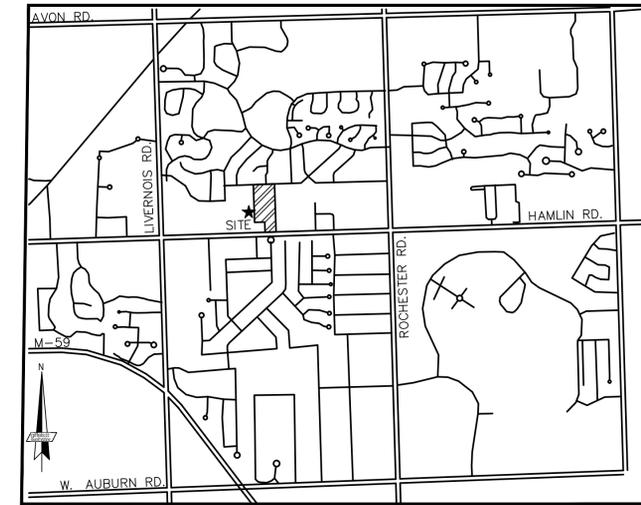
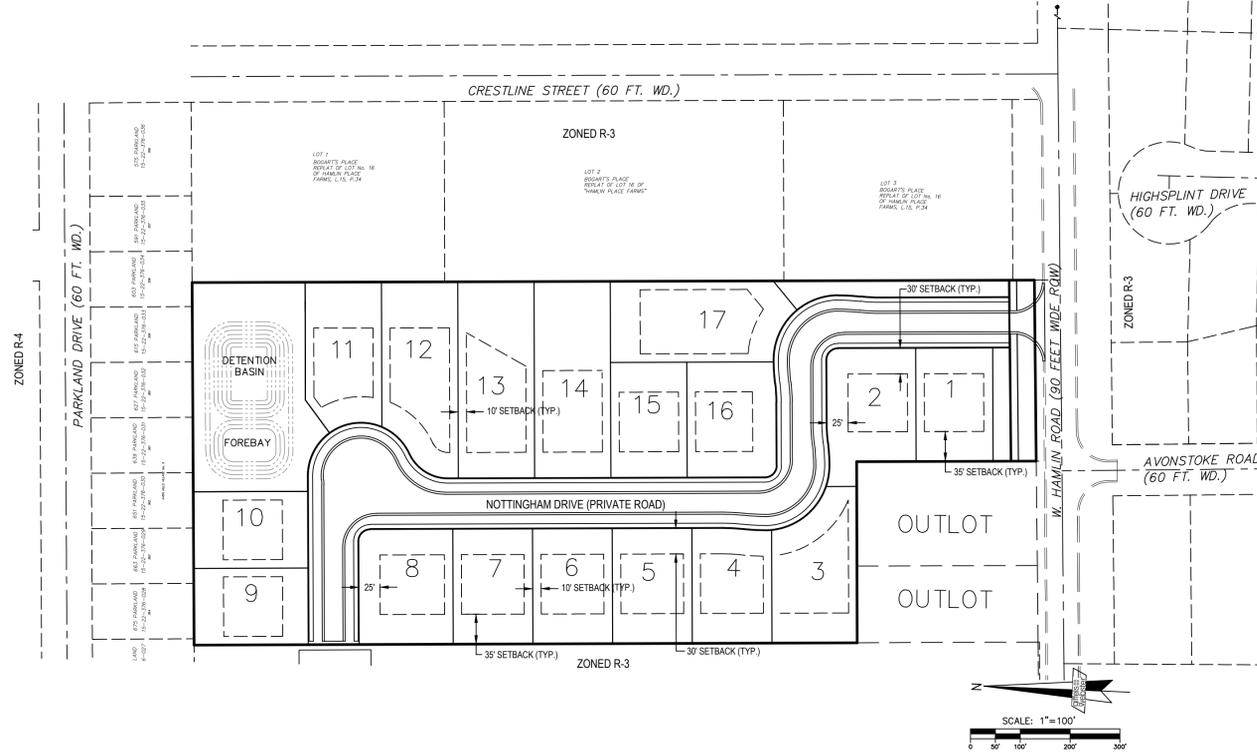


**GENERAL NOTES**

- ALL PROPOSED ROADS ARE TO BE PRIVATE. ALL ROAD PAVEMENT AND STORM DRAINAGE SHALL BE IN ACCORDANCE WITH CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ROCHESTER HILLS, AND THE ROAD COMMISSION FOR OAKLAND COUNTY (RCOC) WHERE APPLICABLE. WITH CONCRETE CURB AND GUTTER. ALL ROADS SHALL BE 27 FT. WIDE, BACK-TO-BACK OF CURBS. THE TOTAL LENGTH OF PROPOSED ROADS (MEASURED CENTERLINE-TO-CENTERLINE) IS 1,235 LF (TYPICAL 27 FT. WIDE).
- THE STORM DRAINAGE SYSTEM WILL INCLUDE STORM SEWER PIPES AND CATCH BASINS DISCHARGING TO A NORTHERN AND SOUTHERN DETENTION BASIN. THE DESIGN OF THE STORM WATER SYSTEM WILL MEET THE CITY OF ROCHESTER HILLS STANDARDS WITH THE DETENTION SYSTEMS DESIGNED TO PROVIDE FOR 10-YEAR STORM LEVELS. BOTH DETENTION BASINS WILL OUTLET TO AN EXISTING COUNTY DRAIN THROUGH A CONTROLLED OUTLET.
- SANITARY SEWER DISPOSAL WILL BE THROUGH A PROPOSED SEWERAGE COLLECTION SYSTEM, CONNECTING TO AN EXISTING SEWER ON HAMLIN RD.
- POTABLE WATER SUPPLY SOURCE WILL BE FROM EXISTING CITY OF ROCHESTER HILLS WATER SUPPLY SYSTEM. THE PROPOSED WATER DISTRIBUTION SYSTEM SERVICING THE SITE WILL BE CONNECTED TO AN EXISTING 16" WATER MAIN THAT RUNS THROUGH PHASE 1 OF THE SITE. THE EXISTING WATER MAIN WILL REMAIN IN PLACE, AS IS.
- UNDERGROUND GAS, ELECTRIC, TELEPHONE, AND CABLE TV LINES WILL BE LOCATED IN 10 FT. WIDE EASEMENTS ALONG PROPOSED ROADWAYS AND REAR YARDS.
- OPEN SPACE AREAS ARE PRIVATE AND FOR THE ENJOYMENT OF NOTTINGHAM WOODS RESIDENTS
- MAXIMUM 20 FT. WIDE EASEMENTS WILL BE PROVIDED FOR STORM SEWERS, SANITARY SEWERS, AND WATER MAINS. EASEMENTS WILL ALSO BE PROVIDED FOR ALL DRAINAGE SWALES AND STORM WATER DETENTION PONDS. DETAILED EASEMENT INFORMATION WILL BE INCLUDED IN THE FINAL SITE PLAN PROCESS.
- FIRE LANES TO BE PROVIDED ON INTERIOR STREETS AND PARKING TO BE ALLOWED ON ONE SIDE OF THE STREET ONLY.
- THERE ARE NO REGULATED WETLAND AREAS ON SITE.
- SIDEWALKS ARE PROPOSED ON BOTH SIDES OF THE ROADS. SIDEWALKS WILL BE DELINEATED IN THE DETAILED ENGINEERING PLAN PROCESS.
- ALL DIMENSIONS ARE TO BACK OF CURB, IF APPLICABLE.
- ALL PROPOSED WATER MAINS SHALL BE CENTERED IN A 20' EASEMENT.
- SEWER MAIN AND MANHOLE LOCATIONS ARE CONCEPTUAL. FINAL LOCATIONS TO BE DETERMINED AT FINAL DESIGN.
- PRIOR TO CONSTRUCTION PERMIT APPROVAL, OWNER TO COMPLETE SOIL BORINGS TO DETERMINE WATER TABLE ELEVATION AND SOIL PERCOLATION RATES. DETENTION BASIN BOTTOM ELEVATION TO BE CONSTRUCTED BELOW THE OUTLET INVERT, ALLOWING FOR INFILTRATION BASED ON RESULTS OF SOIL ANALYSIS.
- A PRIVATE ROAD EASEMENT WILL BE RECORDED AS PART OF THE CONDOMINIUM DOCUMENTS AND WILL INCLUDE LANGUAGE ALLOWING FOR FUTURE EXTENSION OF NOTTINGHAM DRIVE TO THE WEST.
- FINAL GRADING OF LOTS TO MEET CITY OF ROCHESTER HILLS AND MICHIGAN BUILDING CODE (2009) STANDARD REQUIREMENTS.
- FINAL CONFIGURATION OF THE TREE PRESERVATION AREA MAY CHANGE BASED ON DETERMINATION OF FINAL REQUIREMENTS FOR DETENTION.

