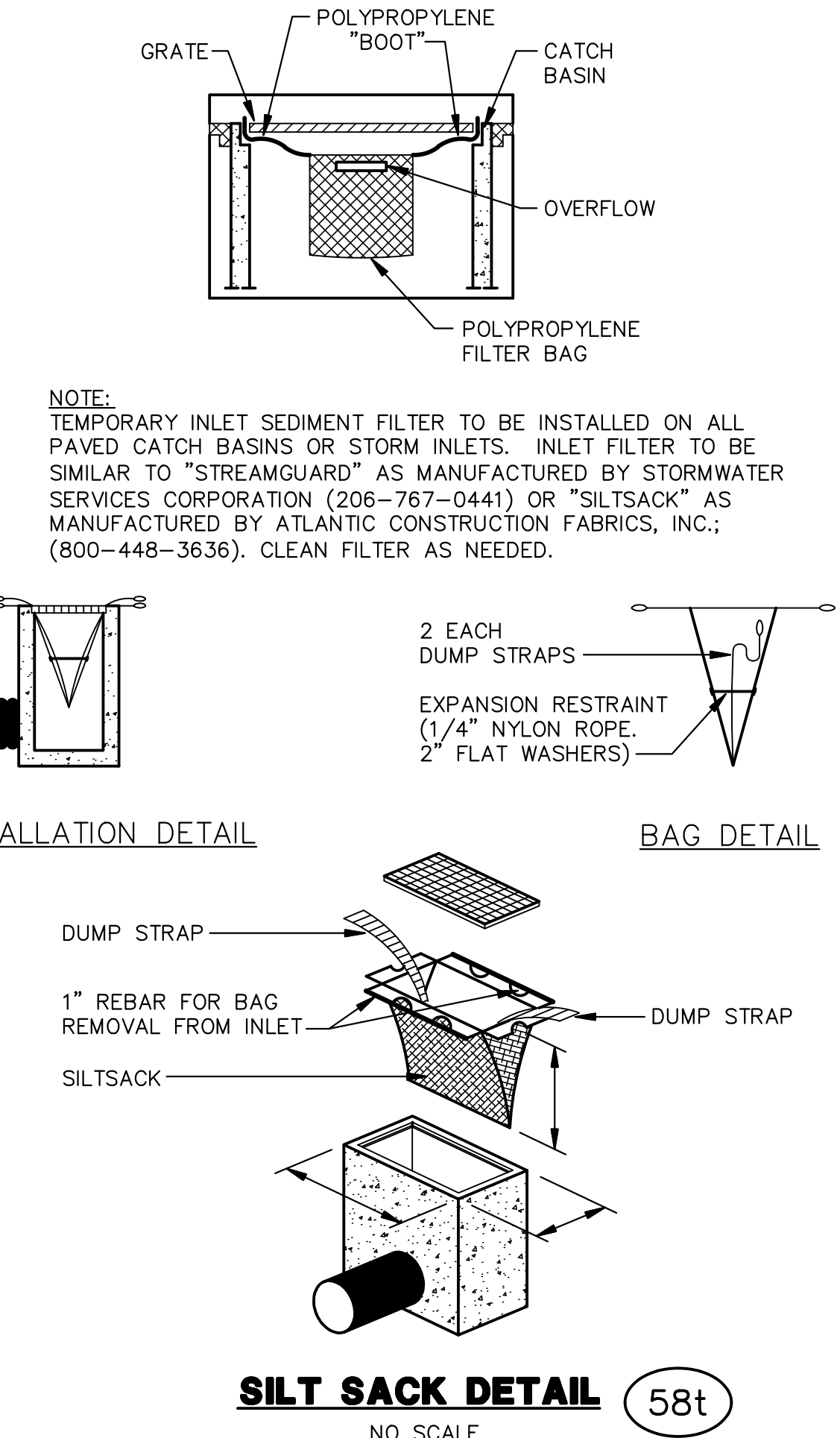


PERMANENT MAINTENANCE TASKS, SCHEDULE AND BUDGET

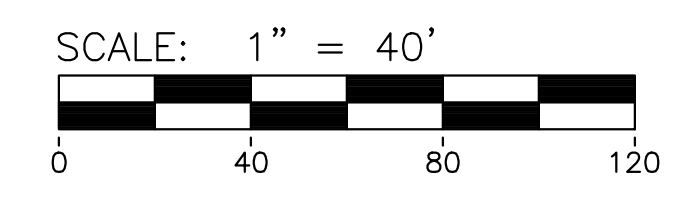
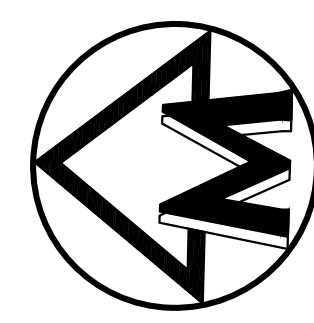
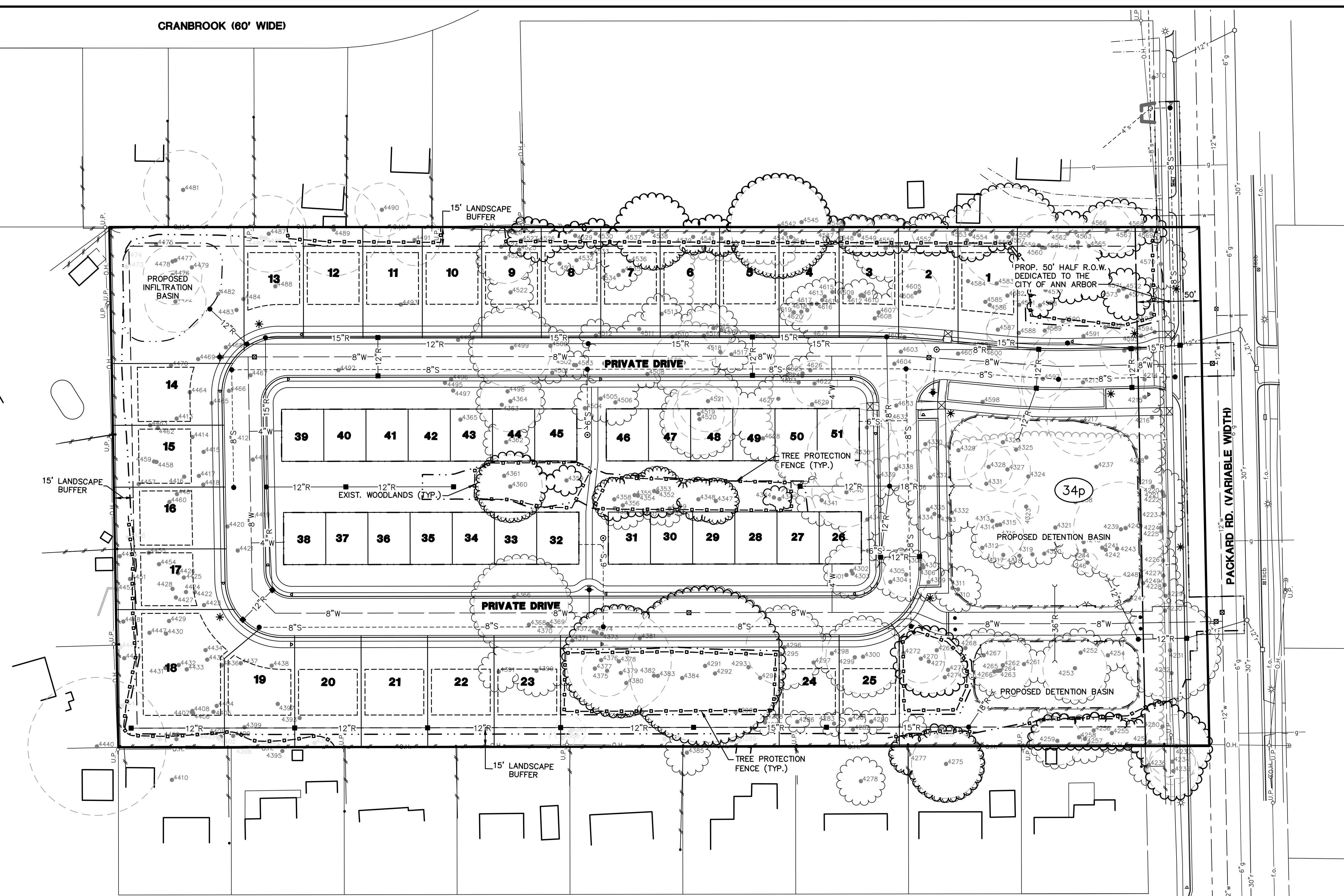
TASKS	Storm Sewer System	Catch Basin Sumps	Catch Basin Castings	Ditches & Swales	Detention Basin	Emergency Overflow	Schedule	Project Cost
Inspect for sediment accumulation	X	X		X	X		annually	\$100
Removal of sediment accumulation	X	X		X	X		every 2 yrs as needed	\$500
Inspect for floatables and debris			X	X	X		annually	\$50
Cleaning of floatables and debris			X	X	X		as needed	\$100
Inspect for erosion				X	X	X	as needed	\$100
Reestablish permanent vegetation on eroded slopes				X	X	X	as needed	\$100
Inspect structural elements during wet weather and compare to as-built plans (by a professional engineer reporting to the owner)					X	X	annually	\$100
Inspect stormwater system components during wet weather and compare to as-built plans (by professional engineer reporting to Washtenaw County.)	X	X	X	X	X	X	annually	\$100
Make adjustment or replacements as determined by annual wet weather inspection	X	X	X	X	X	X	as needed	\$250
Keep records of all inspections and maintenance activities and report to Washtenaw County.							annually	\$50

