

FINAL ENGINEERING

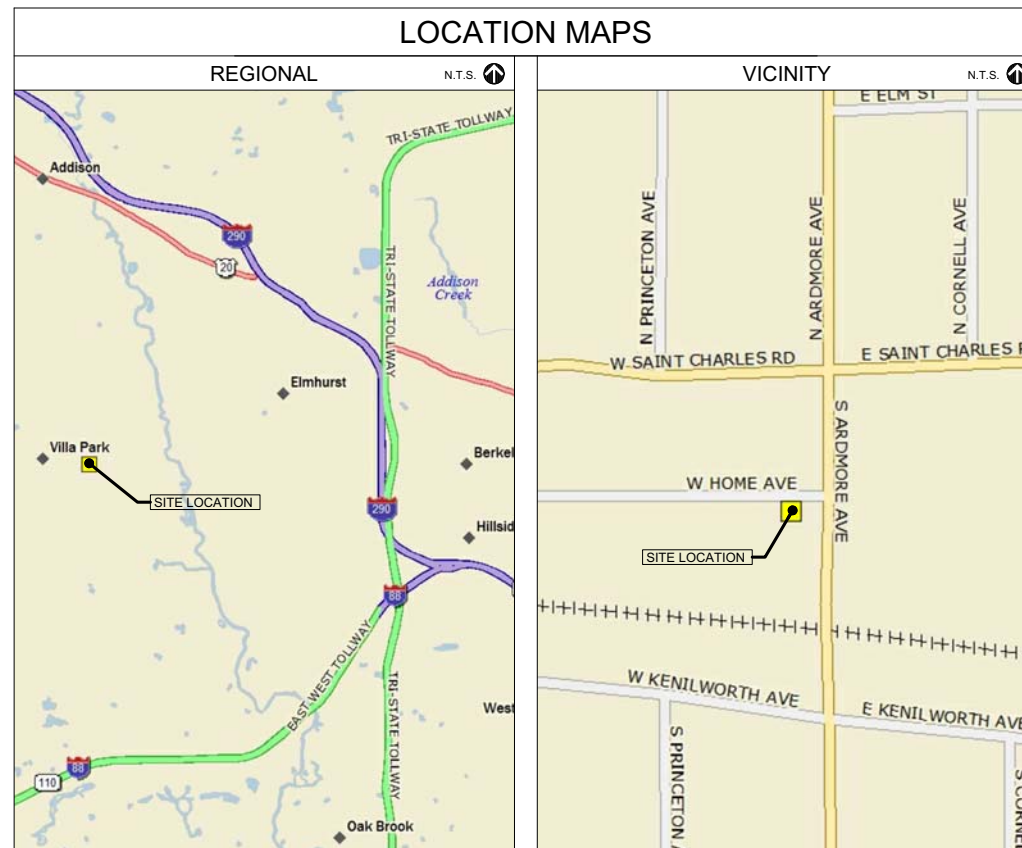
FOR

VILLAGE OF VILLA PARK WATER TANK GROUNDING

11 W. HOME AVE. VILLA PARK, IL 60181

LEGEND		
DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER		
STORM SEWER		
COMBINED SEWER		
WATERMAIN		
GAS		
TELEPHONE		
ELECTRIC		
OVER HEAD WIRE		
CURB		
FENCE		
STORM CATCHBASIN OR MANHOLE, OPEN LID STRUCTURE		
SANITARY MANHOLE OR STORM MANHOLE		
INLET & FLARED END SECTION		
SEWER CLEANOUT		
FIRE HYDRANT & VALVE VAULT		
SIAMASE CONNECTION & B-BOX		
WATER METER VAULT		
LIGHTS		
UTILITY POLE & GUY ANCHOR		
DRAINAGE ARROWS		
ELEVATIONS		
TOP OF CURB		
TOP OF DEPRESSED CURB		
EDGE OF PAVEMENT		
OVERLAND OVERFLOW		
SOIL BORINGS		
TRAFFIC SIGN		
TRAFFIC ARROW		
PARKING STALL COUNT		
CONCRETE		
WETLAND		
MAIL BOX		
TRAFFIC SIGNAL BOX		
TELEPHONE BOX		
FOUND IRON PIPE		
SET IRON PIPE		
FOUND IRON ROD		
SET IRON ROD		
FOUND CUT CROSS		
SET CUT CROSS		
FOUND P.K. NAIL		
SET P.K. NAIL		
FOUND CONCRETE MONUMENT		
SET CONCRETE MONUMENT		
MEASURED (50.00')		
RECORDED (50.00')		
POINT OF COMMENCEMENT P.O.C.		
POINT OF BEGINNING P.O.B.		
ARC RADIUS A		
CHORD BEARING CHDBRG		
POINT OF CURVATURE PIC		
POINT OF TANGENCY PIT		
TOP OF FOUNDATION TIF		
FINISHED FLOOR FIF		
TOP OF CURB TIC		
BACK OF CURB BOC		
FACE OF CURB FOC		
EDGE OF PAVEMENT EOP		
PRIORITY LINE PL		

ALL DIMENSIONS, COORDINATES, AND PROPOSED GRADES ARE REFERENCED TO THE EDGE OF PAVEMENT UNLESS OTHERWISE INDICATED. OPEN SYMBOLS AND DASHED LINES INDICATE EXISTING CONDITIONS.



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No.	SHEET TITLE	REV. #
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CONSULTANT TEAM	
CIVIL ENGINEER:	TERRA CONSULTING GROUP, LTD. 600 BUSSE HIGHWAY PARK RIDGE, IL 60068
	TOM ZIMMERMANN 847-698-6400 tzimm@terrailltd.com
ELECTRICAL ENGINEER:	CHRISTOPHER DOWSE CONSULTING ENGINEERS P.O. BOX 722 OAK PARK, IL 60303
	CHRIS DOWSE, P.E. 708-358-8957 CDowse5604@aol.com

OPERATES 24 HOURS
A DAY 365 DAYS A YEAR



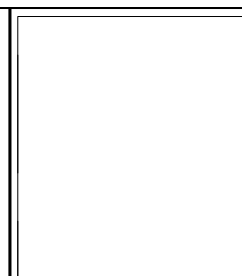
SITE BENCHMARK:
NORTHWEST CORNER FLANGE BOLT OF HYDRANT
LOCATED JUST NORTH OF WATER TOWER
ELEVATION = 100.00 (ASSUMED)