# NOTTINGHAM WOODS

## VANGUARD COMPANIES PRELIMINARY SITE PLAN ROCHESTER HILLS OAKLAND COUNTY, MI



LOCATION MAP  
(1"=2,000')

**BENCHMARK DATA**

(N.G.V.D. 1929) DATUM  
SOURCE: GPS, NAVD 88 AND CONVERTED USING  
VERTCON TOOL AVAILABLE ON THE NGS WEBSITE

**SITE BENCHMARK NO. 1**  
BENCHMARK TIE IN NORTH FACE OF A  
UTILITY POLE ON THE SOUTH SIDE OF  
HAMLIN ROAD, +/- 160 FEET WEST OF  
CRESTLINE STREET.  
(OUT OF SCOPE OF DRAWING)  
ELEVATION=846.33'

**SITE BENCHMARK NO. 2**  
ARROW ON HYDRANT AT THE SOUTHWEST  
CORNER OF HAMLIN ROAD AND AVONSTOKE  
ROAD.  
ELEVATION=854.16'

**SITE BENCHMARK NO. 3**  
MAG NAIL WITH GW TAG #80004 IN THE  
SOUTH FACE OF A UTILITY POLE, +/- 70  
FEET EAST OF THE NORTHWEST CORNER OF  
THE PROPERTY AND +/- 6 FEET NORTH OF  
PROPERTY LINE IN THE REAR YARD OF  
ADDRESS 675 PARKLAND.  
ELEVATION=849.40'

**ZONING INFORMATION**

PROPOSED USE: R-3 ZONING, SINGLE FAMILY RESIDENTIAL  
EXISTING USE: UNDEVELOPED FARMLAND/WOODLAND

EXISTING ZONING: R-3 RESIDENTIAL

TOTAL UNITS = 17

SETBACKS:  
FRONT = 30'  
SIDE (EACH) = 10'  
SIDE (TOTAL) = 20'  
SIDE (ABUTTING STREET) = 25'  
REAR = 35'

	REQUIRED	PROPOSED
MAXIMUM LOT COVERAGE	30%	30%
AVG. MIN. LOT WIDTH	90'	92.6'
(LOT SIZE VARIATION OPTION)		
MIN. LOT WIDTH	81'	81'
(LOT SIZE VARIATION OPTION)		
AVG. MIN. LOT AREA	12,000 SF.	13,737
(LOT SIZE VARIATION OPTION)		
MIN. LOT AREA	10,800 SF.	12,076 SF.
(LOT SIZE VARIATION OPTION)		
MAXIMUM STORIES	2	2
MAXIMUM BUILDING HEIGHT	30'	30'
MINIMUM FLOOR AREA	1,200 SF.	2,000 SF.

EXISTING PARCEL AREA = 8.673 ACRES  
RESIDENTIAL DENSITY = 1.96 DWELLINGS/ACRE

**GENERAL LEGEND**

	EXISTING	PROPOSED
STORM SEWER	STM	---
SANITARY SEWER	SAN	---
WATER MAIN	W	---
GAS MAIN	G	---
UNDERGROUND ELECTRIC LINES	UGE	---
UNDERGROUND TELEPHONE LINES	UGT	---
UNDERGROUND CABLE TELEVISION LINES	CTV	---
OVERHEAD LINES	OH	---
PUBLIC LIGHTING LINES	PLD	---
STEAM LINES	STEAM	---
FENCE LINE	X	X
PROJECT PHASE LIMIT LINE	---	---
CONCRETE CURB AND GUTTER (STANDARD)	---	---
CONCRETE CURB AND GUTTER (REVERSED)	---	---
THICKENED SLAB CURB/WALK	---	---
STORM MANHOLE	⊖	⊖
CATCH BASIN	⊕	⊕
YARD BASIN	⊗	⊗
INLET BASIN	⊙	⊙
END SECTION	)	)
ROOF/DOWN SPOUT	⊙	⊙
OVERFLOW/OUTLET STRUCTURE	⊕	⊕
STORM CLEAN OUT	⊕	⊕
SANITARY MANHOLE	⊕	⊕
SANITARY CLEAN OUT	⊕	⊕
SANITARY RISER	⊕	⊕
SANITARY PUMP STATION	⊕	⊕

EXISTING	PROPOSED	EXISTING	PROPOSED
GATE VALVE	⊗	GUY WIRE ANCHOR	<
FIRE HYDRANT	⊕	UTILITY FLAG	---
STOP BOX AND VALVE	⊕	SIGN POST	---
FDC CONNECTION	⊕	GUARD POST/BOLLARD	⊙
WATER METER	⊕	FENCE POST	⊙
POST INDICATOR VALVE	⊕	PAY PHONE	⊕
WELL HEAD	⊕	PARKING METER	⊕
IRRIGATION CONTROL BOX	⊕	RESIDENTIAL MAILBOX	⊕
LAWN IRRIGATION HEAD	+	U.S. MAILBOX	⊕
GAS VALVE	⊕	BLDG CORNER (FIELD LOCATED)	+
GAS MANHOLE	⊕	TREE	⊕
GAS RISER	⊕	WETLAND FLAG	⊕
GAS METER	⊕	SPOT ELEVATION	⊕
ELECTRIC MANHOLE	⊕	SOIL BORING	⊕
ELECTRIC RISER	⊕	ASPH.	⊕
ELECTRIC METER	⊕	CONC.	⊕
ELECTRIC TRANSFORMER	⊕	A.C.	⊕
LIGHT POLE	⊕	G.P.	⊕
TELEPHONE MANHOLE	⊕	C.L.F.	⊕
TELEPHONE RISER	⊕	D.L.	⊕
TELEPHONE CROSS BOX	⊕	F.F.	⊕
CABLE RISER	⊕	O.H.	⊕
TRAFFIC CONTROL BOX	⊕	F.I.	⊕
AIR CONDITIONER	⊕	S.I.	⊕
PUBLIC LIGHTING MANHOLE	⊕	F.I.P.	⊕
UTILITY POLE	⊕	M.R.	⊕
		F.M.	⊕
		S.N.	⊕

**DEMOLITION LEGEND**

REMOVE UTILITY STRUCTURE	⊕
REMOVE UTILITY PIPE	⊕
ABANDON UTILITY PIPE	⊕
CUT AND BULKHEAD UTILITY PIPE	⊕
REMOVE BUILDING	⊕
REMOVE CONCRETE PAVEMENT	⊕
REMOVE ASPHALT PAVEMENT	⊕
REMOVE SIDEWALK	⊕

**PAVING AND GRADING HATCH LEGEND**

COMPACTED SAND BACKFILL (CSB)	⊕
AGGREGATE MATERIAL	⊕
ASPHALT PAVEMENT	⊕
CONCRETE PAVEMENT	⊕

**SHEET INDEX**

- 01 COVER
- 02 EXISTING CONDITIONS
- 03 SITE PLAN
- 04 UTILITY CALCULATIONS
- 05 TREE PRESERVATION PLAN
- 06 TREE TABLE 1 OF 2
- 07 TREE TABLE 2 OF 2
- LA-01 LANDSCAPE PLAN
- LA-02 LANDSCAPE DETAILS

**giffels webster**  
Engineers  
Surveyors  
Planners  
Landscape Architects  
Environmental Specialists  
6303 26 Mile Road  
Suite 100  
Washington, MI 48094  
p (586) 781-8950  
f (586) 781-8951  
www.giffelswebster.com

Executive:	P.M.
Manager:	M.P.
Engineer:	L.W.
Quality Control:	N.M.
Section:	