STORMWATER MANAGEMENT SYSTEM MAINTENANCE NOTES:

- The Contractor shall implement and maintain the soil erosion control measures as shown on the SESC Plans at all times during construction on this project. Following construction, it will be the responsibility of the Condominium Association to perform the maintenance. Any modifications or additions to the soil erosion control measures due to construction or changed conditions, shall be complied with as required or directed by the owner, project engineer, or Washtenaw County.
- Daily inspections shall be made by the Contractor. Periodic inspections may be made by the Owner/Project Engineer/County to determine the effectiveness of erosion and sedimentation control measures. Any necessary corrections shall be made without delay by the onsite responsible individual.
- The Contractor shall be responsible for maintaining all temporary soil erosion control measures and removal of some upon authorized completion of project. Completion of project will not be authorized until all site work, home building, road work, and utility construction is complete and all soils are stabilized.
- No chemicals are allowed in storm water features or buffer zones with the following exception: invasive species may be treated with chemicals by a certified applicator. In addition, mowing of storm water features is only allowed twice per year.



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NOTES.

1. REFER TO EXISTING CONDITIONS AND NATURAL FEATURES PLAN AND TREE LIST FOR ADDITIONAL INFORMATION ON EXISTING ON-SITE NATURAL FEATURES.
2. REFER TO GRADING PLAN AND CROSS-SECTION SHEET FOR CROSS-SECTION OF PROPOSED DEVELOPMENT.
3. REFER TO ALTERNATIVE ANALYSIS SHEETS FOR NATURAL FEATURES ALTERNATIVE ANALYSIS.
4. REFER TO LANDSCAPE PLAN FOR PROPOSED NATURAL FEATURES MITIGATION PLANTINGS AND MITIGATION CALCULATIONS.
5. REFER TO NATURAL FEATURES MAINTENANCE PLAN FOR TREE PROTECTION DURING CONSTRUCTION AND POST-CONSTRUCTION TREE MAINTENANCE.

LEGEND

81.3	EXIST. CONTOUR	---s---	EXIST. SANITARY SEWER
813.2	EXIST. SPOT ELEVATION	⊥	SIGN
U.P.	EXIST. UTILITY POLE	⊥	MAILBOX
OH	EXIST. OVERHEAD UTILITY LINE	⊥	TELEPHONE RISER
guy	GUY WIRE	⊥	ELECTRIC METER
l	EXIST. LIGHT POLE	⊥	GAS METER
t	EXIST. TELEPHONE LINE	⊥	TRAFFIC SIGNAL CONTROL BOX
e	EXIST. ELECTRIC LINE	⊥	POST
g	EXIST. GAS LINE	⊥	WELL
f.o.	EXIST. FIBER OPTIC LINE	⊥	FENCE
w	EXIST. WATER MAIN	⊥	SINGLE TREE
h	EXIST. HYDRANT	⊥	TREE OR BRUSH LIMIT
g	EXIST. GATE VALVE IN BOX	⊥	EXIST. REGULATED WOODLANDS
g	EXIST. GATE VALVE IN WELL	⊥	REGULATED WOODLANDS TO REMAIN
x	EXIST. CURB STOP & BOX	⊥	LIMITS OF DISTURBANCE
r	EXIST. STORM SEWER	⊥	TREE PROTECTION FENCE
□	EXIST. CATCH BASIN OR INLET	⊥	

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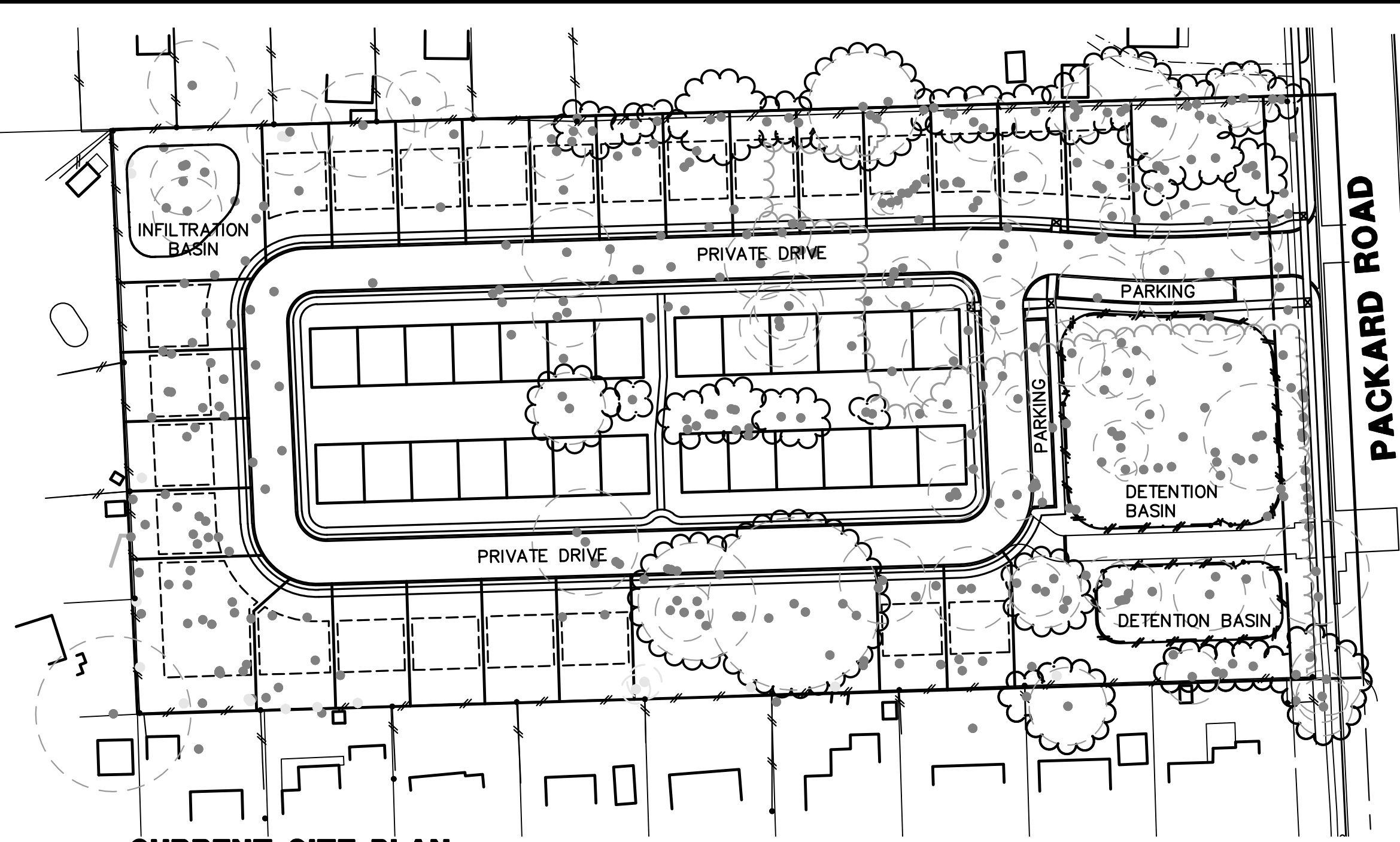
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2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
NATURAL FEATURES OVERLAY PLAN