DRAWN BY:	PP
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
TITLE SHEET

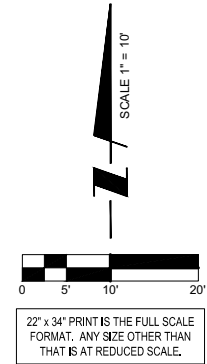
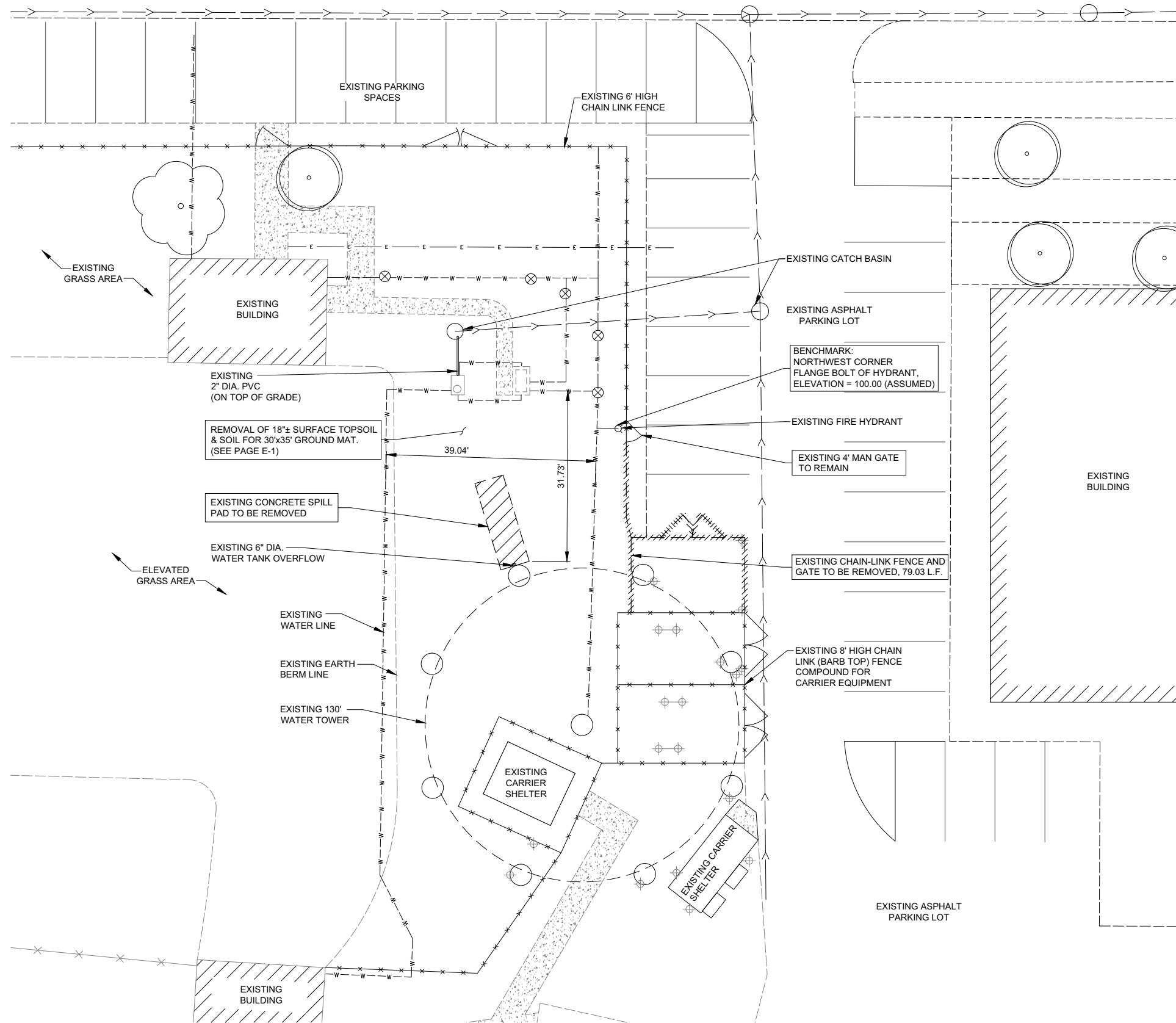
SHEET NUMBER
T-1



REVISIONS	
NO.	DESCRIPTION
1	ISSUED FOR REVIEW
2	VILLAGE REVIEW #1
3	ISSUED FOR BIDDING AND CONSTRUCTION

BY	DATE	PP	KSB	JLR
	06/09/16			
	06/30/16			
	6/24/16			

W HOME AVE.



REVISIONS

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR REVIEW	06/09/16	PP
	VILLAGE REVIEW #1	06/30/16	KSB

VILLAGE OF VILLA PARK WATER TANK GROUNDING

11 W. HOME AVE.
VILLA PARK, IL 60181

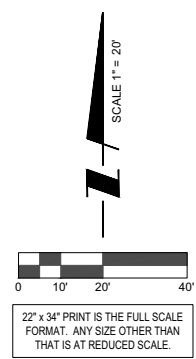
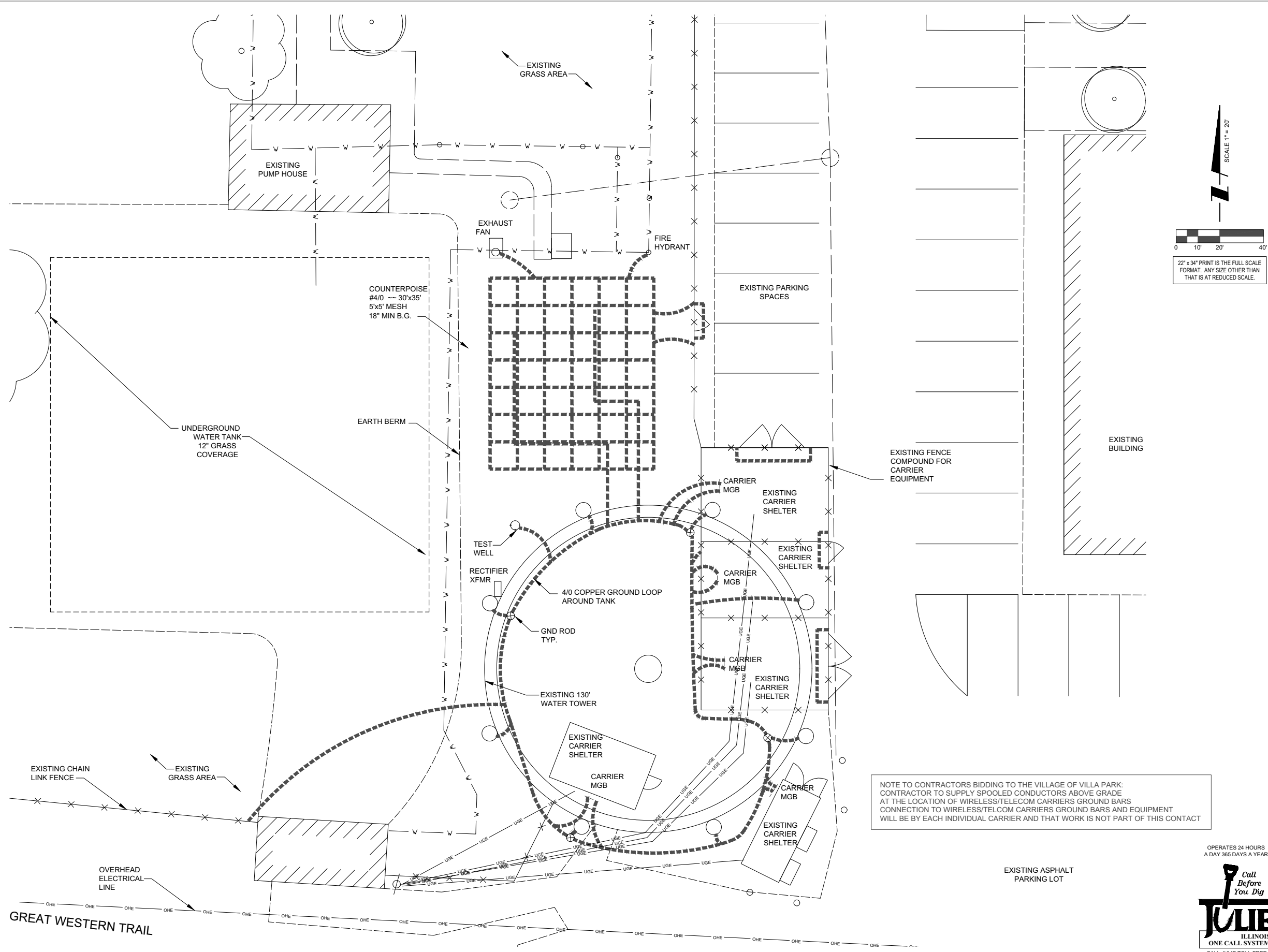
DRAWN BY:	PP
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
DEMOLITION PLAN