DATE:	ISSUE:
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17
01.20.2016	REVISED PER NEIGHBORHOOD MEETING

Developed For:  
**VANGUARD COMPANIES**  
101 S. MAIN STREET  
ROCHESTER, MI 48037  
p (248) 650-6206  
f (248) 650-6274

**COVER**  
PRELIMINARY SITE PLAN  
NOTTINGHAM WOODS  
ROCHESTER HILLS  
MICHIGAN  
Oakland County

Date:	01/27/2016
Scale:	1" = 100'
Sheet:	01
Project:	18701.00

Z:\18701.00 Nottinghams Woods\Drawing Files\Site plan\01 Cover Sheet.dwg

**LEGAL DESCRIPTION**

LOT 18 AND PART OF LOT 17 OF HAMLIN PLACE FARMS, ACCORDING TO THE PLAT THEREOF AS RECORDED IN LIBER 15 OF PLATS PAGE 34, OAKLAND COUNTY RECORDS. MORE PARTICULARLY DESCRIBED AS:

COMMENCING AT THE SOUTH QUARTER CORNER OF SECTION 22, TOWN 3, NORTH, RANGE 11 EAST, AVON TOWNSHIP (NOW CITY OF ROCHESTER HILLS), OAKLAND COUNTY, MICHIGAN, SOUTH 87 DEGREES 04 MINUTES 41 SECONDS WEST, 287.51 FEET ALONG THE SOUTH LINE OF SECTION 22; THENCE NORTH 02 DEGREES 30 MINUTES 23 SECONDS WEST, 30.00 FEET TO THE SOUTHWEST CORNER OF LOT 17, SAID POINT BEING THE POINT OF BEGINNING; THENCE SOUTH 87 DEGREES 04 MINUTES 41 SECONDS WEST, 212.50 FEET ALONG THE NORTH RIGHT OF WAY LINE OF HAMLIN ROAD (VARIABLE WIDTH) TO THE SOUTHWEST CORNER OF SAID LOT 17; THENCE NORTH 02 DEGREES 30 MINUTES 23 SECONDS WEST, 211.92 FEET ALONG THE WEST LINE OF LOT 17 SAID LINE ALSO BEING THE EAST LINE OF LOT 18; THENCE SOUTH 87 DEGREES 27 MINUTES 33 SECONDS WEST, 212.52 FEET TO A POINT ON THE WEST LINE OF LOT 18; THENCE NORTH 02 DEGREES 32 MINUTES 27 SECONDS WEST, 782.16 FEET ALONG SAID WEST LINE TO A POINT ON THE SOUTH LINE OF "AVON HILLS VILLAGE SUBDIVISION NO. 5, AS RECORDED IN LIBER 95 OF PLATS, PAGE 11, OAKLAND COUNTY RECORDS; THENCE NORTH 87 DEGREES 20 MINUTES 03 SECONDS EAST, 425.60 FEET ALONG SAID SOUTH LINE TO THE NORTHWEST CORNER OF LOT 1 OF "BOGART'S PLACE REPLAT OF LOT 16 OF HAMLIN PLACE FARMS" AS RECORDED IN LIBER 123 OF PLATS, PAGE 3, OAKLAND COUNTY RECORDS SAID POINT ALSO BEING THE NORTHEAST CORNER OF LOT 17; THENCE SOUTH 02 DEGREES 30 MINUTES 23 SECONDS EAST, 993.60 FEET TO THE POINT OF BEGINNING AND CONTAINING 8.673 ACRES.

PARCEL ID NO. 15-22-376-039

Executive:	P.M.
Manager:	M.P.
Engineer:	L.W.
Quality Control:	N.M.
Section:	

Professional Seal:



DATE:	ISSUE:
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17

Developed For:

**VANGUARD COMPANIES**  
101 S. MAIN STREET  
ROCHESTER, MI 48037  
p (248) 650-6206  
f (248) 650-6274

**EXISTING CONDITIONS**

PRELIMINARY SITE PLAN  
NOTTINGHAM WOODS

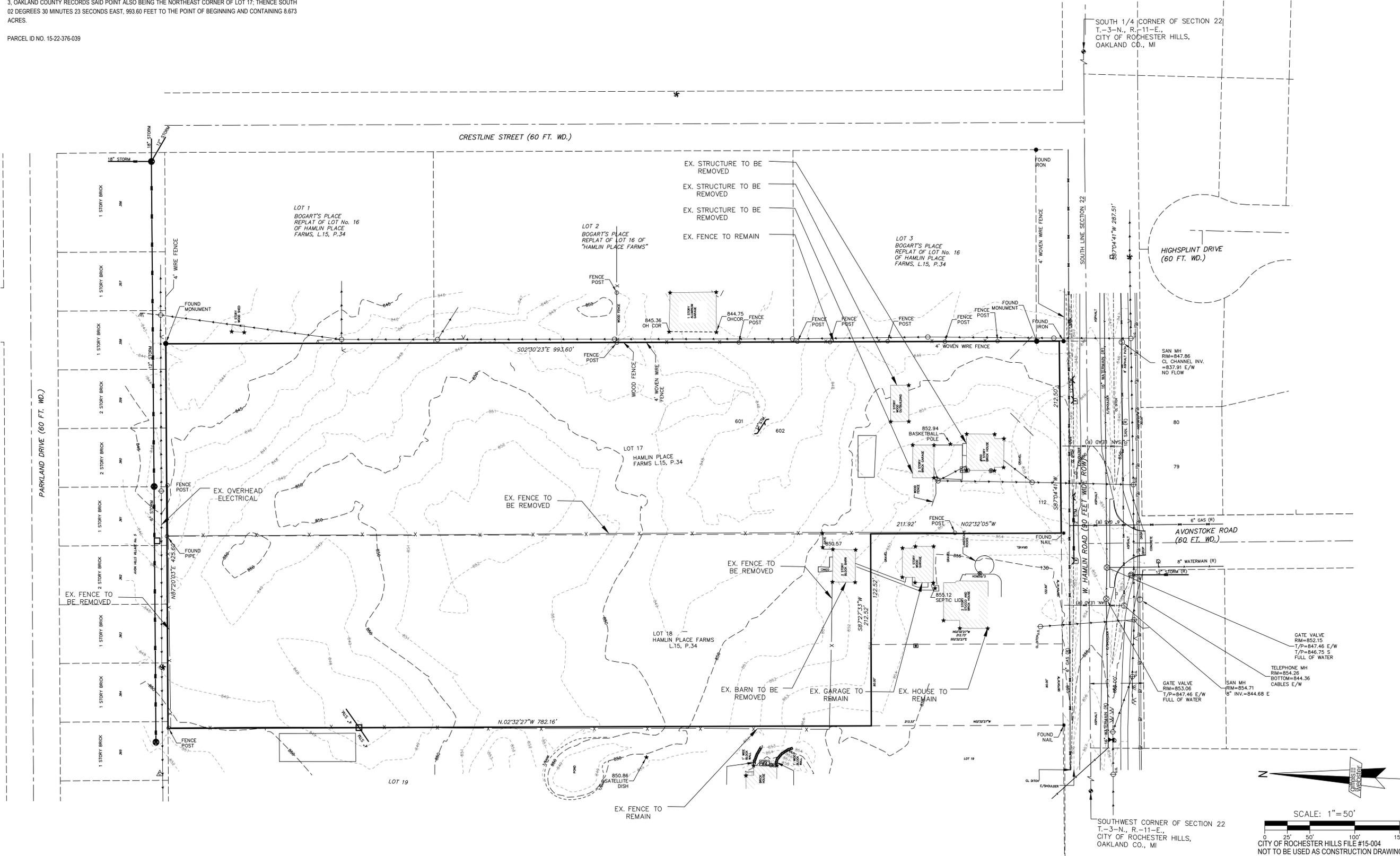
ROCHESTER HILLS  
MICHIGAN

Oakland County

Date:	7/6/15
Scale:	1" = 50'
Sheet:	02
Project:	18701.00

Copyright © 2015 Giffels Webster.  
No reproduction shall be made without the  
written consent of Giffels Webster.