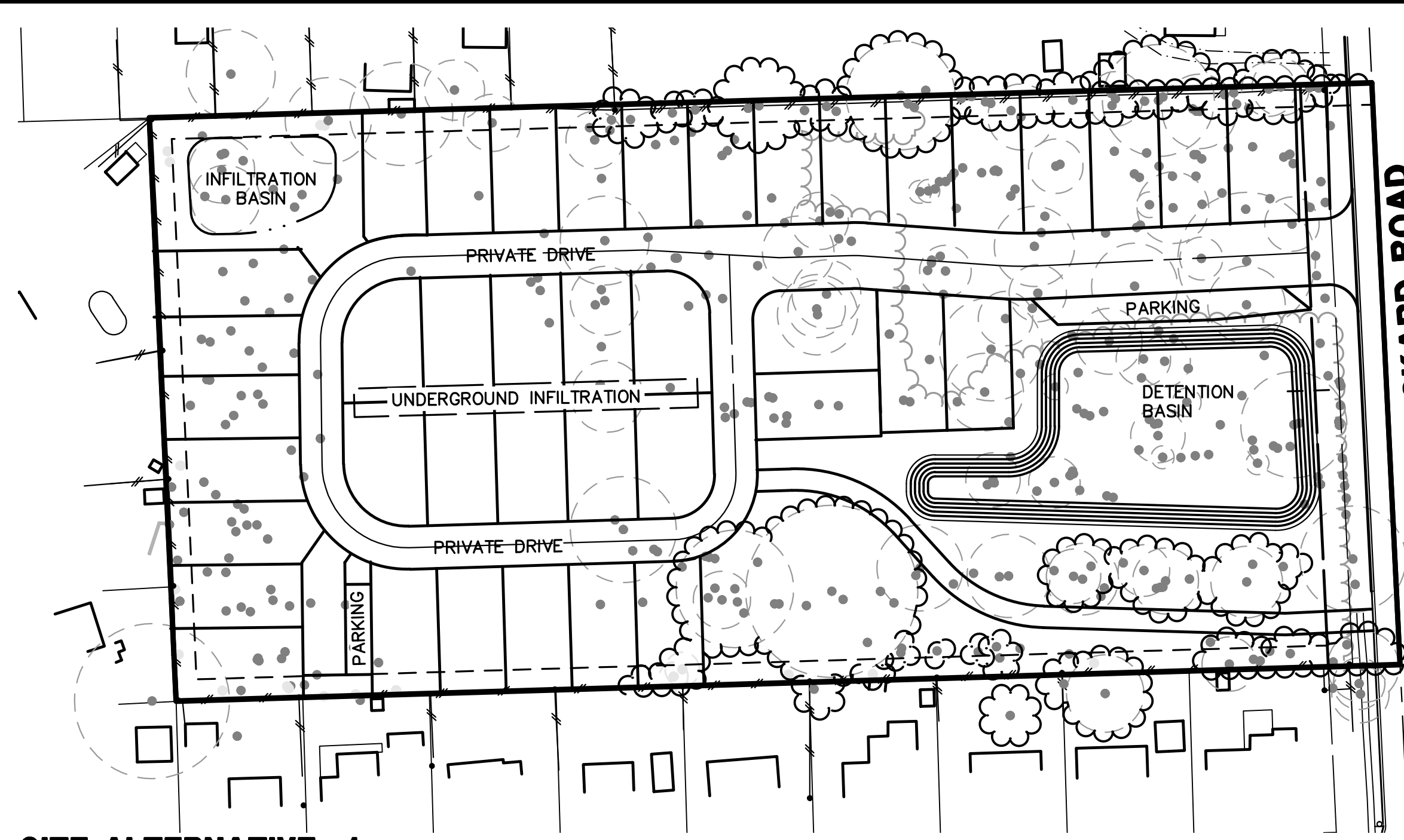
25

JOB No.	16070
DATE	7/25/19
SHEET	25 OF 27
REV. DATE	05/31/19
ADD. CTS/DES	06/14/19
ENG. SGT	
PK. TJC	
TECH. TRF	
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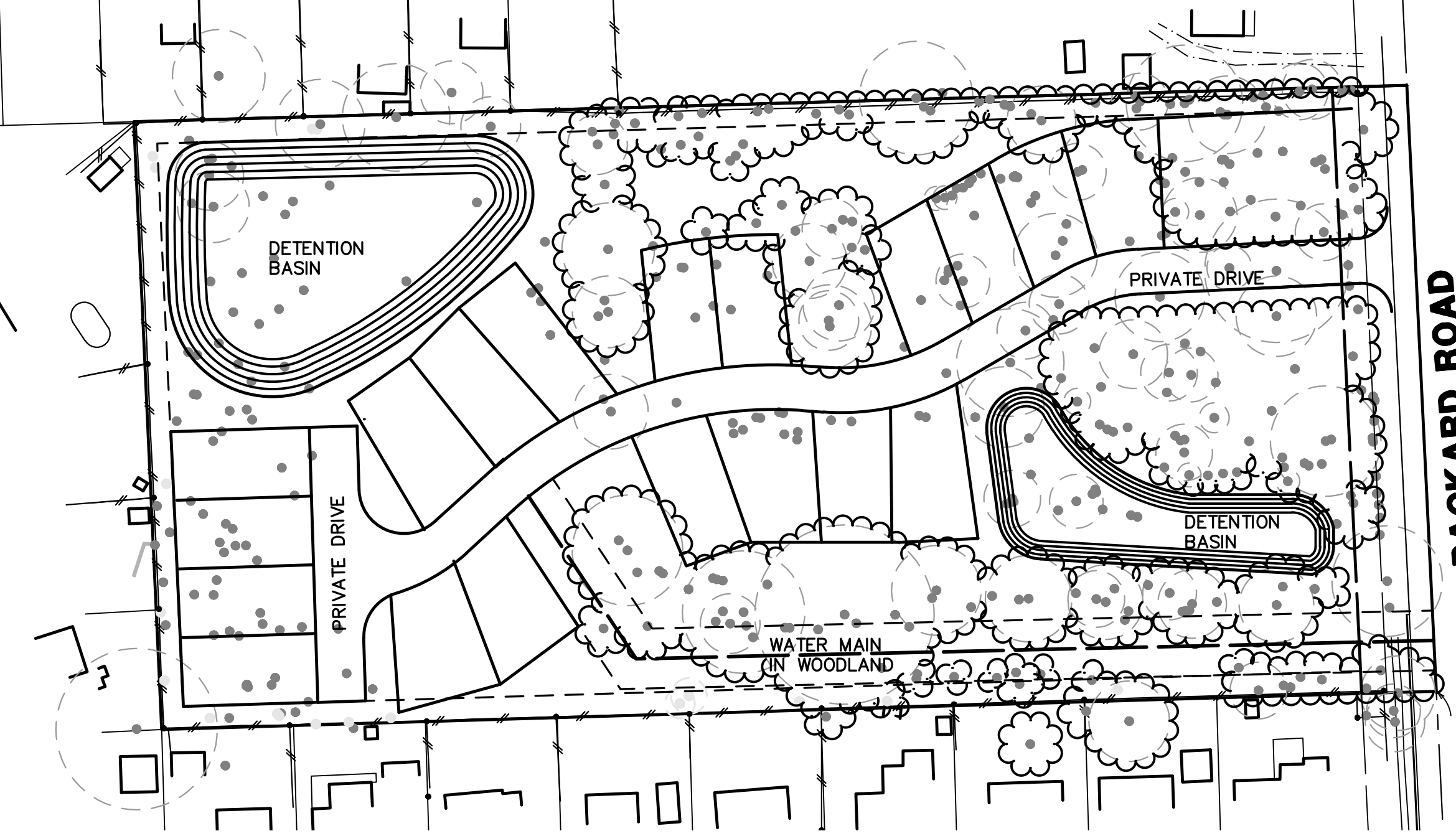
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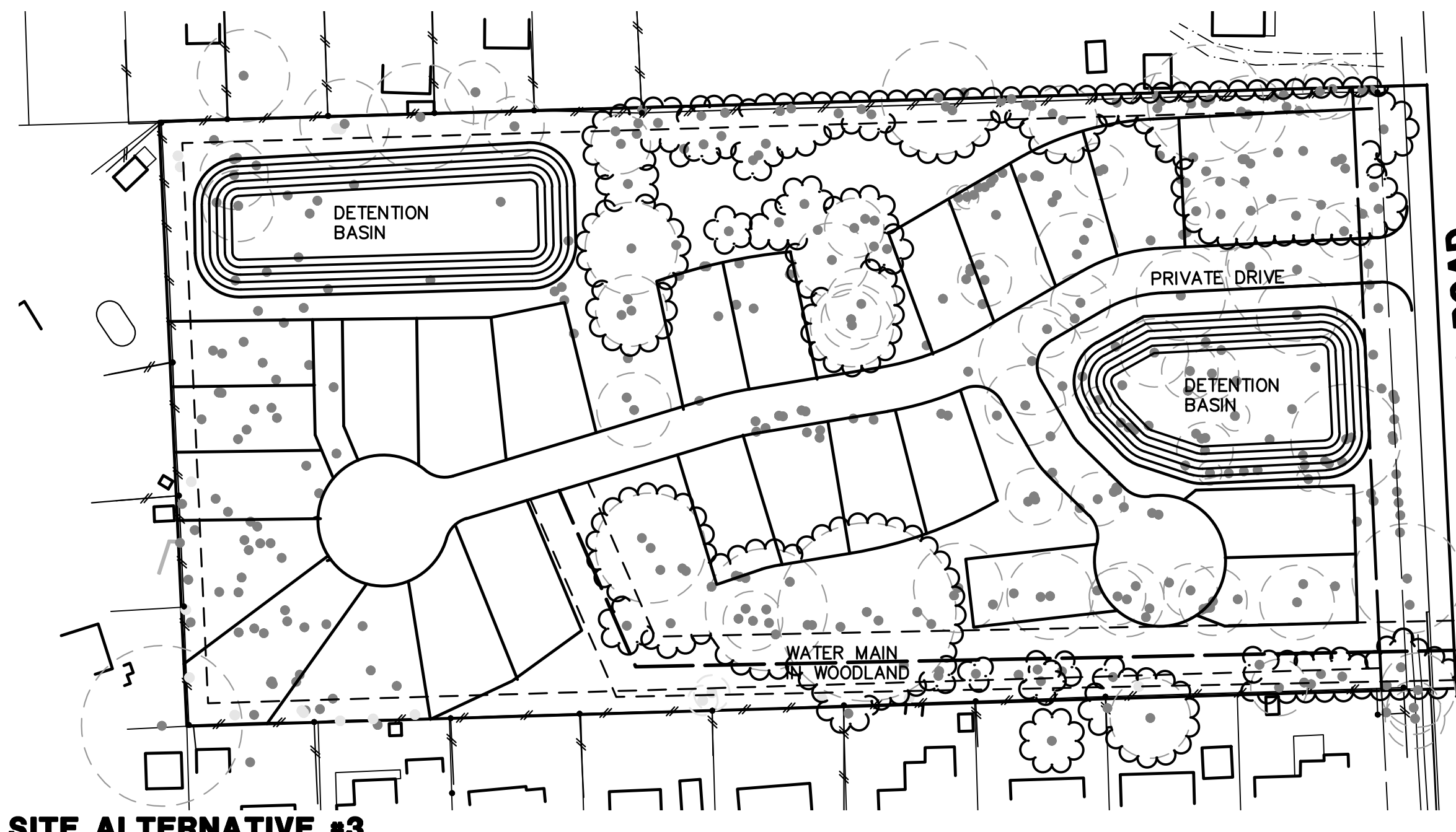
CURRENT SITE PLAN