SHEET NUMBER
DEMO

1 ENGINEERING SITE PLAN
SCALE: 1" = 10'





NOTE TO CONTRACTORS BIDDING TO THE VILLAGE OF VILLA PARK:
 CONTRACTOR TO SUPPLY SPOOLED CONDUCTORS ABOVE GRADE
 AT THE LOCATION OF WIRELESS/TELECOM CARRIERS GROUND BARS
 CONNECTION TO WIRELESS/TELECOM CARRIERS GROUND BARS AND EQUIPMENT
 WILL BE BY EACH INDIVIDUAL CARRIER AND THAT WORK IS NOT PART OF THIS CONTACT

1 LOCATION PLAN
 SCALE: 1/8"=1'-0"

TERRA
 CONSULTING ENGINEERS, LTD.
 600 Busse Highway
 Park Ridge, IL 60068
 Ph: 847/698-6400
 Fax: 847/698-6401

PROFESSIONAL ENGINEER
 CHRISTOPHER J. DOWSE
 No. 00000000
 STATE OF ILLINOIS
 4/22/16
 ELEC.
 Exp. 11/30/2017

DOWSE CONSULTING ENGINEERING
 Electrical Engineering
 P.O. Box 7122
 Oak Park, IL 60303
 Cell: (708) 465-6148

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR REVIEW	5/23/16	JAY
2	ISSUED FOR BIDDING AND CONSTRUCTION	6/24/16	JAY

**VILLAGE OF VILLA PARK
 WATER TANK
 GROUNDING**
 11 W. HOME AVE
 VILLA PARK, IL 60181

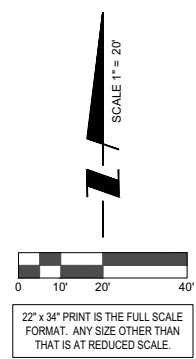
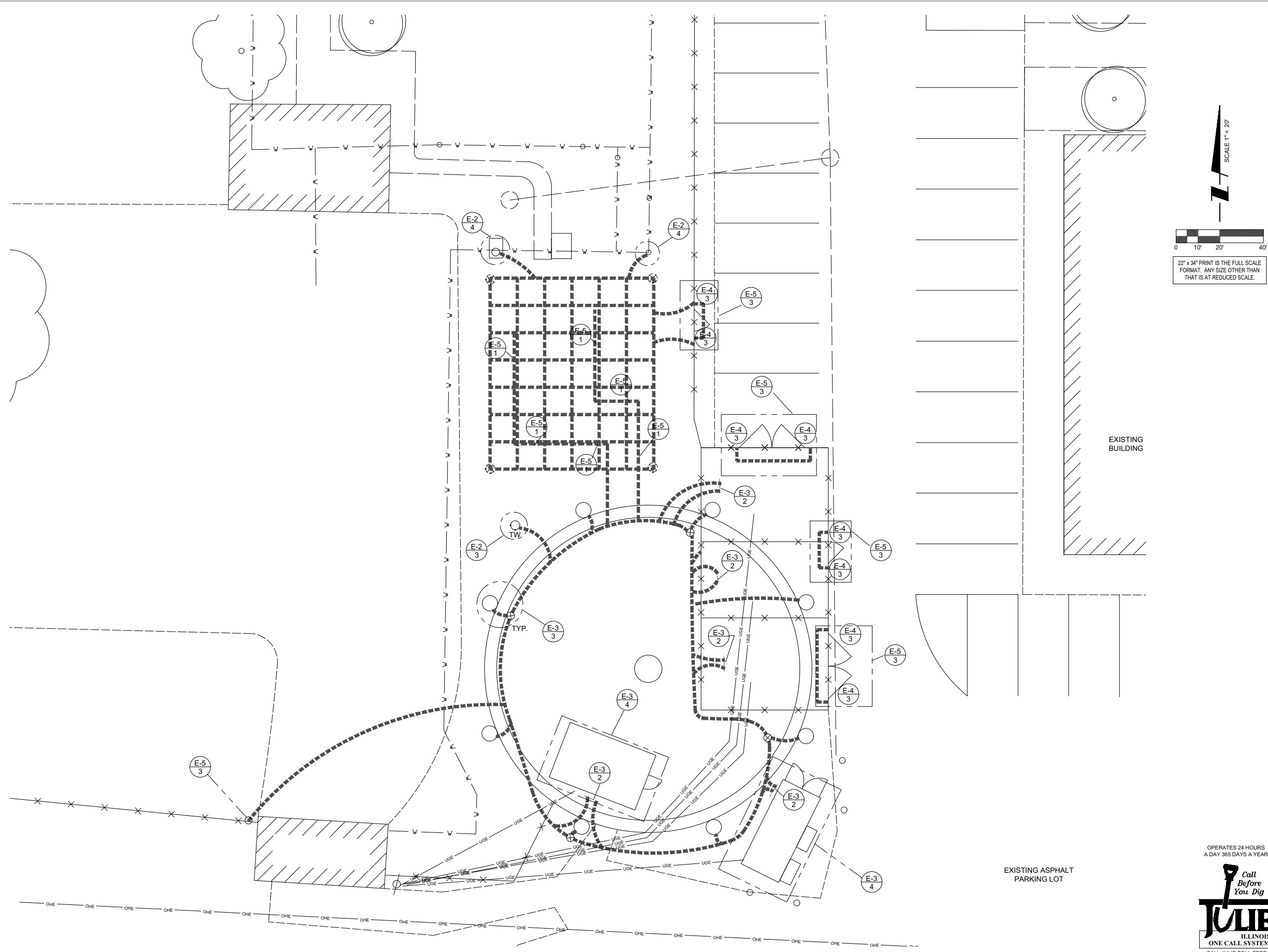
DRAWN BY:	JAY
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
**COUNTERPOISE
 GROUNDING PLAN**

SHEET NUMBER
E-1

OPERATES 24 HOURS
 A DAY 365 DAYS A YEAR

Call Before You Dig
JULIE
 ILLINOIS
 ONE CALL SYSTEM
 CALL JULIE TOLL FREE
 1(800) 892-0123
 48 HOURS BEFORE
 YOU DIG



1 LOCATION PLAN
SCALE: 1/8"=1'-0"

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MULTIMEDIA CONSULTING, LTD.

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Electrical Engineering
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NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR REVIEW	5/23/16	JAY
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VILLA PARK, IL 60181