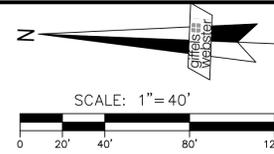
Z:\18701.00 Nottingham Woods\Drawing Files\Site plan\02 Existing Conditions.dwg



SOUTHWEST CORNER OF SECTION 22  
T.-3-N., R.-11-E.,  
CITY OF ROCHESTER HILLS,  
OAKLAND CO., MI

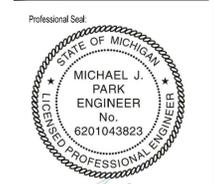
# FIRE DEPARTMENT NOTES:

- CONSTRUCTION SITE SHALL BE SAFEGUARDED IN ACCORDANCE WITH IFC 2006, CHAPTER 14.
- OPEN BURNING IS NOT PERMITTED INCLUDING THE BURNING OF TRASH, DEBRIS, OR LAND CLEARING MATERIALS. OPEN BURNING FOR WARMING OF SAND AND/OR WATER FOR THE PREPARATION OF MORTAR SHALL BE WITHIN THE CITY OF ROCHESTER HILLS BURN PERMIT GUIDELINES. FIRE PRESERVATION ORDINANCE CHAPTER 58, SEC 307.6.2 & 307.6.2.3
- BUILDING CONSTRUCTION TYPE IS V-8.
- PROPOSED INDIVIDUAL BUILDING SIZES WILL RANGE FROM 2,000 SF TO 3,600 SF OF LIVING SPACE.



**giffels webster**  
 Engineers  
 Surveyors  
 Planners  
 Landscape Architects  
 Environmental Specialists  
 6303 26 Mile Road  
 Suite 100  
 Washington, MI 48094  
 p (586) 781-8950  
 f (586) 781-8951  
 www.giffelswebster.com

Executive: P.M.  
 Manager: M.P.  
 Engineer: L.W.  
 Quality Control: N.M.  
 Section:



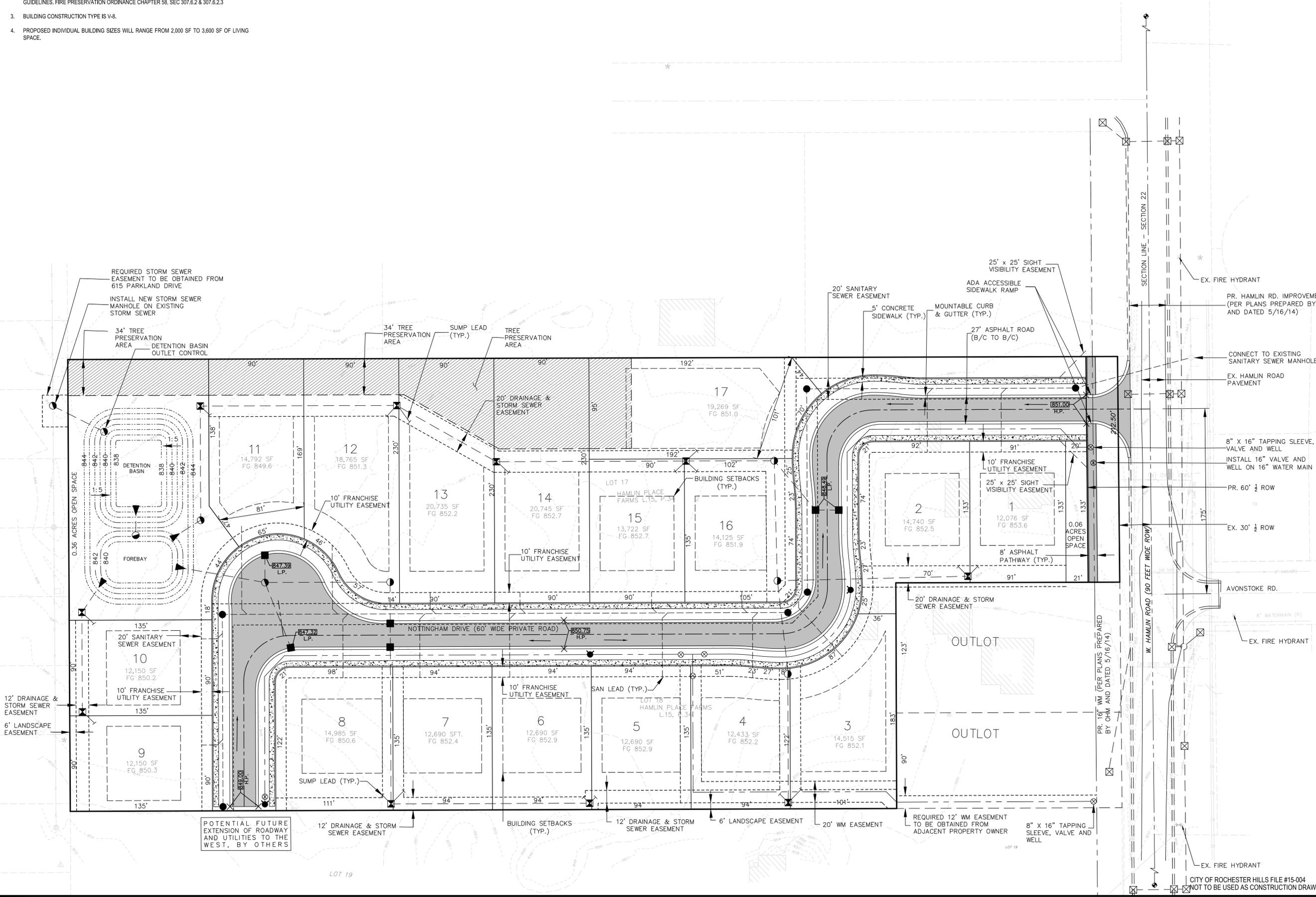
DATE:	ISSUE:
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17

Developed For:  
**VANGUARD COMPANIES**  
 101 S. MAIN STREET  
 ROCHESTER, MI 48037  
 p (248) 650-6206  
 f (248) 650-6274

**SITE PLAN**  
 PRELIMINARY SITE PLAN  
 NOTTINGHAM WOODS  
 ROCHESTER HILLS  
 MICHIGAN  
 Oakland County

Date: 01/27/2016  
 Scale: 1" = 40'  
 Sheet: 03  
 Project: 18701.00

Z:\18701.00 Nottingham Woods\Drawing Files\Site plan\03 Site Plan.dwg



POTENTIAL FUTURE EXTENSION OF ROADWAY AND UTILITIES TO THE WEST, BY OTHERS

CITY OF ROCHESTER HILLS FILE #15-004  
 NOT TO BE USED AS CONSTRUCTION DRAWINGS

Copyright © 2015 Giffels Webster.  
 No reproduction shall be made without the written consent of Giffels Webster.

DETENTION BASIN CALCULATIONS



Detention Design  
Project Name  
Project Number

Completed By Lydia Wakeland  
Working Date November 24, 2015  
Jurisdiction Oakland County

Weighted "C" Calculation

Area (acres)	C	Area x C
Water surfaces 0.00	1.00	0.00
Roofs 1.45	0.95	1.38
Asphalt or concrete pavement 1.17	0.95	1.11
Semi-permeous lawns (HSG A) 5.38	0.18	0.97
<b>Total</b> 8.00		<b>3.46</b>

\*Based on Sandy Loam Soil Types (HSG A) with slopes <6%

$$C = \frac{\text{Area} \times C}{\text{Area}} = \frac{3.46}{8.00} = 0.43$$

Allowable Outflow Calculation

Based on Acreage: Property Area = 8.00 acres

$$Q_p = 0.20 \text{ cfs/acre} \times 8.00 \text{ acres} = 1.60 \text{ cfs}$$

25 YEAR STORM EVENT

Required Storage Volume

$$Q_p = \frac{Q_s}{A \times C} = \frac{1.60}{8.00 \text{ acres} \times 0.43} = 0.46 \text{ cfs per acre impervious}$$

$$T_{25} = -25 + \sqrt{\frac{8,063}{0.46}} = -25 + \sqrt{17,528} = 107 \text{ minutes}$$

$$V_{25} = \frac{12,900}{T_{25} + 25} \times T_{25} \times 40 \times Q_p \times T_{25} = \frac{12,900}{107 + 25} \times 107 \times 40 \times 0.46 \times 107 = 8,476 \text{ cubic feet per acre impervious}$$

$$V_{25} = V_{25} \times A \times C = 8,476 \times 8.00 \times 0.43 = 29,305 \text{ cubic feet}$$

The required infiltration volume is one half inch of rain in a 24-hour storm.