SITE ALTERNATIVE #1



SITE ALTERNATIVE #2



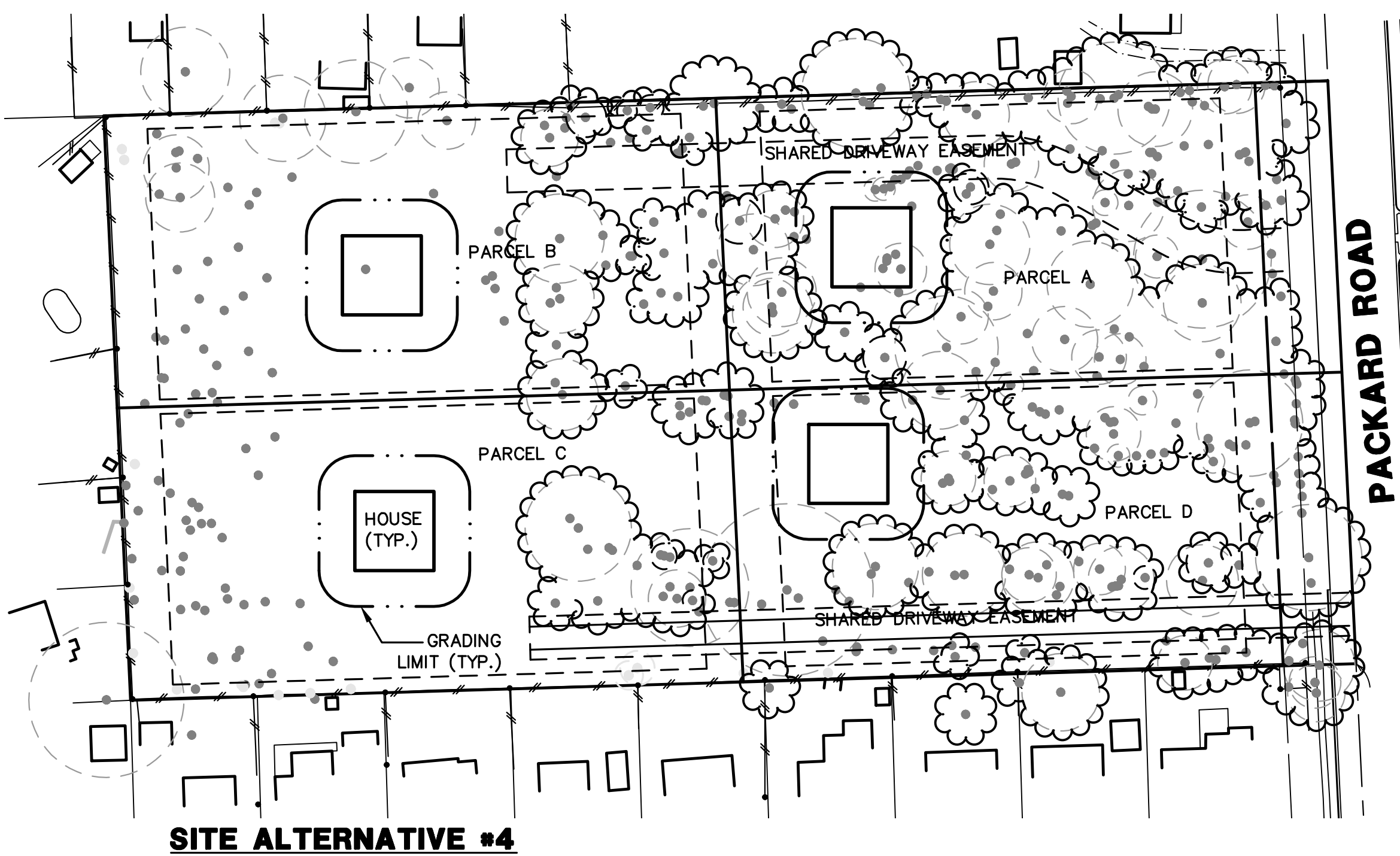
SITE ALTERNATIVE #3

SITE ALTERNATIVE COMPARISON CHART

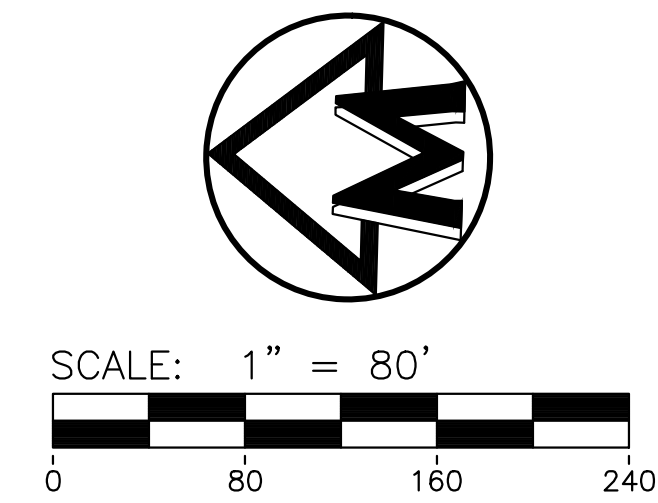
With our alternatives analysis we explored a number of variations of the project and summarize them as follows:

	Existing	Current PUD Site Plan	Area Plan	Denied Site Plan	Revised Site Plan #1 with Blvd	Site Alternative 1	Site Alternative 2	Site Alternative 3	Site Alternative 4
LM Trees >16 health to be preserved*	51	> 16 health	14 trees	7 trees	11 trees	14 trees	32 trees	17 trees	41 trees
LM Trees > 16 health dbh to be preserved*	1235"	dbh	381" dbh	191" dbh	348" dbh	393" dbh	835" dbh	507" dbh	997" dbh
Woodland Area to be preserved	3.4 acres	0.89 acres	0.79 acres	0.3 acres	0.65 acres	0.8 acres	2.25 acres	1.46 acres	2.6 acres
Woodland dbh >8" DBH >40% health to be preserved*	1692"	dbh	584" dbh	266" dbh	317" dbh	357" dbh	982" dbh	665" dbh	1303" dbh
Wetlands / Water Courses	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Floodplains	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Steep Slopes	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Private Roadway	None	1578 lf	1,672 lf	1578 lf	1578 lf	1309 lf	923 lf	883 lf	None
Dead Ends	None	No	No	No	No	No	Yes	Yes	NA
Dual Access per fire access	None	Yes	2	Yes	2	No	1	No	1
Single Access per City traffic	None	Yes	No	Yes	Yes	Yes	Yes	Yes	NA
Shared Drives	None	No	Yes	No	Yes	2	No	Yes	1
Water Main Loop Max. Distance	None	emerg. access	Yes	emerg. access	No	emerg. access	emerg. access	Bore in woodland	Bore in woodland
Stormwater - County Compliant	None	Yes	No	Yes	Yes	Yes	Yes	Yes	NA
At Grade	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Underground	None	No	No	No	No	Yes	Yes	Yes	NA
Slope	None	1	3	1	3	1	5	1	5
Infiltration	None	1	5	1	5	1	3	1	3
Loading Ratio per County	None	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
At grade	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Below grade	None	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Bioswale	None	No	Yes	No	No	No	No	No	No
Meeting groundwater separation	None	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Perimeter Landscape Buffers - 15 ft. min	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Homes / Lots	1	51	52	51	52	40	19	24	4
Financially Feasibility (Land cost; Infrastructure costs; Lot yield)	None	Yes	Yes	Yes	Yes	No	No	No	No