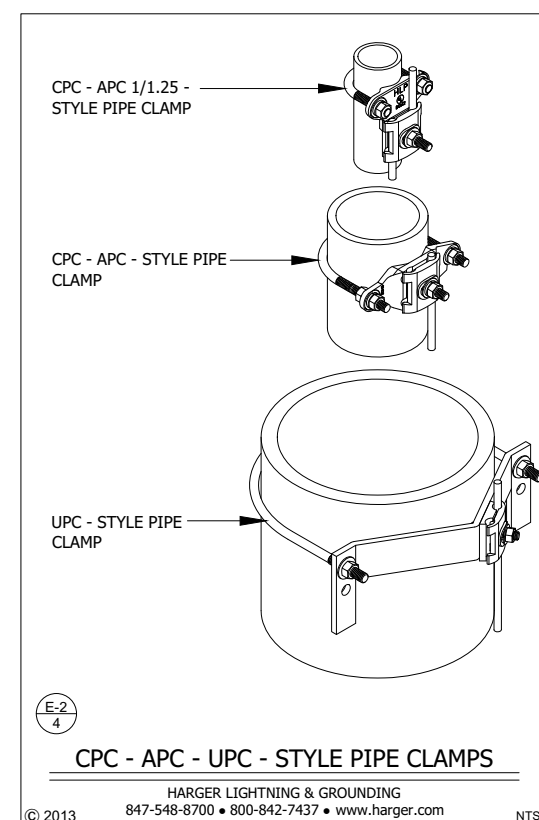
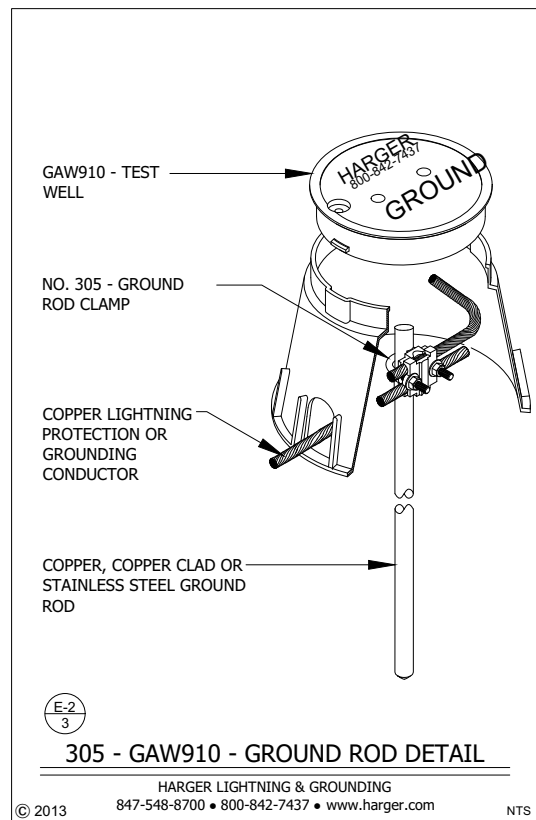
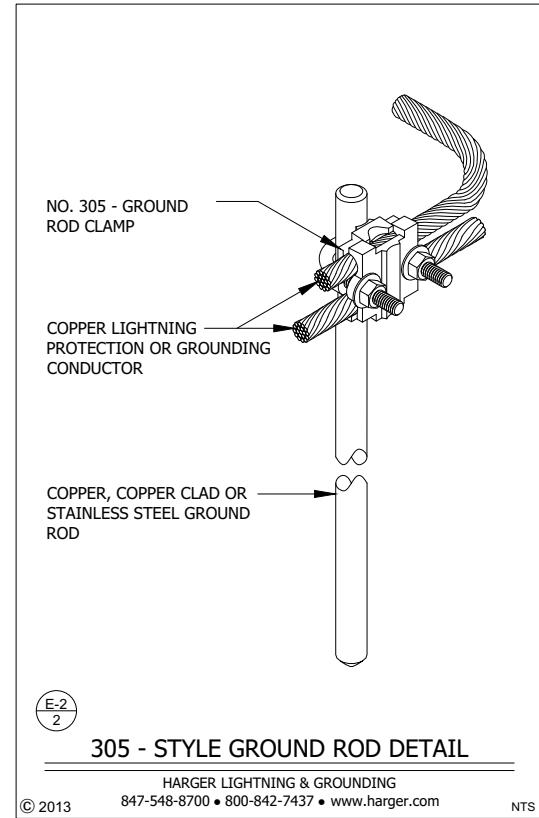
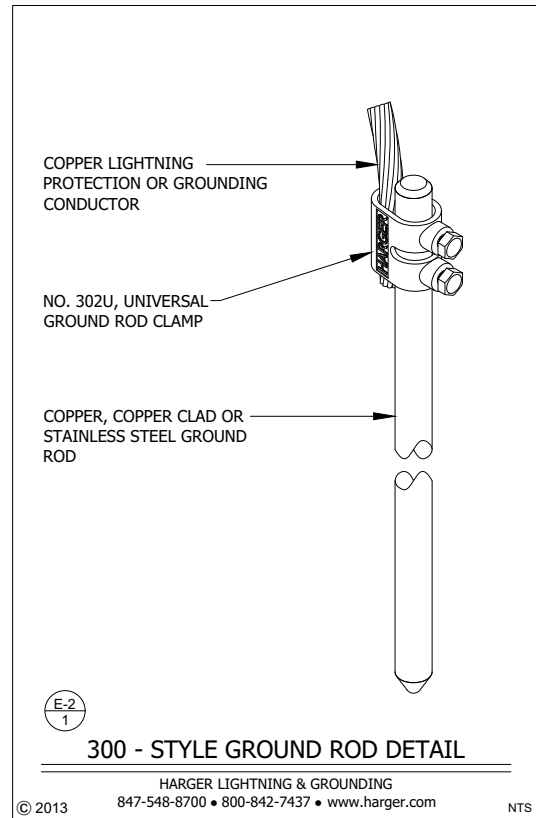
DRAWN BY:	JAY
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
DETAIL REFERENCE GROUNDING PLAN

SHEET NUMBER
E-1.1

OPERATES 24 HOURS
A DAY 365 DAYS A YEAR

Call Before You Dig
JULIE
ILLINOIS
ONE CALL SYSTEM
CALL JULIE TOLL FREE
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48 HOURS BEFORE
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REVISIONS

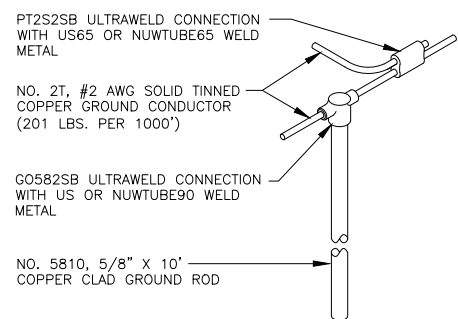
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1	ISSUED FOR REVIEW	5/23/16	JAY
1	OWNER REVISIONS	6/12/16	JAY
2	ISSUED FOR BIDDING AND CONSTRUCTION	6/24/16	JAY

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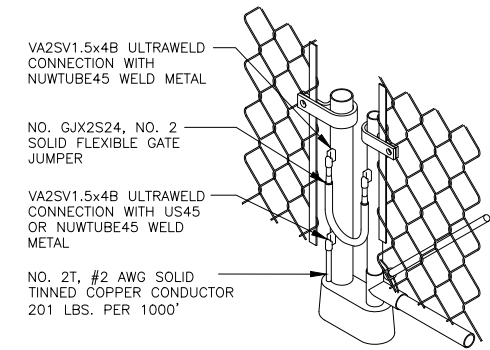
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GROUNDING DETAILS

SHEET NUMBER
E-2



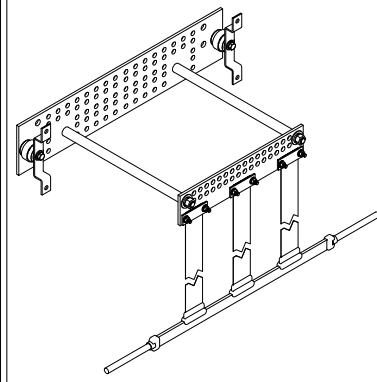
GROUND ROD DETAIL "G"

E-4
2 NTS



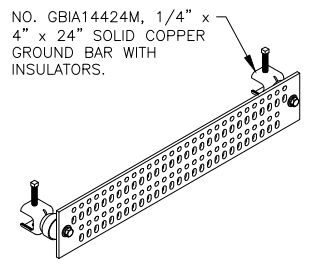
FENCE GROUNDING DETAIL "FG"