Existing Undisturbed Tree Area = 23,340 square feet  
Credit Infiltration Volume = 1' x 23,340 = 23,340 cubic feet

$$V_{25} = 1,815 \times A \times C = 1,815 \times 8.00 \times 0.43 = 4,408 \text{ cubic feet}$$

The forebay will detain the first flush volume, or first half inch of rain in a 24-hour storm.

$$V_{25} = 1,815 \times A \times C = 1,815 \times 8.00 \times 0.43 = 6,275 \text{ cubic feet}$$

Elevation	Infiltration Basin			Forebay			Detention Pond		
	Area (sq ft)	Incremental Volume (cft)	Cumulative Volume (cft)	Area (sq ft)	Incremental Volume (cft)	Cumulative Volume (cft)	Area (sq ft)	Incremental Volume (cft)	Cumulative Volume (cft)
Freeboard Elevation	844	0	7,857		0	6,884		0	43,962
High Water of Pond	843	0	7,857		0	6,884		16,839	27,123
Top of Forebay Storage	842	0	7,857	4468	3,878	6,884	8099	7,290	13,070
	841	0	7,857	3317	2,806	6,884	6510	5,780	5,780
Bottom of Detention Pond/ Bottom of Forebay	840	5079	7,857	2324	0	6,884	5079	0	0
	839	3805	4,427		0	6,884		0	0
Bottom of Infiltration Storage	838	2688	3,230		0	6,884		0	0

Infiltration Vol. Provided = 7,857 cft    Forebay Vol. Provided = 6,884 cft    Total Vol. Provided = 41,464 cft  
Infiltration Vol. Required = 4,408 cft    Forebay Vol. Required = 6,275 cft    Total Vol. Required = 29,305 cft

**NOTES:**

- SOIL BORINGS, TO DETERMINE SOIL PERCOLATION RATES, WILL BE COMPLETED DURING PREPARATION OF CONSTRUCTION DRAWINGS FOR PERMITTING. IF INSUFFICIENT PERCOLATION RATES ARE INDICATED, THEN DRY WELLS WILL BE REQUIRED FOR PERMITTING AS AN ALTERNATIVE MEANS TO OBTAIN A SUFFICIENT RATE OF INFILTRATION.

SANITARY SEWER CALCULATIONS

SITE SANITARY SEWER DEMAND

Number of Lots = 17

Population = Number of Lots x 3.5 = 17 lots x 3.5 people per lot = 60 people

Average Flow =  $\frac{\text{Population} \times \text{Per Capita Capacity}}{\text{Gallons per Cubic Foot} \times \text{Seconds per Day}}$

$$= \frac{60 \text{ people} \times 100 \text{ gpcpd}}{7.48 \text{ gal/cft} \times 86,400 \text{ sec/day}} = 0.01 \text{ CFS or } 4.13 \text{ GPM}$$

Peaking Factor = 4.00

Peak Flow = Average Flow x Peaking Factor = 0.01 people x 4.00 = 0.04 CFS or 16.53 GPM

EXISTING PIPE CAPACITY

Min. Pipe Slope = 0.40 %  
Pipe Diameter = 8 Inch  
N = 0.013  
Pipe Capacity (Hazen Williams) = 0.76 CFS

ULTIMATE SANITARY SEWER DEMAND (EXTENSION OF SEWER OFF-SITE TO WEST)

Number of Lots = 21

Population = Number of Lots x 3.5 = 21 lots x 3.5 people per lot = 74 people

Average Flow =  $\frac{\text{Population} \times \text{Per Capita Capacity}}{\text{Gallons per Cubic Foot} \times \text{Seconds per Day}}$

$$= \frac{74 \text{ people} \times 100 \text{ gpcpd}}{7.48 \text{ gal/cft} \times 86,400 \text{ sec/day}} = 0.01 \text{ CFS or } 5.10 \text{ GPM}$$

Peaking Factor = 4.00

Peak Flow = Average Flow x Peaking Factor = 0.01 people x 4.00 = 0.05 CFS or 20.42 GPM

EXISTING PIPE CAPACITY

Min. Pipe Slope = 0.40 %  
Pipe Diameter = 8 Inch  
N = 0.013  
Pipe Capacity (Hazen Williams) = 0.76 CFS

WATER FIRE FLOW CALCULATIONS

Design Criteria

Required Fire Flow	1,500 GPM with a residual pressure of 20 psi
Maximum Day Flow	17 REUs x 1,000 gallons/day/REU = 17,000 gallons/day = 12 gpm
Hazen & Williams	C = 120

(1,500 GPM fire suppression + 12 gallon/minute maximum day demand)

Estimate Residual Pressure at Fire Hydrant with 1,512 GPM Demand (1,500 GPM Fire Suppression + 12 GPM Maximum Day Demand)

Residual Flow, Qr (GPM)	Static Pressure @ Test Hydrant	Calculated Residual Pressure @ 1,512 gpm	Residual Pressure at Test Hydrant
1,512	57	$1,512 = Q_r \times \left( \frac{P_s - P_{r1512}}{P_s - P_r} \right)^{0.54}$ $P_{r1512} = 49 \text{ psi}$	44

Residual Pressure at the Furthest Point of Proposed WM (1,512 GPM Demand)

H <sub>f</sub>	L (ft.)	C	Q (gpm)	D (in.)
$H_f = 0.002083 L (100/C)^{1.85} \times (C^{1.85}/d^{4.8655})$ $H_f = 50.3 \text{ ft} = 21.8 \text{ psi}$	1,100	120	1,512	8

$P = P_{r1512} - H_f = 49 - 21.8 = 27.2 \text{ psi}$



Engineers  
Surveyors  
Planners  
Landscape Architects  
Environmental Specialists

6303 26 Mile Road  
Suite 100  
Washington, MI 48094  
p (586) 781-8950  
f (586) 781-8951  
www.giffelswebster.com

Executive: P.M.  
Manager: M.P.  
Engineer: L.W.  
Quality Control: N.M.  
Section:

Professional Seal:



DATE:	ISSUE:
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17

Developed For:

VANGUARD COMPANIES  
101 S. MAIN STREET  
ROCHESTER, MI 48037  
p (248) 650-6206  
f (248) 650-6274

UTILITY CALCULATIONS  
PRELIMINARY SITE PLAN  
NOTTINGHAM WOODS

ROCHESTER HILLS  
MICHIGAN

Oakland County

Date: 7/6/15  
Scale: 1" = 100'  
Sheet: 04  
Project: 18701.00







**STREET TREE PLANT LIST:** XX

TREE REQ.ED 1 PER LOT 17 LOTS 17 TREES PROPOSED (TO BE PLANTED BY THE CITY)

TREES:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	4	RED MAPLE	ACER RUBRUM 'OCTOBER GLORY'	3" CAL. B&B	RM
	4	SWEETGUM	LIGUSTRUM STRYFOFLIA	3" CAL. B&B	SG
	4	TULIP TREE	LIRIODENDRON TULIPIFERA	3" CAL. B&B	TU
	4	CHINKAPIN OAK	QUERCUS MUEHLENBERGII	3" CAL. B&B	CK
	1	SHAGBARK HICKORY	CARYA OVATA	3" CAL. B&B	SH

**GREENBELT PLANT LIST:** XXX

REQ.ED 6 DECIDUOUS TREE; 4 ORNAMENTAL TREES = 6 DECIDUOUS TREES; 4 ORNAMENTAL TREES PROPOSED

PERENNIALS:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	28	OBISDIAN CORAL BELLS	HEUCHERA 'OBISDIAN'	1 GAL. POT	PUB
	15	FOUNTAIN GRASS	PENNISETUM ALOPECUROIDES	1 GAL. POT	FOU