*Note: Critical Root Zone impacts to trees to remain are not included in the calculations and removals of existing trees between 6" DBH and 8" DBH within woodland are not included in these calculations.
**Previous submittal preservation numbers updated to reflect DTE impacts to woodland and landmark trees



SITE ALTERNATIVE #4



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2857 PACKARD ROAD
PLANNED UNIT DEVELOPMENT
ALTERNATIVE ANALYSIS PLAN

16070

DATE: 7/25/19
SHEET 26 OF 27

REV. DATE: 05/17/19
ADD. CTS: TES

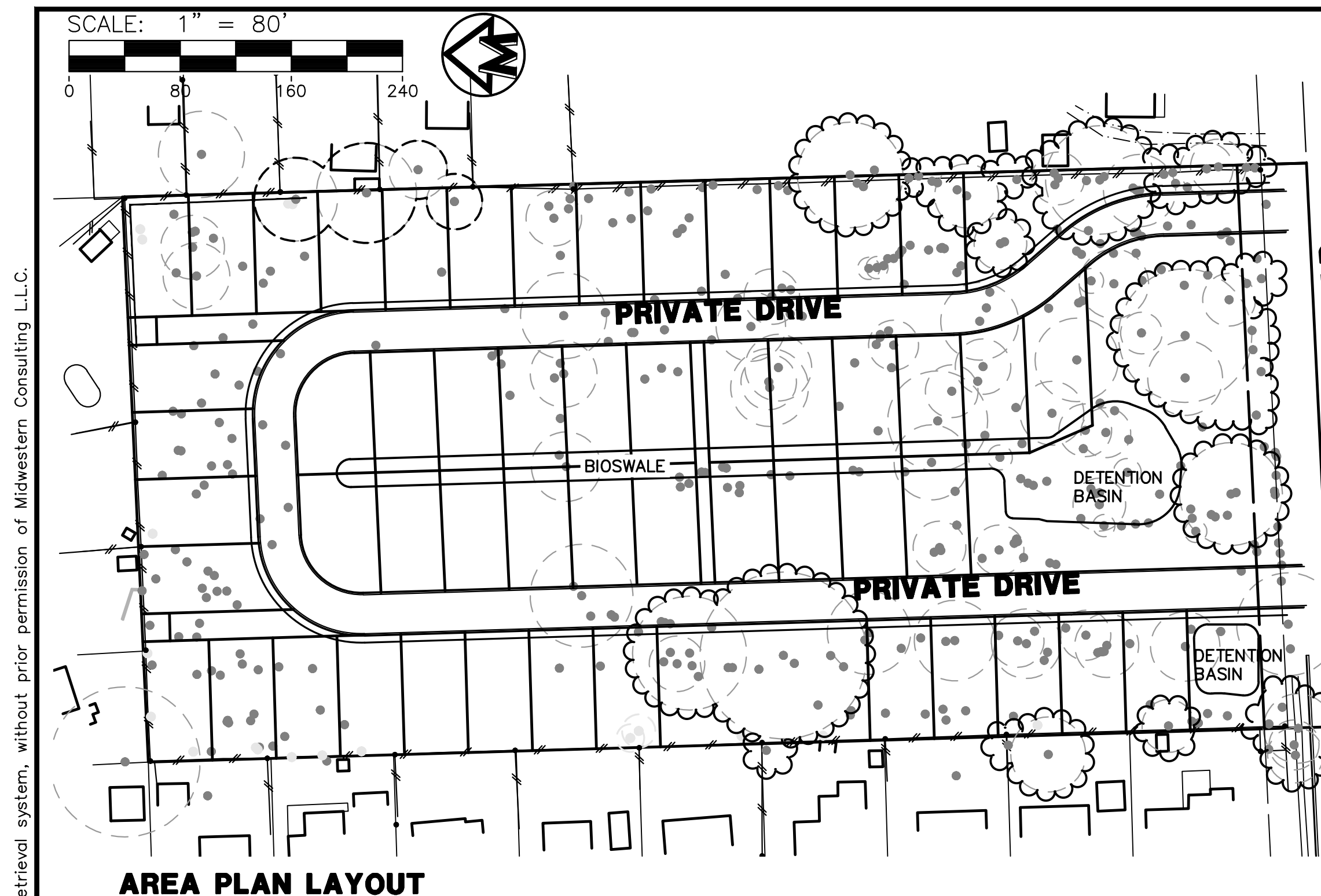
REV. DATE: 06/14/19
ENG. SGF

REV. DATE: 06/14/19
P.M. TJC

REV. DATE: 06/14/19
TECH. TRF

REV. DATE: 06/14/19
16070SA1.dwg

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NATURAL FEATURES ALTERNATIVE ANALYSIS

- Site Design Goals / Elements**
- 52 Single Family Homes and lots minimum of 4,000 sq. ft. with 46 feet along the north, east and west property lines.
 - Where possible minimize impacts to Trees and Woodlands.
 - Provide pedestrian access through the site.
 - Meet the conditions of the conditional rezoning (site specific goals)
 - Provide a 15 foot wide landscape buffer of limited/minimal grading and impacts along the north, east and west property lines.
 - Provide for no more than five new homes / lots.
 - Provide no less than five ranch style homes along the perimeter of the site where adjacent to existing single family homes
 - Vehicular Circulation utilizing double loaded private roadway to efficiently utilize impervious surfaces
 - Minimize impervious surfaces where possible
 - Minimize the length of single loaded roadways
 - Vehicular Circulation that is accessible by fire apparatus as well as solid waste vehicles. Requiring no dead end streets, and two access points.
 - Provide Stormwater management that meets Washtenaw County Water Resources Commissioner's recently updated requirements
 - Recent updates for infiltration require:
 - Infiltration loading of 1:10
 - For our site this means 0.75 acres / 32,700 sq. ft.
 - This would allow for the soils capacity to dictate the loading rate for the infiltration. This would allow for a reduction in the size of the detention basin of about 25% or 6,000sq. ft.
 - Reduce the number of homes / parcels
 - Which does not make the project financially feasible
 - In doing so we potentially decrease the efficiency of the access roadway, the main impervious surface.
- There are opportunities to lessen these factors and preserve additional trees and woodlands. Those factors are:
- Allow for the stormwater system to be designed outside of the Washtenaw County Water Resources Requirements, and requirements for a County Drainage District.
 - This would allow for slopes at the detention basin to be steeper than 1:5 (w/o a fence)
 - This would allow for the soils capacity to dictate the loading rate for the infiltration. This would allow for a reduction in the size of the detention basin of about 25% or 6,000sq. ft.
 - Reduce the number of homes / parcels
 - Which does not make the project financially feasible
 - In doing so we potentially decrease the efficiency of the access roadway, the main impervious surface.
- Based on initial review comments from the City of Ann Arbor planning staff, the submitted site layout was revised to address the following comments/concerns (additional comments/concerns not identified here but also addressed) which has a direct impact on the ability to preserve regulated natural features:
- Vehicular Circulation that is accessible by fire apparatus as well as solid waste vehicles while minimizing traffic conflicts. Requiring no dead end streets, and two access points. Per City traffic comments, one boulevard entrance that aligns with the church driveway on the opposite side of Packard Road is identified as preferred method for vehicular access to the site. Further this single access point needs to be designed as a boulevard entry in order to function as two points of access. This style and point of access requires an additional east-west road surface. In incorporating the project goals with this new road surface including the single boulevard entry requires impact to regulated natural features in the southeast corner of the site.
 - Provide 1 parking space per dwelling unit in the private street easement. We have modified the plan to include a combination of parallel and ninety degree parking along the proposed private roadway. We are proposing limiting parking to one side of the street as well as limiting parking in the roadway direction transitions to ensure adequate accessibility by fire apparatus and solid waste vehicles. This design requires additional bays of parking adjacent to the entrance/detention basin in order to achieve the required amount of on-street parking.

Since our Area Plan and Rezoning there were a number of things that result in the current proposal with respect to minimizing the impacts to natural features at the site (landmark trees, and woodlands):

- Further evaluation of the trees including health condition has been completed and it is concluded that the area identified in the Area Plan at the northwest corner is not a woodland as defined by ordinance (less than 1/2 acre in size)
- With the Area Plan we had conceptually designed a system that would load and infiltrate the stormwater based upon the capacity of the soil. With the recently updated County rules we are only able to account for loading of 1:10 as opposed to the calculated capacity of the soil based upon the testing.

- We have also completed additional infiltration tests at the site to evaluate soil conditions. During this testing it has been determined that the groundwater is a bit higher than indicated in the previous testing. This could be a seasonal condition, however we will need to account for this elevation and propose our infiltration 3 feet above the groundwater.
- Further evaluation and topographical survey indicated that there is approximately 1.38 acres / 60,113 sf of off-site area in the adjacent subdivision that contributes run-off through our site. This is significantly more than conceptually accounted for with the Area Plan. Since the existing neighborhood was developed at a time that there were no or minimal stormwater design guidelines much of this area drains to a low spot shared on our site and the adjacent homes along our eastern property line. We had heard about this concern during the Citizen Participation Meeting. Our goal with this, and as you will see with the proposed plan, is to make this situation better than existing by accounting for much of this stormwater runoff with our system. We are reducing the contributing area of stormwater runoff by this area by 75%. This requires our system to provide about 11,500 cft. of additional stormwater treatment.