E-4
3 NTS



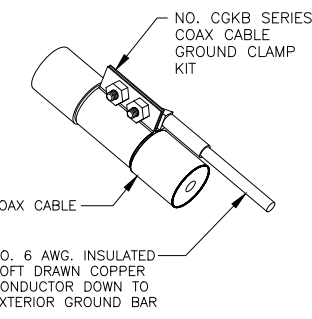
ENTRANCE PANEL DETAIL "EPK"

E-4
4 NTS



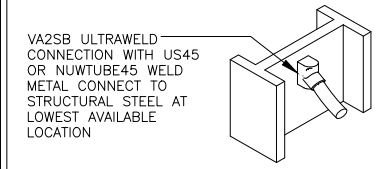
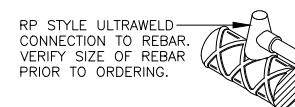
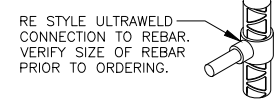
GROUND BAR DETAIL "GB"

E-4
5 NTS

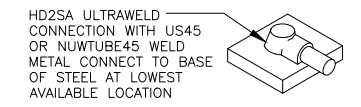
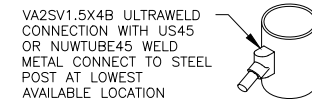


COAX GROUNDING DETAIL "CGK"

E-4
6 NTS



E-4
7



ULTRAWELD DETAILS

NTS

HARGER LIGHTNING PROTECTION-GROUNDING-EXOTHERMIC
 301 ZIEGLER DRIVE GRAYSLAKE, IL 60030 (847) 548-8700

TYPICAL WIRELESS COMMUNICATION SITE EXTERIOR GROUNDING DETAILS

HARGER LIGHTNING & GROUNDING
 847-548-8700 • 800-842-7437 • www.harger.com

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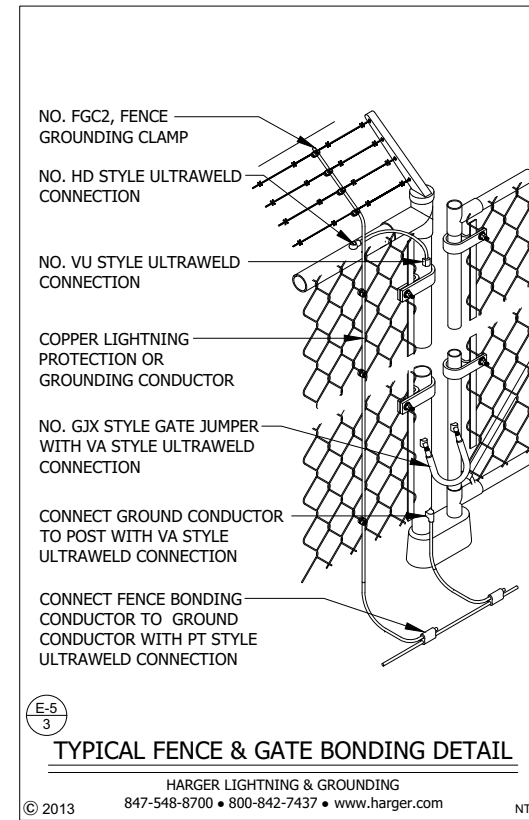
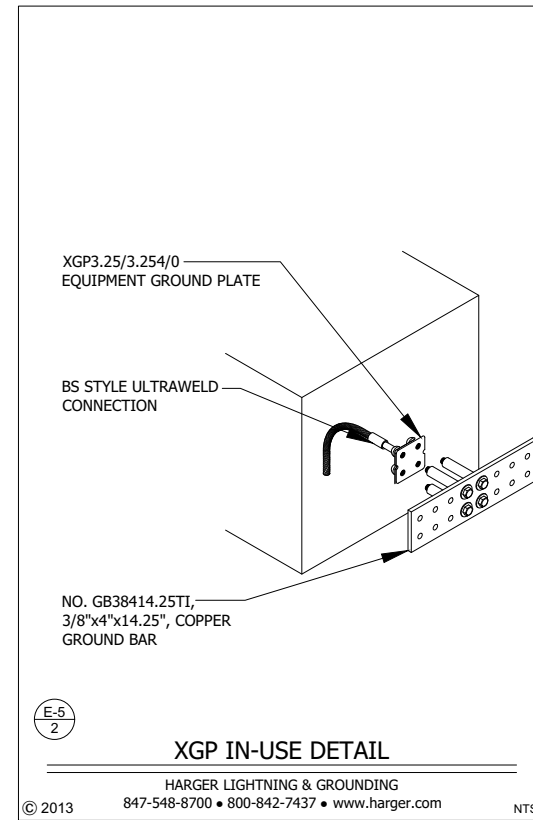
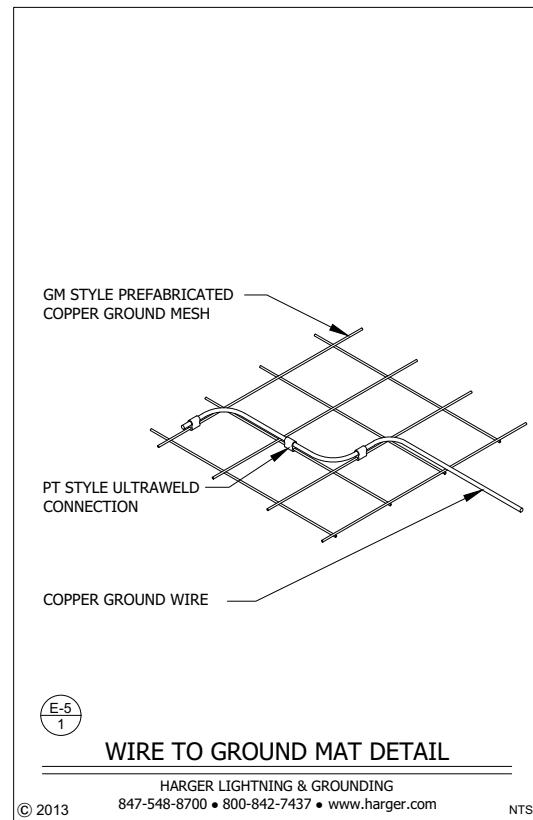
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2	ISSUED FOR BIDDING AND CONSTRUCTION	6/24/16	JAY
	OWNER REVISIONS	6/12/16	JAY

VILLAGE OF VILLA PARK WATER TANK GROUNDING
 11 W. HOME AVE
 VILLA PARK, IL 60181

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 CHECKED BY: TAZ
 DATE: 06/09/16
 PROJECT #: 1454

SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
E-4



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ENGINEERING

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REVISIONS		NO.	DESCRIPTION	DATE	BY
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	OWNER REVISIONS	1	OWNER REVISIONS	6/12/16	JAY
	ISSUED FOR BIDDING AND CONSTRUCTION	2	ISSUED FOR BIDDING AND CONSTRUCTION	6/24/16	JAY

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SHEET TITLE
GROUNDING DETAILS

SHEET NUMBER
E-5

COUNTERPOISE GROUNDING & BONDING

GROUNDING AND BONDING

PART 1 - GENERAL

- A. This Section includes:
 1. Grounding of electrical systems and equipment and basic requirements for grounding protection of life, equipment, circuits, and systems.
 2. Water Tower Ground Rings (counterpoise systems)
- B. Provide grounding of the entire electrical installation as shown on the Drawings and specified herein, as in accordance with Article 250 of the National Electrical Code (NEC).