SHRUBS:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	24	BRIDALWEATH SPIREA	SPIRAEA PRUNIFOLIA	24" SP.	SPY
	6	SKYROCKET JUNIPER	JUNIPERUS SCOPULORUM 'SKYROCKET'	5-6" HT.	SKY
	15	GROW-LOW SUMAC	Rhus ARMATA 'GRC-Low'	24" SP.	SUM

TREES:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	5	LONDON PLANE TREE	PLATANUS X ACERIFOLIA	3" CAL. B&B	LP
	3	SHAGBARK HICKORY	CARYA OVATA	3" CAL. B&B	SH
	4	KOREAN LILAC TREE	SYRINGA MEYERI 'PALUBIN (TREE FORM)'	3" CAL. B&B	LI
	9	WHITELAR	ABIES CONCOLOR	6-7" TALL B&B	CF
	42	WHITE SPRUCE	PICEA LAUCA	6-7" TALL B&B	WS
	6	PYRAMIDAL ENGLISH OAK	QUERCUS ROBUR 'FASTIGIATA'	3" CAL. B&B	EO

**DETENTION PLANT LIST:** XXX

REQ.ED 11 TREES; 8 EVERGREEN TREES; 30 SHRUBS = 1522/35 = 4.34 = 11 DECIDUOUS TREES; 8 EVERGREEN TREES; 30 SHRUBS PROPOSED

PERENNIALS:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	54	GREAT BLUE LOBELIA	LOBELIA SIPHILITICA	1 GAL. POT	GBL

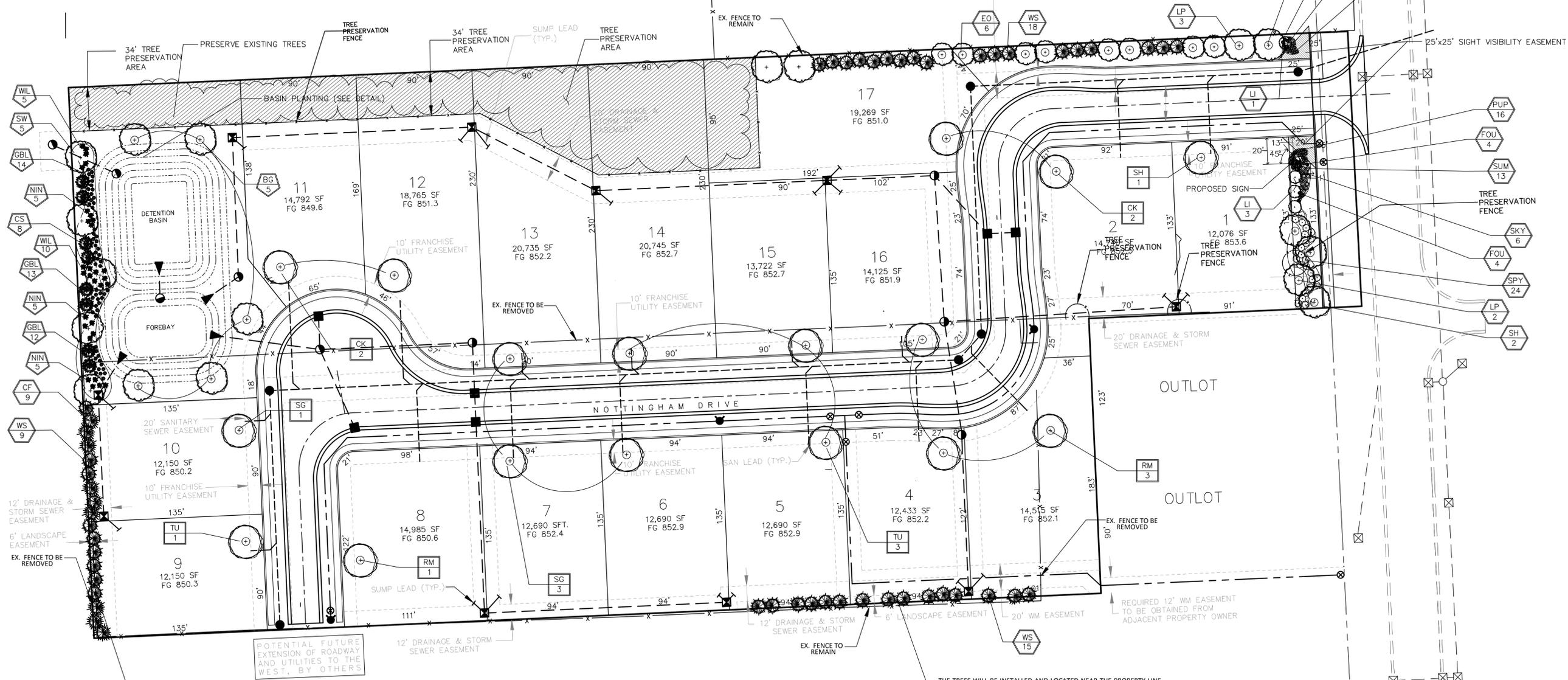
SHRUBS:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	15	SUMMER WINE NINEBARK	PHYSOCARPUS OPULIFOLIUS	30" TALL	NIN
	15	DAPPLIED WILLOW	SALIX INT. 'HAKURO NISHIKI'	24" TALL	WIL

DECIDUOUS TREES:	NO.	COMMON NAME	BOTANICAL NAME	SIZE	SYMBOL
	51	BLACK GUM	NYSSA SYLVATICA	3" CAL. B&B	BG
	5	SOURWOOD	OXYDENDRUM ARBOREUM	3" CAL. B&B	SW
	8	COLORADO SPRUCE	PICEA PUNGENS	6-7" TALL B&B	CS

**NOTES**

- PRIOR APPROVAL IS REQUIRED TO PLANT ANY TREE OR SHRUB ON THE PUBLIC RIGHT-OF-WAY.
- ALL TREES AND SHRUBS MUST BE PLANTED AT LEAST 10' FROM THE EDGE OF THE PUBLIC ROAD. (TREES MUST BE PLANTED AT LEAST 15' AWAY FROM CURB OR ROAD EDGE WHERE THE SPEED LIMIT IS MORE THAN 35 MPH.) SHADE TREES AND SHRUBS MUST BE PLANTED AT LEAST 5' FROM THE EDGE OF THE PUBLIC WALKWAY. EVERGREEN AND ORNAMENTAL TREES MUST BE PLANTED AT LEAST 10' FROM THE PUBLIC WALKWAY.
- NO TREES OR SHRUBS MAY BE PLANTED WITHIN THE TRIANGULAR AREA FORMED AT THE INTERSECTION OF ANY STREET RIGHT-OF-WAY LINES AT A DISTANCE ALONG EACH LINE OF 25' FROM THEIR POINT OF INTERSECTION. NO TREES OR SHRUBS MAY BE PLANTED IN THE TRIANGULAR AREA FORMED AT THE INTERSECTION OF ANY DRIVEWAY WITH A PUBLIC WALKWAY AT A DISTANCE ALONG EACH LINE OF 15' FROM THEIR POINT OF INTERSECTION.
- ALL TREES AND SHRUBS MAY BE PLANTED AT LEAST 10' FROM ANY FIRE HYDRANT. SHADE AND EVERGREEN TREES MUST BE PLANTED AT LEAST 15' AWAY FROM THE NEAREST OVERHEAD WIRE. TREES MUST BE PLANTED A MINIMUM OF 5' FROM AN UNDERGROUND UTILITY, UNLESS THE CITY'S LANDSCAPE ARCHITECT REQUIRES A GREATER DISTANCE.
- PRIOR TO THE RELEASE OF THE PERFORMANCE BOND, THE CITY OF ROCHESTER HILLS FORESTRY DIVISION NEEDS TO INSPECT ALL TREES, EXISTING OR PLANTED, TO IDENTIFY ANY THAT POSE A HAZARD TO THE SAFE USE OF PUBLIC RIGHT-OF-WAY. FORESTRY MAY REQUIRE THE DEVELOPER TO REMOVE, AND POSSIBLY REPLACE, ANY SUCH TREES.
- ALL PLANTING AREAS TO BE IRRIGATED
- PARCEL BOUNDARY IS THE LIMITS OF GRADING
- PRIOR TO THE RELEASE OF THE PERFORMANCE BOND, THE CITY OF ROCHESTER HILLS MUST INSPECT ALL LANDSCAPING PLANTINGS AND THE OPERATION OF THE IRRIGATION SYSTEM.
- IRRIGATION WILL ONLY OCCUR BETWEEN THE HOURS OF 12AM AND 5AM.
- ALL SIGNS MUST MEET THE REQUIREMENTS OF SECTION 138-12.306 AND CHAPTER 134 OF THE CITY OF ORDINANCES AND BE APPROVED UNDER SEPARATE PERMITS ISSUED BY THE BUILDING DEPARTMENT.
- THE PROPOSED STREET TREES ARE TO BE PLANTED IN THE ROW AFTER CONSTRUCTION OF THE PROJECT IS COMPLETED. APPLICANT SHALL PAY \$700 PER LOT TO ACCOUNT FOR PLANTINGS.