- Provide sidewalk on both sides of the private street. The inclusion of sidewalk on both sides of the private street promotes pedestrian accessibility but also decreases the buildable footprint of the lots.
- Based on additional comments from the City of Ann Arbor staff, the submitted site layout was revised a second time to address the following comments/concerns (additional comments/concerns not identified here but also addressed) which has a direct impact on the ability to preserve regulated natural features:
- Vehicular Circulation that is accessible by fire apparatus as well as solid waste vehicles while minimizing traffic conflicts. Requiring no dead end streets, and two access points. Per City traffic comments, one entrance that aligns with the church driveway on the opposite side of Packard Road is identified as preferred method for vehicular access to the site. Per City Fire access comments, the single boulevard access point is not acceptable as two access points. Therefore, at a minimum, an additional emergency access point is required. The alignment with the church maintains the natural features impacts from the first revised submittal and the second emergency access point limits site availability for stormwater management and requires impact to regulated natural features in the southwest corner of the site.
 - Per City engineering comments, the two connection points for the water main loop needs to be as far apart as possible on the site. This requires the use of the emergency access point to also serve as the second connection of the water main to Packard Road. This limits the potential for this area to be utilized for stormwater management, both for detention and infiltration.
 - Per WRCRC comments and discussion with the Walcotts Creek Advisory Committee, the WRCRC will require dedicated easements to the WRCRC and the extent of wooded vegetation needs to be limited to the greatest extent practicable. This limits the availability of space in the rear yards of lots to preserve existing trees and to plant mitigation trees. Lot configuration was shifted to accommodate these easements to the greatest extent possible.

Based on additional comments from the City of Ann Arbor staff, the submitted site layout was revised a third time to address the following comments/concerns (additional comments/concerns not identified here but also addressed) which has a direct impact on the ability to preserve regulated natural features:

- Stormwater management in the northeast corner of the site to direct and outlet off-site drainage and rear yard of lots in the vicinity. This resulted in the loss of a lot and reconfiguration of remaining lots and impact to natural features.
- Solid waste service requires direct driveway access to private road. This resulted in the reconfiguration of lots and impact to natural features.

Based on comments from the City of Ann Arbor Planning Commission and City Council for the denied site plan, the layout has been revised in the PUD site plan submittal to preserve additional natural features on the site. This has been achieved by attaching the units in the central portion of the site in order to preserve two areas of woodland/landmark trees on the western side of the site, one area of woodland near the entrance to the site, and one area of woodland trees between the attached units.

Natural features on the site include City regulated woodland predominantly on the southern portion of the site, and landmark trees within the woodland and scattered throughout the site. The zoning and master plan for the site, as well as expressed preference by neighboring residents is for the site to be developed as single family residential development as opposed to attached homes or multi-family housing. Lot size requirements for single family homes will

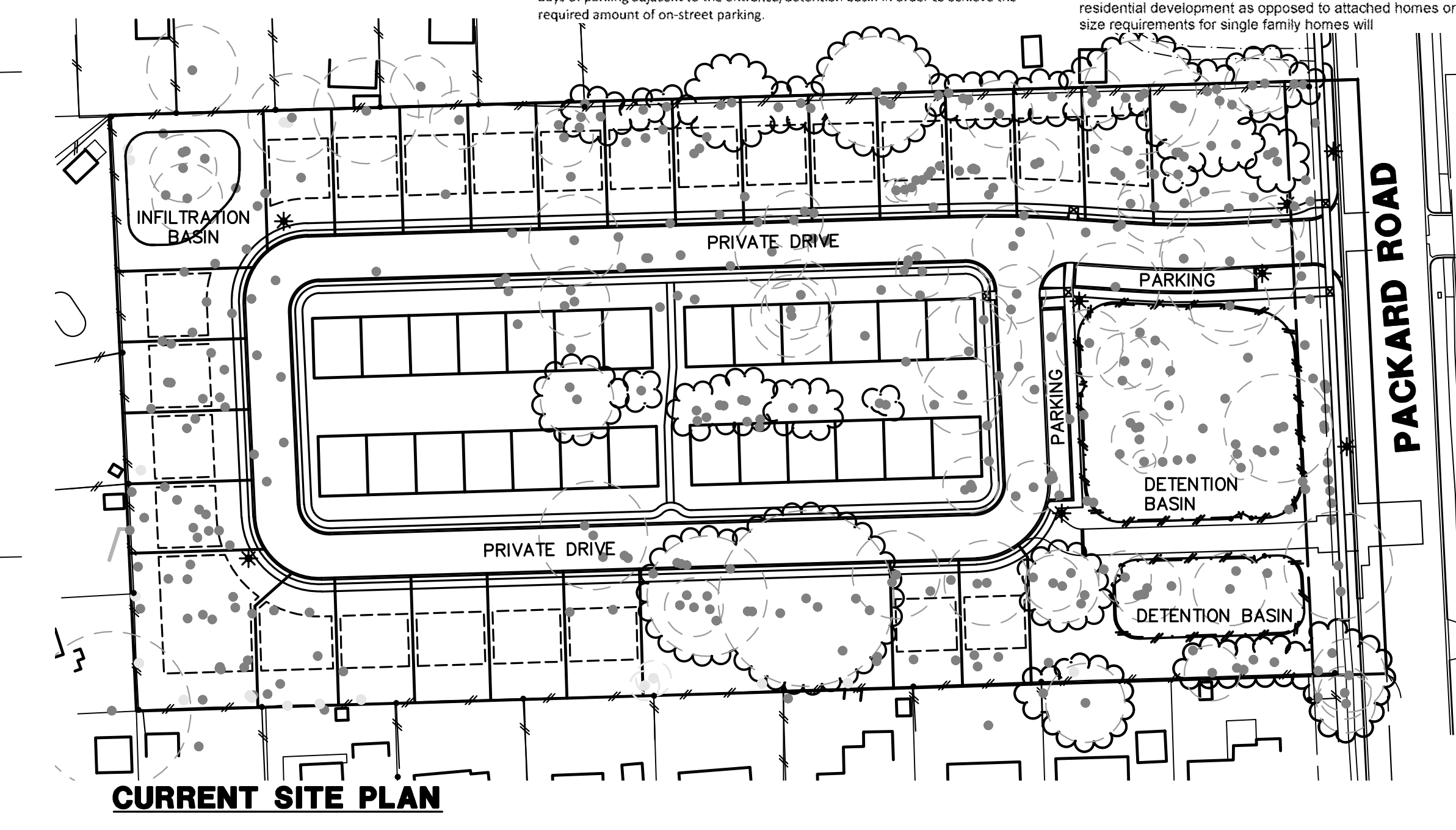
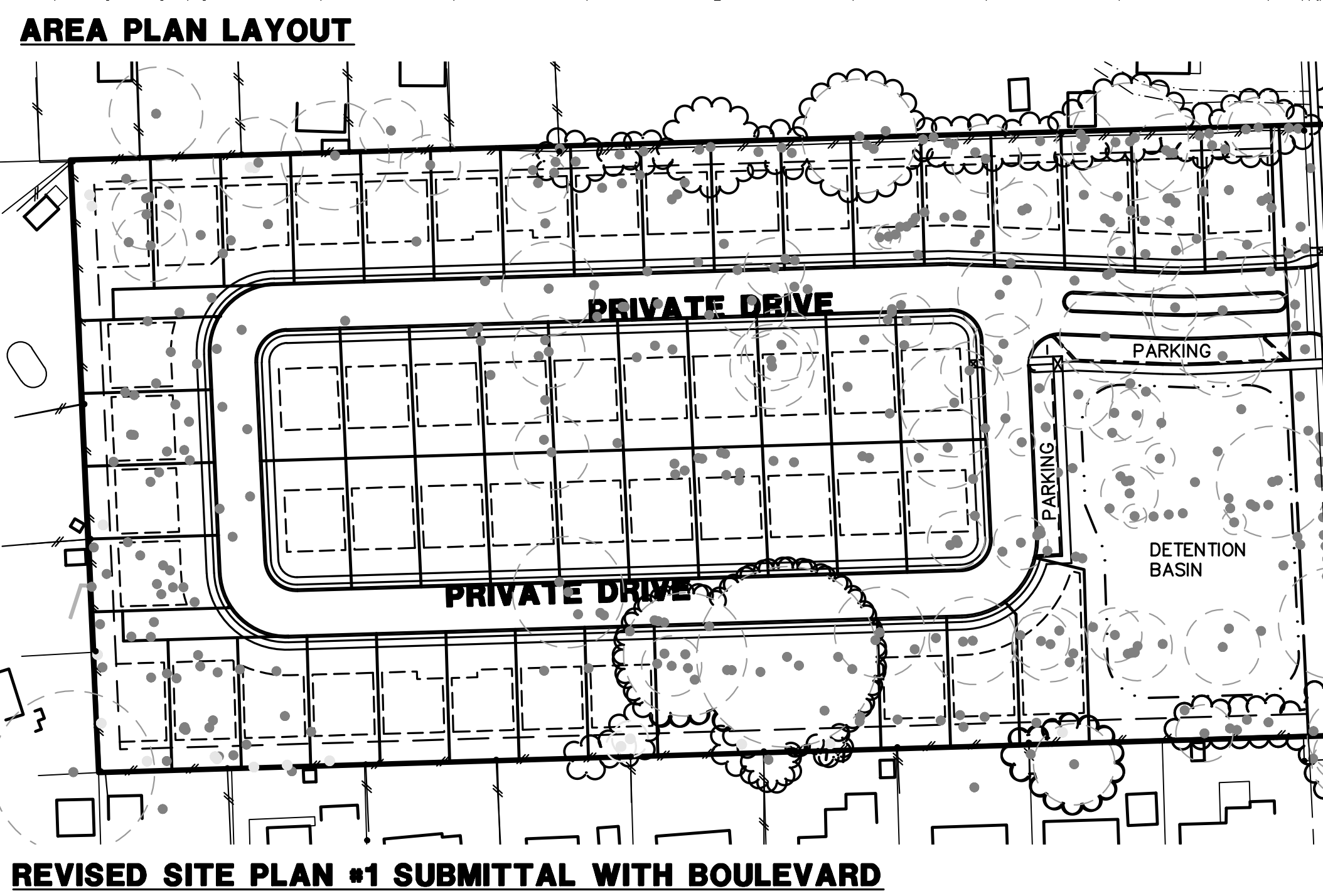
The location of the entrance and the existing topography of the site would require that stormwater management in order to be provided in the southern portion of the site within the regulated woodlands in order to capture and treat as much of the runoff from the site as possible. The elevation of the southeast corner of the site and the elevation of groundwater limit the depth of the detention basin in order to accommodate an infiltration area to the required volume of stormwater runoff that would be captured on the site. This leads to filling on the site. Incorporation of houses with view-out basements responds to this raising of the site and reduces the amount of impact within the 15-foot landscape buffer along the perimeter of the site and the natural features located in these areas. Providing stormwater detention area in the southeast corner of the site makes it difficult to achieve a looped road network, resulting in far fewer lots as illustrated in Alternatives 2 and 3. Efforts to preserve natural features in the southern portion of the site in Alternative 1 requires detention basin slopes of 3:1 and use of underground infiltration in the rear yards of 10 of the lots. Both the current site layout and Alternative 1 propose aggregate below the side slopes of the detention basin to meet the required infiltration area per the WRCRC rules. This limits impact to natural features that would be necessary to achieve this infiltration at surface grades.