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of this Specification Section.
- B. Product Data for grounding rods, connectors and connection materials, and grounding fittings.
- C. Field tests and observation reports certified by the testing organization and indicating and interpreting test reports for compliance with performance requirements.
- D. Manufacturer instructions for storage, handling, protection, examination, preparation and installation exothermic connectors.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Testing agency as defined by OSHA or a member company of Nation Electrical Testing Association (NETA) and that is acceptable to authorities having jurisdiction.
- B. Comply with UL 467.
- C. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
- D. Comply with NECA Standard of Installation.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

- A. Governing Requirements: Where types, sizes, ratings, and quantities indicated are in excess of Nation Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, or quantity indications govern.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Harger Lighting & Grounding; Electrical Products Grounding

COUNTERPOISE GROUNDING & BONDING

C. Wire and Cable Grounding Conductors

1. Conform to NEC except as otherwise indicated, for conductor properties, including stranding.
2. Use only copper wire for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
3. Equipment Grounding Conductors: Insulated with green color insulation.
 4. Grounding-Electrode Conductors: Bare Stranded copper.
 5. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.
6. Bare Copper Conductors: Conform to the following:
 - a. Solid Conductors: ASTM.
 - b. Assembly of Stranded Conductors: ASTM.
 - c. Tinned Conductors: ASTM.
7. Grounding Bus: Bare, annealed-copper bars of rectangular cross section, with insulators.
8. Bonding Straps: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

D. Connector Products

1. Products shall be listed and labeled as grounding connectors for the materials used. No aluminum materials shall be utilized within 18" of the earth where used for the purpose of grounding.
2. Exothermic-Welded Connections shall be as manufactured by Harger. Provide exothermic welding system for use in making electrical grounding connections of copper to copper or copper to steel. Exothermically welded connections are required on all grounding electrode conductors, all connections to building steel (connections to structural member), all grounding conductors run under the earth, connection to ground rods and in any case where grounding conductors are subject to a hostile environment.
 - a. The exothermic welding system furnished under these specifications shall meet the applicable requirements of IEEE80, Chapter 9, Section of conductors and joints.
 - b. Starting material, if used, shall consist of aluminum and copper/copper oxide and iron oxides. It shall not contain phosphorus or any caustic, toxic or explosive substance. Weld metal used for grounding connections shall contain copper oxide, aluminum.

E. Grounding Electrodes and Test Wells

1. Grounding Rods: copper-clad steel, Size: 5/8 inch by 10 feet.
2. Test Wells shall be type No. 305 as manufactured by Harger. Where multiple connection are made, a Harger ground inspection well type no 305 shall be used.

COUNTERPOISE GROUNDING & BONDING

C. Wire and Cable Grounding Conductors

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COUNTERPOISE GROUNDING & BONDING

A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
 2. Make connections with clean, bare metal at points of contact.
 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and grounding rods.

D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A/B.

E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing site code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

F. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.9 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Engage an independent electrical testing organization to perform tests described below.
- B. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than 2 full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2-point method according to IEEE 81.
- C. The maximum earth resistance values shall be less than 5 ohms for the service entrance ground with the counterpoise removed and no greater for the counterpoise system when measured alone. Earth resistance testing shall be done no sooner than 180 days after occupancy and prior to 360 days. Earth resistance testing shall be done by the done by the manufacturer of the earthing/grounding components and shall be included in the cost of materials.
- D. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify Owner promptly and include recommendations to reduce ground resistance and to accomplish recommended work.

COUNTERPOISE GROUNDING & BONDING

- E. Report: Prepare test reports, certified by the testing organization, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.


3.10 GRADING AND PLANTING

- A. Restore surface features, including vegetation, at areas disturbed by work of this Section. Reestablish original grades, except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, stering of dirt, cable laying, and other activities to their original condition. Include topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.


- B. Comply with other divisions of this specification. Maintain restored surfaces. Restore disturbed paving as required.

SCHEDULE OF MATERIALS


1. 2000 L.F. #4/0 AWG Cu HARD DRAWN
2. (4) 5/8" DIA x 10' LG. Cu GROUND RODS (SEE DRAWING E-2 FOR PART NUMBERS)
3. (4) TOWER LEG GROUNDS (SEE DRAWING E-3 FOR PART NUMBERS)
4. (1) TEST WELL (SEE DRAWING E-2 FOR PART NUMBERS)
5. (2) PIPE CLAMP GROUNDS (SEE DRAWING E-2 FOR PART NUMBERS)
6. (7) FENCE AND GATE BONDINGS (SEE DRAWING E-5 FOR PART NUMBERS)
7. (4) GROUND BARS (SEE DRAWING E-3 FOR PART NUMBERS)
8. (10) WIRE TO GROUND MAT CONNECTORS (SEE DRAWING E-5 FOR PART NUMBERS)



600 Busse Highway
Park Ridge, IL 60068
Ph: 847/698-6400
Fax: 847/698-6401



CHRISTOPHER J. DOWSE
Professional Engineer
No. 00000000
State of Illinois
Exp. 11/30/2017



DOWSE CONSULTING ENGINEERING
Electrical Engineering
P.O. Box 272
Oak Park, IL 60303
Cell: (708) 465-6148

NO.	DESCRIPTION	DATE	BY	
			DATE	BY
1	ISSUED FOR REVIEW	5/29/16	JAY	
	OWNER REVISIONS	6/12/16	JAY	
2	ISSUED FOR BIDDING AND CONSTRUCTION	6/24/16	JAY	

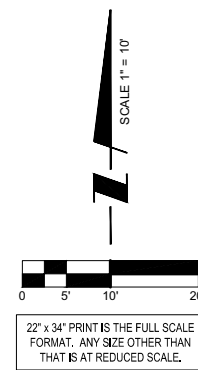
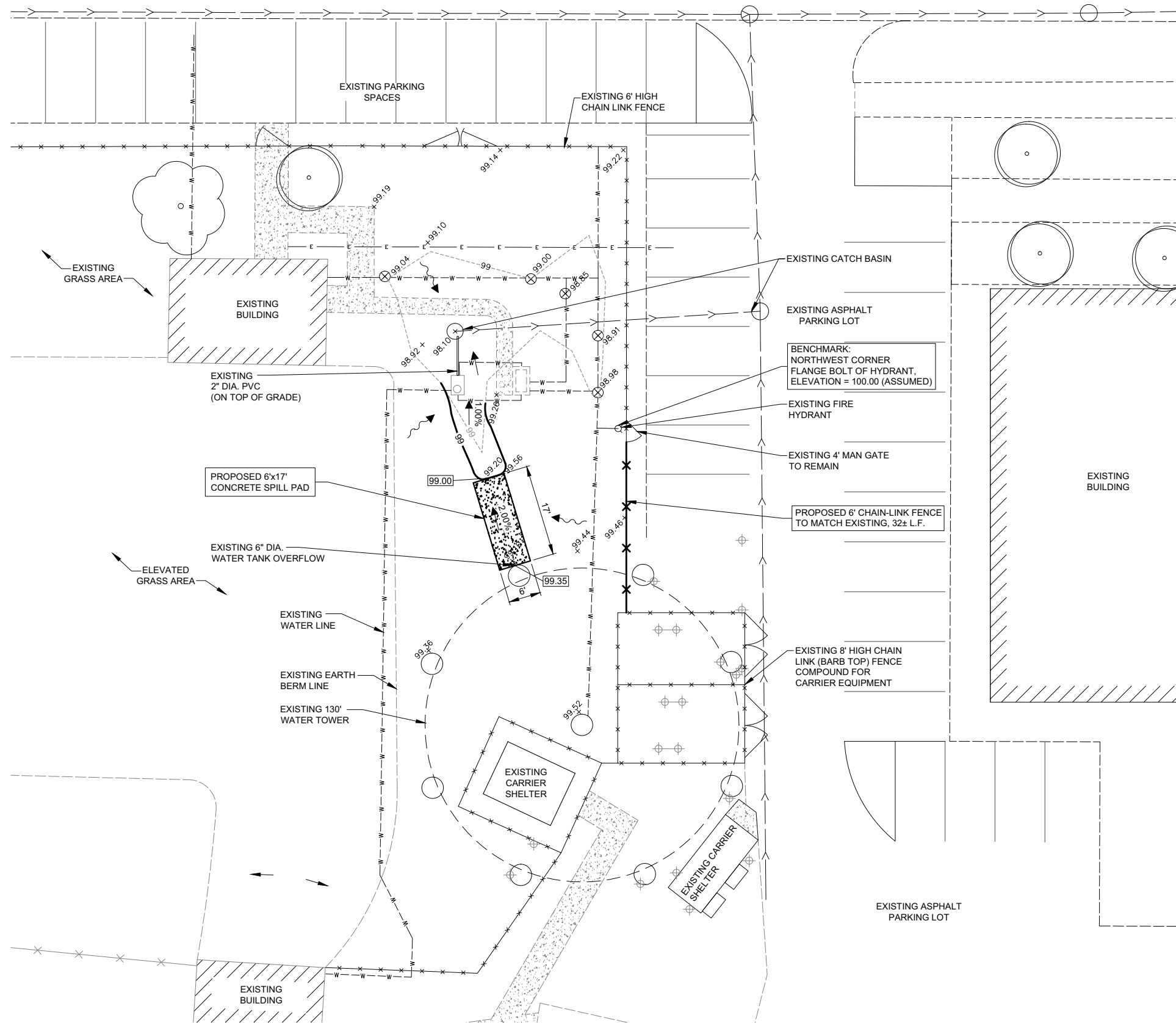
VILLAGE OF
VILLA PARK
WATER TANK
GROUNDING
11 W. HOME AVE
VILLA PARK, IL 60181