ITEM	QUANT.	UNIT PRICE	TOTAL
Stone Sign	1	\$10,000.00	\$10,000.00
Red Maple	4	\$350.00	\$1,400.00
Sweetgum	4	\$400.00	\$1,600.00
Tulip Tree	4	\$350.00	\$1,400.00
Chinkapin	4	\$400.00	\$1,600.00
Shagbark Hickory	4	\$400.00	\$1,600.00
London Plane Tree	5	\$350.00	\$1,750.00
Korean Lilac Tree	4	\$400.00	\$1,600.00
Black Gum	5	\$400.00	\$2,000.00
Pyramidal English Oak	6	\$400.00	\$2,400.00
White Fir	11	\$400.00	\$4,400.00
Sourwood	6	\$350.00	\$2,100.00
White Spruce	42	\$350.00	\$14,700.00
Colorado Spruce	8	\$400.00	\$3,200.00
Bridal Weath Spiraea	24	\$35.00	\$840.00
Skyrocket Juniper	6	\$70.00	\$420.00
Grow-Low Sumac	15	\$35.00	\$525.00
Summer Wine Ninebark	15	\$45.00	\$675.00
Dappled Willow	15	\$45.00	\$675.00
Obisidian Coral Bells	28	\$15.00	\$420.00
Fountain Grass	15	\$15.00	\$225.00
Great Blue Lobelia	54	\$15.00	\$810.00
Mulch by the Yard installed	25	\$50.00	\$1,250.00
Planting Soil by the Yard installed	25	\$70.00	\$1,750.00
Irrigation System installed	1	\$15,000.00	\$15,000.00
# of Lb's Native Seed Pond Mix	20	\$100.00	\$2,000.00
# of Yards of Sod installed	4,100	\$2.50	\$10,250.00
<b>Sub-Total</b>			<b>\$84,590.00</b>
<b>10% Contingency</b>	0	\$0.00	<b>\$8,459.00</b>
<b>GRAND TOTAL</b>			<b>\$93,049.00</b>



**giffels webster**  
 Engineers  
 Surveyors  
 Planners  
 Landscape Architects  
 Environmental Specialists  
 6303 26 Mile Road  
 Suite 100  
 Washington, MI 48094  
 p (586) 781-8950  
 f (586) 781-8951  
 www.giffelswebster.com

Executive:	P.M.
Manager:	M.P.
Engineer:	L.W.
Quality Control:	N.M.
Section:	



72 HOURS (1 WORKING DAYS)  
**BEFORE YOU DIG**  
 CALL MISS DIG  
 800-482-7171  
 OR 811  
 (TOLL FREE)

DATE:	ISSUE:
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17
01.20.2016	REVISED PER NEIGHBORHOOD MEETING

Developed For:	
VANGUARD COMPANIES	
101 S. MAIN STREET ROCHESTER, MI 48037	
p (248) 650-6206 f (248) 650-6274	
LANDSCAPE PLAN PRELIMINARY SITE PLAN NOTTINGHAM WOODS	
ROCHESTER HILLS MICHIGAN	
Oakland County	

Date:	01/27/2016
Scale:	1" = 40'
Sheet:	LA-01
Project:	18701.00

Executive:	P.M.
Manager:	M.P.
Engineer:	L.W.
Quality Control:	N.M.
Section:	

Professional Seal:



DATE	ISSUE
03.05.2015	PRELIM. SITE PLAN SUBMITTAL
07.06.2015	REVISED PER CITY REVIEW
08.04.2015	REVISED PER CITY REVIEW
10.23.2015	REVISED PER PC REVIEW
12.02.2015	RELOCATE LOT 17

Developed For:

VANGUARD COMPANIES  
101 S. MAIN STREET  
ROCHESTER, MI 48037

p (248) 650-6206  
f (248) 650-6274

LANDSCAPE  
DETAILS  
PRELIMINARY SITE PLAN  
NOTTINGHAM WOODS

ROCHESTER HILLS  
MICHIGAN  
Oakland County

Date:	7/6/15
Scale:	N/A
Sheet:	LA-02
Project:	18701.00

**PLANT NOTES:**

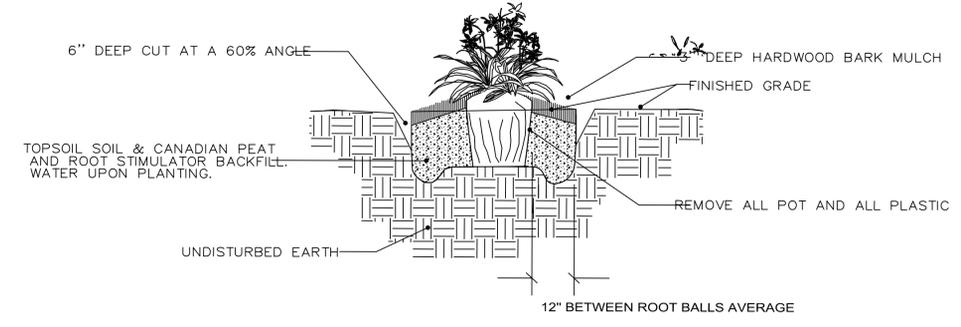
- A. The Planning Department may approve an alternative form of irrigation for a particular site, or may waive this requirement upon determining that underground irrigation is not necessary for the type of proposed plant materials.
- B. All automatic irrigation systems shall be designed to minimize water usage, and shall be shut off during water emergencies, periods of protracted rainfall, or water rationing periods.
- C. The irrigation requirement may be waived by the reviewing authority if the project incorporates landscaping that will contribute points towards LEED certification or an equivalent rating system.
- D. The applicant may be required to post a Performance Bond prior to the issuance of a temporary or final Certificate of Occupancy to ensure the completion of landscaping (including irrigation). If the landscaping is not 100% complete when any certificate of occupancy is requested, the City will inspect the landscaping and determine the percentage of completion and a performance bond must be submitted to the City by the Developer in the sum equal to the unfinished portion of the landscape work. The City will have the authority to determine the percentage of completion and the bond amount required. If the landscaping is 100% complete and approved no Performance Bond will be required.
- E. Maintenance Bond. A Maintenance Bond in the sum of 25% of estimated cost of landscaping (including irrigation) must be posted prior to the issuance of any Certificate of Occupancy (including temporary). The Maintenance Bond is held for a period 2 years, at the end of which time the City shall inspect the landscaping. Once, inspection issues are addressed the unused balance of the Maintenance Bond will be released.

**Maintenance**

- The owner of the property shall be responsible for all maintenance of site landscaping, as follows:
- A. Landscaping shall be kept in a neat, orderly and healthy growing condition, free from debris and refuse.
  - B. Pruning shall be minimal at the time of installation, only to remove dead or diseased branches. Subsequent pruning shall assure proper maturation of plants to achieve their approved purpose.
  - C. All dead, damaged, or diseased plant material shall be removed immediately and replaced within six (6) months after it dies or in the next planting season, whichever occurs first. For purposes of this Section, the planting season for deciduous plants shall be between March 1 and June 1 and from October 1 until the prepared soil becomes frozen. The planting season for evergreen plants shall be between March 1 and June 1. Plant material installed to replace dead or diseased material shall be as close as practical to the size of the material it is intended to replace. The City may notify property owners of the need to replace dead, damaged, or diseased material.
  - D. The approved landscape plan shall be considered a permanent record and integral part of the Site Plan Approval. Unless otherwise approved in accordance with the aforementioned procedures, any revisions to or removal of plant materials, or non-compliance with the maintenance requirements of this Section 138-2.109 will place the parcel in non-conformity with the approved landscape plan and be a violation of this Ordinance.
  - E. If protected trees are damaged, a fine shall be issued on an inch-by-inch basis at a monetary rate as defined by the Forestry Department.