The most efficient and economical way to use impervious road surfaces for the project is to have lots on both sides of the street (double load the street frontage). This splits the amount of impervious surfaces and burden of infrastructure costs per linear foot of road onto more lots and reduces the impact to the project economics. The width of the existing parcel dictates the maximum depth of the lots in a double loaded layout and the required 4,000 square foot lots restricts the use of narrower lots to avoid impacts to natural features. Additionally, the design of houses with 2-car garages and the rezoning condition of a minimum number of ranch houses, dictates a minimum lot width that results in a feasible building envelope for the development. Therefore, a site layout with consistent lot dimensions (i.e. the current site layout, with the exception of the northern corner) requires the design of less architectural footprints than a site layout with a variety of lot dimensions, i.e. site alternative 1 and is preferred.

Additional site considerations for the current site plan and Alternative 1 are outlined below. Refer to the comparison chart on each page of the alternative analysis for additional information on natural features preservation for each alternative and design considerations.

- Current PUD Site Plan**
- Preserves 30% of the landmark trees by dbh, preserves 26% of the woodland area, and preserves 34% of the woodland trees by dbh
 - 2 to 3 standard lot dimensions (width and depth) to provide economy in building footprints
 - Requires approximately 194 linear feet of emergency access drive
 - 3:1 and 4:1 slopes for the detention basin – requires perimeter fence
 - Requires underground aggregate under slopes of detention basin for infiltration area
 - Road to lot ratio: 30.9 linear feet of road per lot and 3.8 linear feet of emergency access drive per lot
- Alternative 1**
- Preserves 31% of the landmark trees by dbh, preserves 23% of the woodland area, and preserves 21% of the woodland trees by dbh
 - Requires variable lot dimensions (width and depth) to achieve 4000 square foot lots as required per ordinance. This requires additional architectural footprints
 - Requires approximately 480 linear feet of emergency access drive
 - Requires 3:1 slopes for the detention basin and fence
 - Requires underground infiltration in the rear yards of 10 lots, which reduces the area of placement of mitigation trees and adds cost for stormwater management
 - Requires underground aggregate under slopes of detention basin for infiltration area
 - Road to lot ratio: 32.7 linear feet of road per lot and 12 linear feet of emergency access drive per lot

City staff has requested additional alternatives that preserve the natural features on the site. Given the location of the natural features in relation to Packard Road and the required site entrance aligned with the driveway on the opposite side of Packard Road, it is not possible to completely eliminate impacts to the natural features on the site. In an effort to illustrate that any development of the site will require natural features impacts, Alternative 4 has been added to the alternative analysis. This alternative illustrates that a land division to allow for four residential lots on the site will require two shared driveways to the site and impacts to the natural features on the site. While there would be less natural features impacts on the site, given the cost of the land, this is not a financially feasible alternative from a developer perspective.



SITE ALTERNATIVE COMPARISON CHART

With our alternatives analysis we explored a number of variations of the project and summarize them as follows:

	Existing	Current PUD Site Plan	Area Plan	Denied Site Plan	Revised Site Plan #1 with Blvd	Site Alternative 1	Site Alternative 2	Site Alternative 3	Site Alternative 4
LM Trees >16 health to be preserved*	51	>16 health	13 trees	14 trees	7 trees	11 trees	14 trees	32 trees	17 trees
LM Trees > 16 health dbh to be preserved*	1235"	dbh	381"	405"	191"	348"	393"	835"	dbh
Woodland Area to be preserved	3.4	acres	0.89 acres	0.79 acres	0.3 acres	0.65 acres	0.8 acres	2.25 acres	1.46 acres
Woodland dbh > 8" DBH > 40% health to be preserved*	1692"	dbh	584"	376"	266"	317"	357"	982"	dbh
Wetlands / Water Courses	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Floodplains:	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Steep Slopes	None	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Private Roadway	None	1578 lf	1,672 lf	1578 lf	1578 lf	1309 lf	923 lf	883 lf	None
Dead Ends	No	No	No	No	No	No	Yes	No	NA
Dual Access per fire access	Yes	2	Yes	2	Yes	1	No	1	NA
Single Access per City traffic	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	NA
Shared Drives	None	Yes	No	No	Yes	2	No	Yes	2
Water Main Loop Max. Distance	None	emrg. access	Yes	emrg. access	No	emrg. access	Bore in woodland	Bore in woodland	None (leads)
Stormwater - County Compliant	None	Yes	No	Yes	Yes	Yes	Yes	Yes	NA
At Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Underground	No	No	No	No	No	Yes	Yes	Yes	NA
Slope	1	3	1	3	1	5	1	5	1
Infiltration	1	5	No	Yes	1	5	1	3	NA
Loading Ratio per County	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	NA
At grade	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	NA
Below grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Bioswale	No	Yes	No	Yes	No	No	No	No	NA
Meeting groundwater separation	Yes	No	Yes	No	Yes	Yes	Yes	Yes	NA
Perimeter Landscape Buffers - 15 ft. min	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Homes / Lots	1	51	52	51	52	40	19	24	4
Financially Feasibility (Land cost; Infrastructure costs; Lot yield)	No	Yes	Yes	Yes	Yes	No	No	No	No

*Note: Critical Root Zone impacts to trees to remain are not included in the calculations and removals of existing trees between 6" DBH and 8" DBH within woodland are not included in these calculations.
 **Previous submittal preservation numbers updated to reflect DTE impacts to woodland and landmark trees

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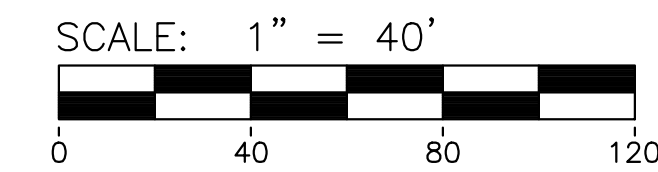
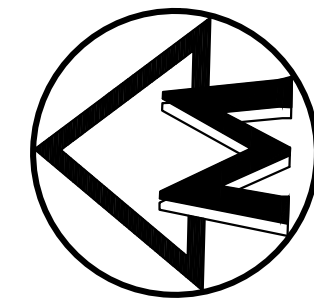
2857 PACKARD ROAD
 PLANNED UNIT DEVELOPMENT
 ALTERNATIVE ANALYSIS PLAN