DRAWN BY:	JAY
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
SPECIFICATIONS

SHEET NUMBER
E-7

W HOME AVE.



REVISIONS	
NO.	DESCRIPTION
1	ISSUED FOR REVIEW
	VILLAGE REVIEW #1

VILLAGE OF VILLA PARK WATER TANK GROUNDING

11 W. HOME AVE.
VILLA PARK, IL 60181

DRAWN BY:	PP
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
SITE GRADING PLAN

SHEET NUMBER
C-1

1 SITE GRADING PLAN
SCALE: 1" = 10'





REVISIONS			
NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR REVIEW	06/09/16	PP
	VILLAGE REVIEW #1	06/30/16	KSB

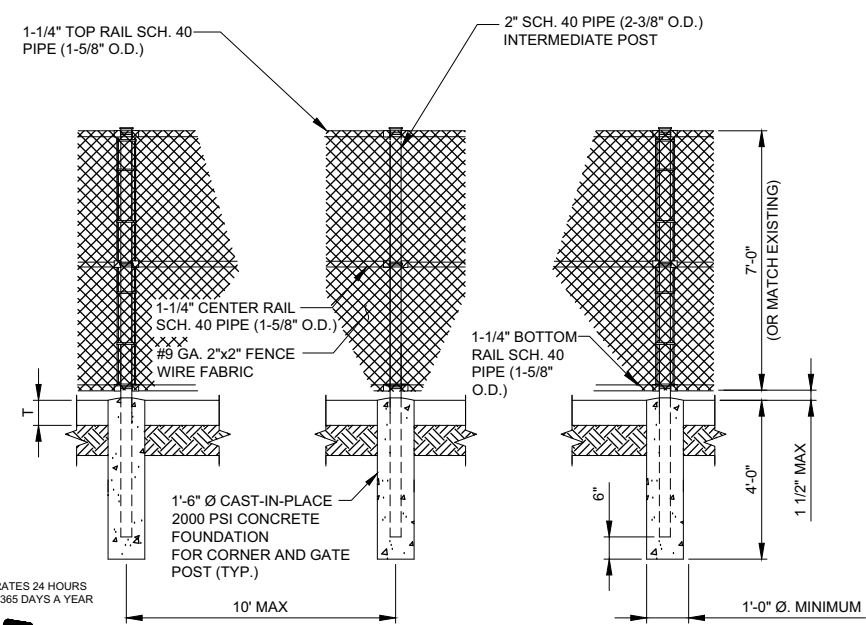
VILLAGE OF
VILLA PARK
WATER TANK
GROUNDING

11 W. HOME AVE.
VILLA PARK, IL 60181

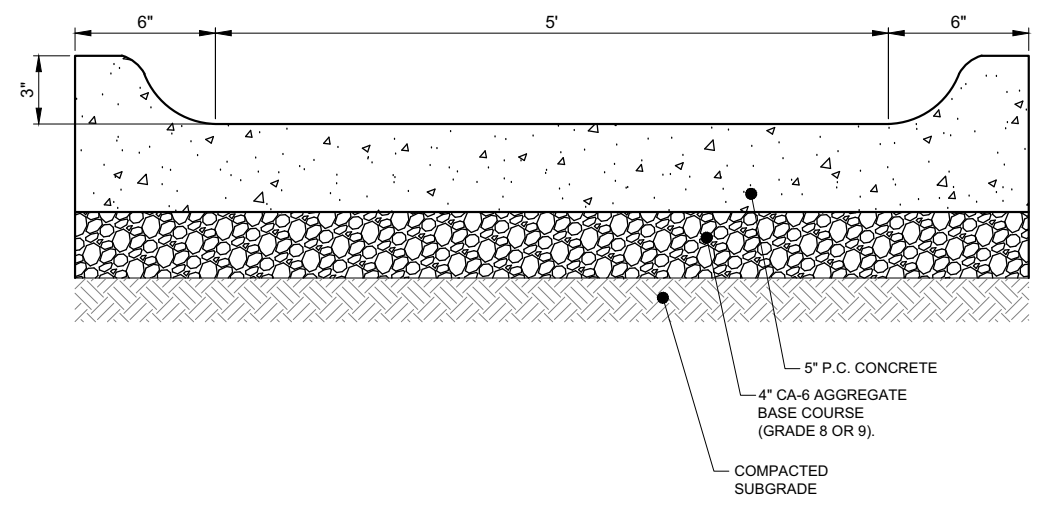
DRAWN BY:	PP
CHECKED BY:	TAZ
DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
SITE DETAILS