**Installation:**

All landscaping shall be installed in a manner consistent with the standards of the American Association of Nurserymen, the approved site plan, and the following:



PERENNIAL PLANTING DETAIL  
NO SCALE

**LAWN SEED MIX:**

- 30% PERENNIAL RYGRASS
- 20% PARK KENTUCKY BLUEGRASS
- 45% CREEPING RED FESCUE
- 5% ANNUAL RYGRASS
- 4\*/1000 S.F. SEEDING RATE

**Bio Retention Native Seed Mix:**

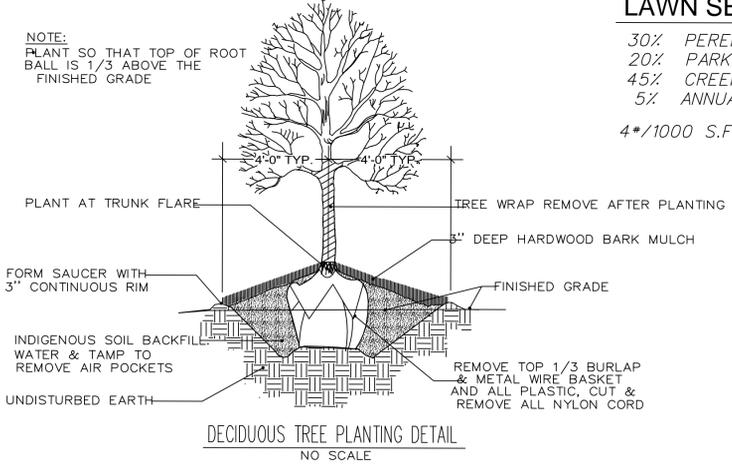
10 pounds

**Temporary Cover:**

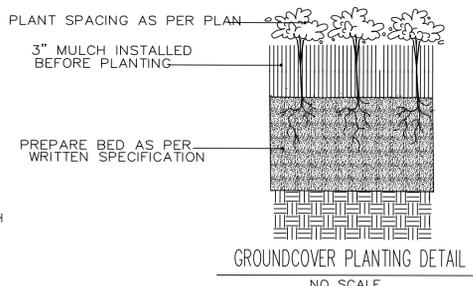
Common Name	Scientific Name	Color	Bloom Time	Oz.
Mexican Aster	Cosmos Bipinnatus	White, Purple	June-August	140
Annual Rye	Lolium perenne	-	-	100

**Grasses:**

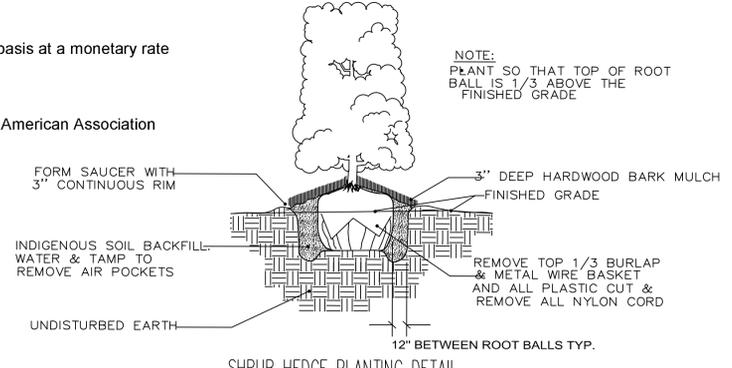
Common Name	Scientific Name	Oz.
Little Bluestem Grass	Schizachyrium scoparium	80



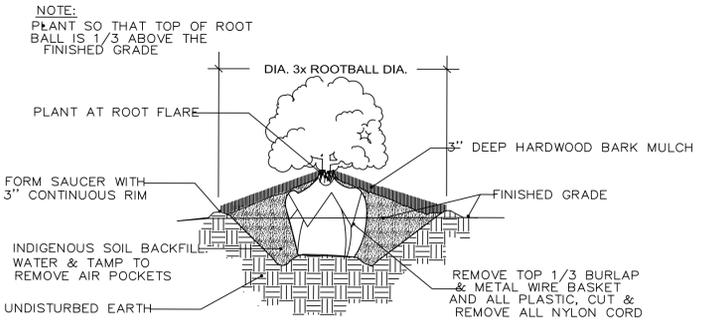
DECIDUOUS TREE PLANTING DETAIL  
NO SCALE



GROUNDCOVER PLANTING DETAIL  
NO SCALE



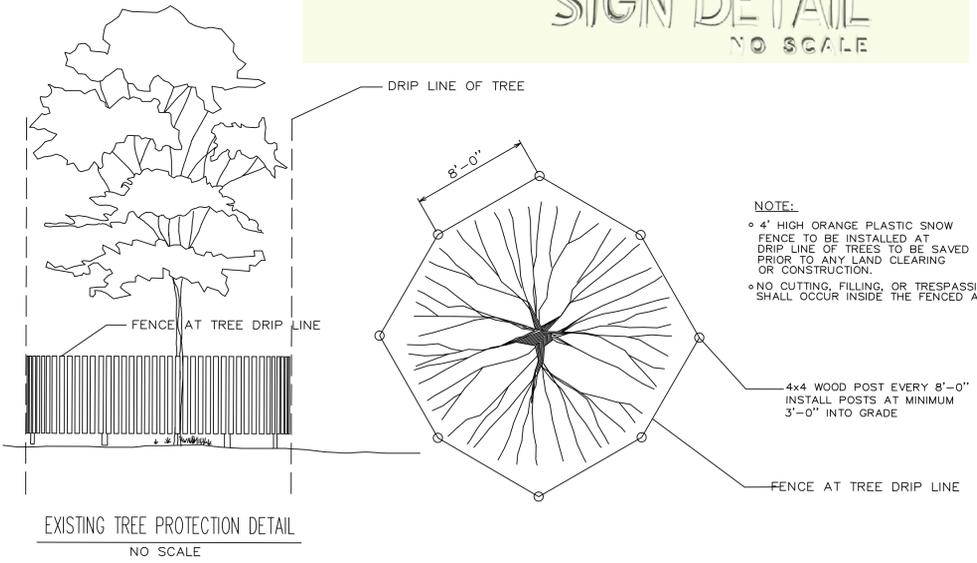
SHRUB HEDGE PLANTING DETAIL  
NO SCALE



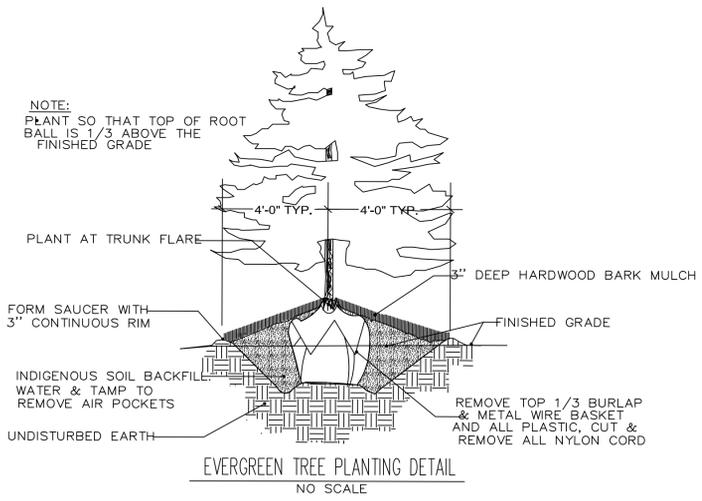
SHRUB PLANTING DETAIL  
NO SCALE



SIGN DETAIL  
NO SCALE



EXISTING TREE PROTECTION DETAIL  
NO SCALE



EVERGREEN TREE PLANTING DETAIL  
NO SCALE