16070

DATE: 4/25/19
SHEET: 27 OF 27
REV. DATE:
 05/17/19 CADD: GTS
 06/14/19 ENG: SGF
 PKM: JTC
 TECH: TRF
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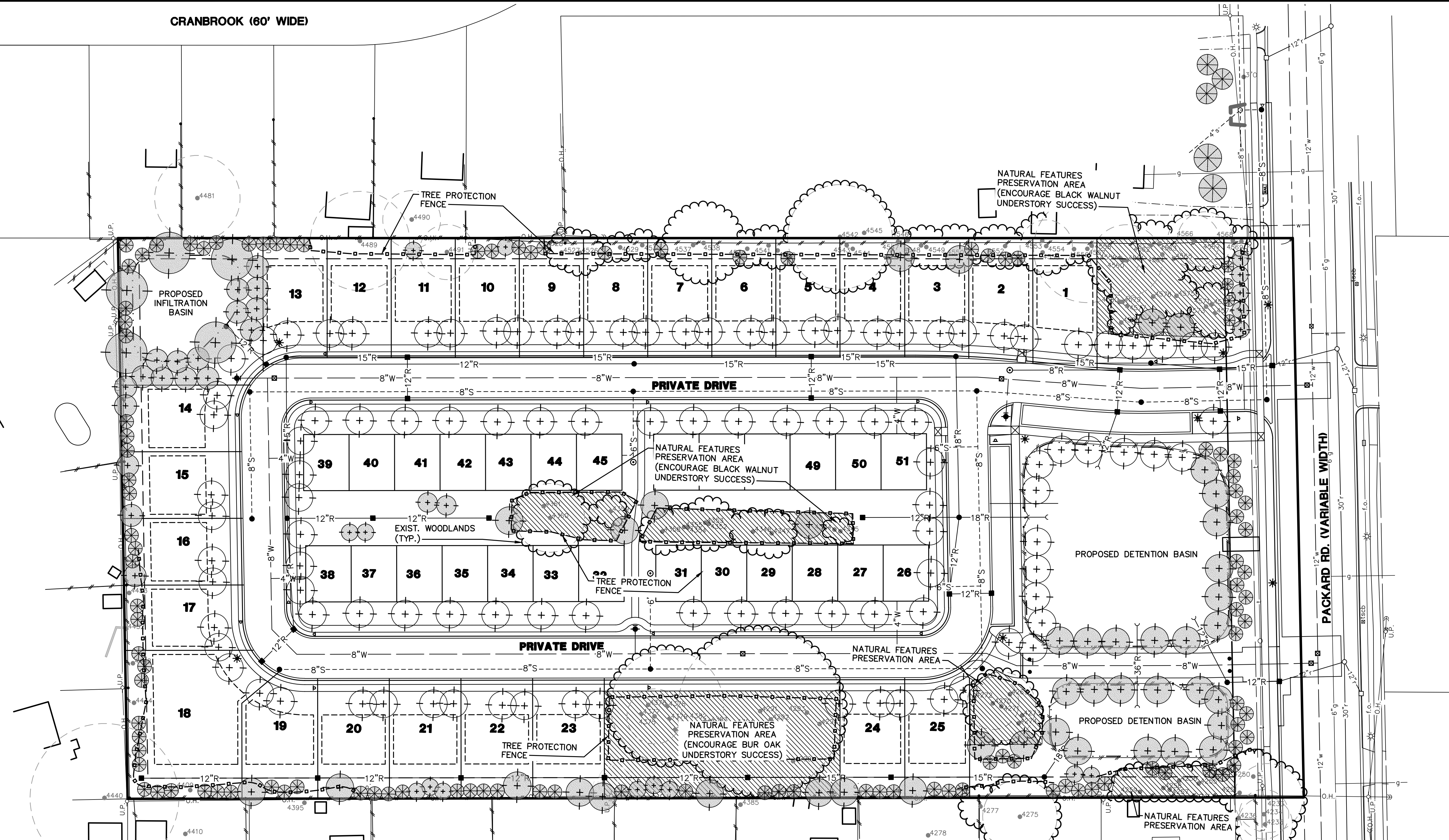
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CRANBROOK (60' WIDE)



LEGEND

- Tree or brush limit
Regulated woodlands to remain
Single tree
Landmark tree critical root zone
Proposed deciduous street tree
Proposed mitigation deciduous tree
Proposed mitigation evergreen tree
Natural features preservation areas



RESPONSIBILITY

- 1. The maintenance of City regulated natural features and the areas identified as Natural Features Preservation Areas on the Natural Features Maintenance Plan will be the responsibility of the developer/owner and/or successor.
2. Pre-construction/construction related items within the fifteen (15) foot conflicting land use buffer will be the responsibility of the developer/owner. Post-construction, each lot owner shall be responsible for maintaining the existing trees in the fifteen (15) foot wide landscape buffer and trees identified as "Landmark Trees", "Woodland Trees" or "Mitigation Trees".

PRE-CONSTRUCTION

- 1. Prior to beginning construction on the site, a certified arborist shall perform a site visit to assess the current condition of the regulated natural features as identified on the approved site plan on file with the City of Ann Arbor. Tree Health/Condition Forms shall be prepared for regulated landmark and woodland trees to remain in order to document the health of the trees prior to construction activities on the site.
2. The Master Deed and By Laws established for the Homeowners Association shall include the following:
a. All mitigation trees and landscaping on the approved site plan that die will be required to be replaced by the next growing season in perpetuity, as a continuing obligation of the site plan.

TREE PROTECTION AND MAINTENANCE

- 1. Site contractor to meet with Midwestern Consulting certified arborist on site to review procedures, access/shield road and tree protection measures. It is recommended that site clearing be completed by an arborist/tree company familiar with the process and procedures of tree preservation or under direct supervision of same.
2. Prior to any site clearing or construction activities beginning, install fence and signage around the CRZ (critical root zone) of existing trees to remain.

PRUNING:

- 1. Preserved trees should be pruned to clear crown of disease, weak crossing or dead wood.
2. Avoid pruning cuts on limbs larger than 4" diameter, except dead wood.
3. Never remove more than 20% of the live foliage.

CONSTRUCTION:

- 1. Prior to any site clearing or construction activities beginning, tree protection fence shall be installed around all existing trees to remain at the limits of the CRZ or as depicted on the soil erosion control plan and natural features maintenance plan.
2. Grading, roads, walkways, underground utility lines, irrigation lines, and all other aspects of soil disturbance shall be minimized to the fullest extent that sound design and public safety will allow.

MULCH TO BE ADDED TO A DEPTH OF 4 INCHES WITHIN THE CRZ TO HELP WITH MOISTURE RETENTION AND SOIL COMPACTION AFTER MOVING AND TREATMENT OF INVASIVE SPECIES PER THE INVASIVE SPECIES CONTROL PLAN BELOW.

POST-CONSTRUCTION:

- 1. During the establishment period for the installed deciduous mitigation trees (3 years or longer as to be determined by certified arborist):
a. Burlap screening or wrapping shall be installed on the southwest and windward sides from late autumn to early spring.
2. The Homeowners Association shall work with landscape contractor/certified arborist to locate healthy, vigorously growing Oak and Black Walnut understory trees. Selective thinning of other understory trees shall be proposed as necessary to nurture these trees to become future canopy.

INVASIVE SPECIES CONTROL:

- 1. Natural features maintenance/restoration contractor, with a certified herbicide applicator on staff, shall work with arborist and landscape architect to prepare an invasive species control schedule to be approved by certified arborist. A copy of the invasive species control plan shall be submitted to the City.
2. Control of woody invasive plants (including but not limited to: honeysuckle, buckthorn, and privet) and aggressive non-invasive species (including but not limited to: boxelder) within the natural features preservation areas and undisturbed portions of the fifteen (15) foot conflicting land use buffer such that these woody species do not make up more than 20% of the total coverage of the natural preservation areas.

RESTORATION HERBACEOUS SEED MIX

- 1. The developer/owner shall provide the City with an annual written report by December 31st of each year detailing the progress made in the invasive species control plan that year and recommended treatment techniques and schedule for the following year.
2. The Homeowners Association shall work with a certified arborist and restoration contractor to develop a long-term invasive species control program for the natural features preservation areas on the site. The program shall include:
a. Site assessment every year to identify invasive species becoming established on the site.
b. Development of invasive species control methods and timelines specific to each type of invasive species to be controlled.
c. Identification of protection measures necessary to minimize impact of invasive species control on regulated natural features within the natural features preservation areas.

RESTORATION HERBACEOUS SEED MIX

Table with 2 columns: Scientific Name and Common Name. Lists various plant species like Allium cernuum, Andropogon scoparius, Anemone virginiana, etc.

Seed should be sowed at 3 ounce per 1,000 square feet of bare area in natural features preservation areas or as directed by seed supplier and approved by City of Ann Arbor Natural Areas Preservation staff

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2857 PACKARD ROAD PLANNED UNIT DEVELOPMENT NATURAL FEATURES MAINTENANCE PLAN

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