SHEET NUMBER
C-2



1 FENCE POST DETAILS
N.T.S.



2 CONCRETE SPILL PAD SECTION (FRONT VIEW)
N.T.S.

OPERATES 24 HOURS
A DAY 365 DAYS A YEAR

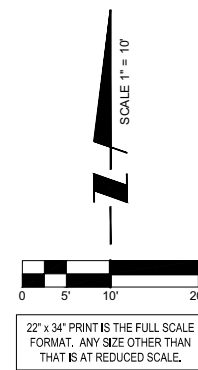
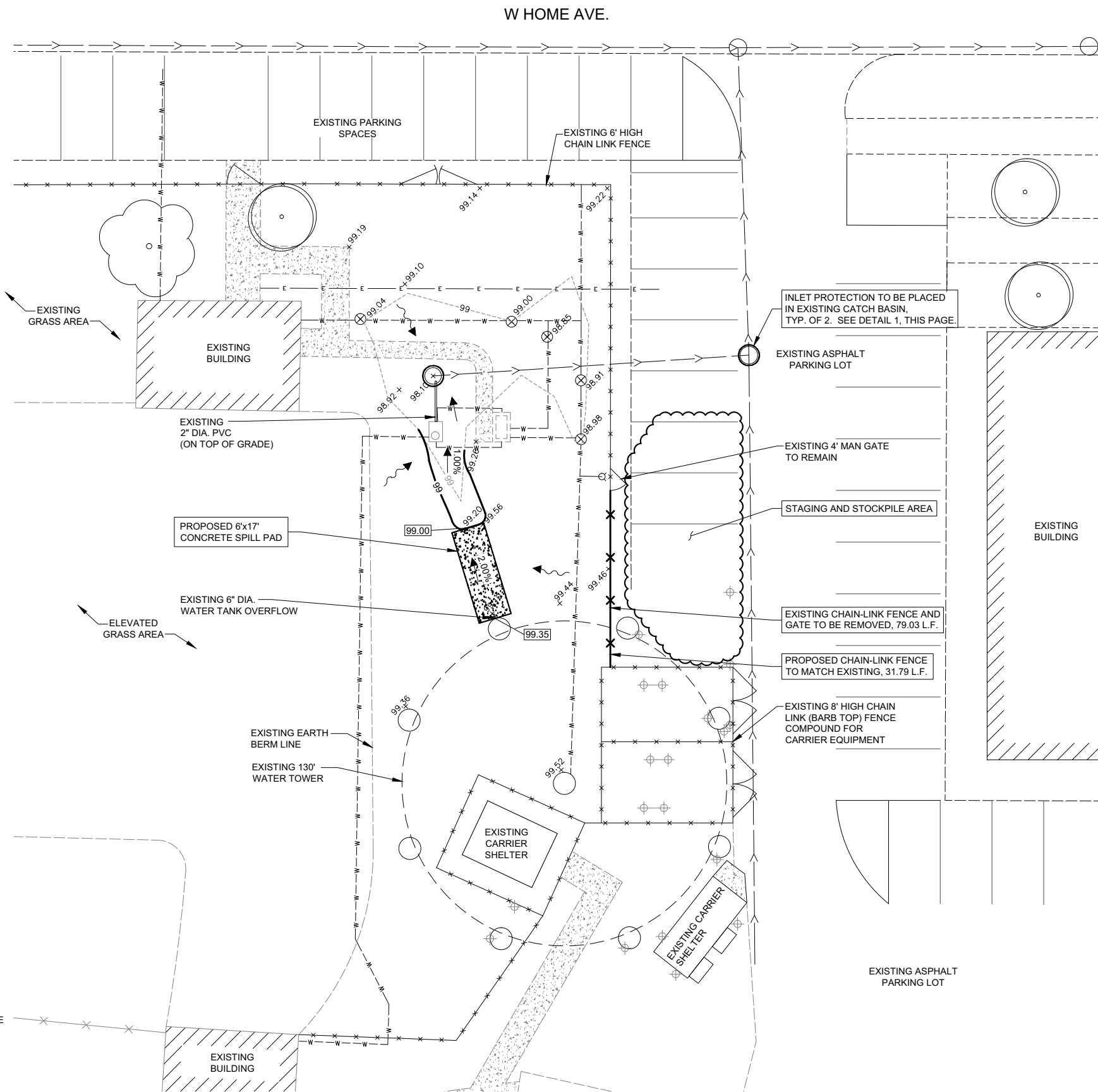
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48 HOURS BEFORE
YOU DIG

EROSION CONTROL NOTES:

1. SOIL DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER TO MINIMIZE EROSION. AREAS OF THE DEVELOPMENT SITE THAT ARE NOT GRADED SHALL BE PROTECTED FROM CONSTRUCTION TRAFFIC OR OTHER DISTURBANCE UNTIL FINAL SEEDING IS PERFORMED.
2. PROPERTIES AND CHANNELS ADJOINING THE DEVELOPMENT SITE SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION.
3. SOIL EROSION AND SEDIMENT CONTROL FEATURES SHALL BE CONSTRUCTED PRIOR TO THE COMMENCEMENT OF HYDROLOGIC DISTURBANCE OF UPLAND AREAS.
4. DISTURBED AREAS SHALL BE STABILIZED WITH TEMPORARY OR PERMANENT MEASURES WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE END OF ACTIVE HYDROLOGIC DISTURBANCE.
5. IF DEWATERING SERVICES ARE USED, ADJOINING PROPERTIES AND DISCHARGE SHALL BE PROTECTED FROM EROSION. DISCHARGES SHALL BE ROUTED THROUGH AN EFFECTIVE SEDIMENT CONTROL MEASURE. (E.G., SEDIMENT TRAP, SEDIMENT BASIN, OR OTHER APPROPRIATE MEASURES).
6. ALL TEMPORARY SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN THIRTY (30) DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. TRAPPED SEDIMENT AND OTHER DISTURBED SOIL AREAS SHALL BE PERMANENTLY STABILIZED.
7. SOIL STOCKPILES SHALL NOT BE LOCATED IN A FLOOD-PRONE AREA OR DESIGNATED BUFFER OF SURFACE WATERS.
8. THE CONTRACTOR SHALL PROVIDE ADEQUATE RECEPTACLES FOR THE DEPOSITION OF ALL CONSTRUCTION MATERIAL DEBRIS GENERATED DURING THE DEVELOPMENT PROCESS. THE CONTRACTOR SHALL NOT CAUSE OR PERMIT THE DUMPING, DEPOSITING, DROPPING, THROWING, DISCARDING OR LEAVING OF CONSTRUCTION MATERIAL DEBRIS UPON OR ONTO ANY DEVELOPMENT SITE, CHANNEL, OR SURFACE WATERS. THE CONTRACTOR SHALL MAINTAIN THE DEVELOPMENT SITE FREE OF CONSTRUCTION MATERIAL DEBRIS.
9. ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN AN EFFECTIVE WORKING CONDITION.



REVISIONS	
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	VILLAGE REVIEW #1

DATE	BY
06/09/16	PP
06/30/16	KSB

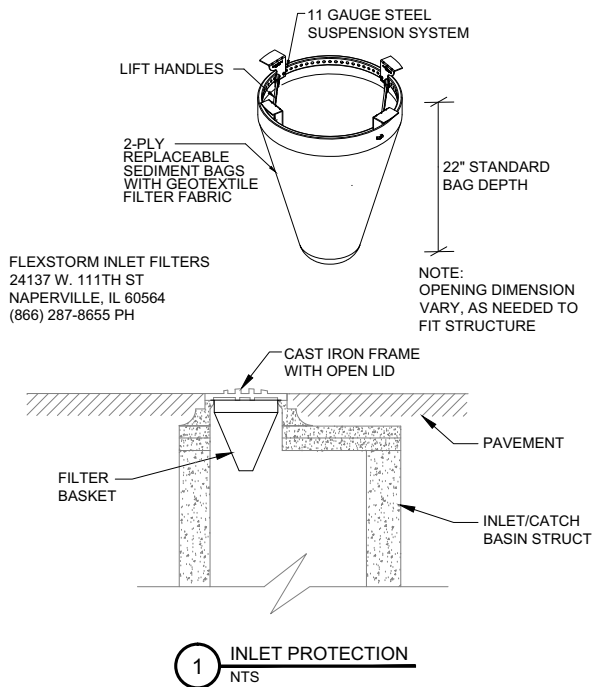
VILLAGE OF VILLA PARK WATER TANK GROUNDING

11 W. HOME AVE.
 VILLA PARK, IL 60181

DRAWN BY:	PP
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DATE:	06/09/16
PROJECT #:	1454

SHEET TITLE
EROSION CONTROL PLAN

SHEET NUMBER
EC-1



1 EROSION CONTROL PLAN
 SCALE: 1" = 10'