

ORDINANCE NO. 2206-22

AN ORDINANCE GRANTING A SPECIAL USE PERMIT FOR A PLANNED UNIT DEVELOPMENT FOR AN EVENT VENUE AND GRANTING CERTAIN RELIEF FROM THE VILLAGE'S ZONING ORDINANCE — HH-HW-RE, LLC —INTERSECTION OF GILMER ROAD AND ILLINOIS ROUTE 176

WHEREAS, on or about May 5, 2022, HH-HW-RE, LLC, as applicant and/or owner of the property ("Applicant"), filed an application for a special use permit for a Planned Unit Development and relief from the Zoning Ordinance regarding the property legally described on **Exhibit "A"** attached hereto and incorporated herein (the "Subject Property"); and

WHEREAS, the Applicant's plans for the development of an event venue at the Subject Property are attached hereto as **Exhibit "B"** and incorporated herein; and,

WHEREAS, Notice of Public Hearing with respect to the aforesaid special use permit application was published on or about May 28, 2022, in the Daily Herald, being a newspaper having general circulation within the Village of Hawthorn Woods, all as required by the statutes of the State of Illinois and the ordinances of the Village, and,

WHEREAS, all other notices required by the statutes of the State of Illinois and the ordinances of the Village were sent on or about May 28, 2022; and,

WHEREAS, pursuant to said notice, and continuations granted by the Planning, Building, and Zoning Commission of the Village of Hawthorn Woods, a Public Hearing was conducted regarding the special use permit application on or about November 8, 2022, all as required by the statutes of the State of Illinois and the ordinances of the Village; and,

WHEREAS, the Planning, Building, and Zoning Commission forwarded its recommendations, including its Findings of Fact, regarding the special use permit application, to the

Mayor and Board of Trustees on or about November 8, 2022, a copy of which is attached hereto as **Exhibit “C”** and incorporated herein.

NOW, THEREFORE, BE IT ORDAINED by the Mayor and Board of Trustees of the Village of Hawthorn Woods, Lake County, Illinois, as follows:

SECTION ONE: The preambles set forth hereinabove are incorporated herein as substantive provisions of this Ordinance as if fully set out in this Section One.

SECTION TWO: That the Applicant is hereby granted with respect to the Subject Property a special use permit for a Planned Unit Development, so as to permit the development of an event venue located on the Subject Property, subject to the following conditions:

1. That final engineering be approved by the Village Engineering Consultants and the Public Works Director/Village Engineer prior to a building permit being issued for the development.
2. That all necessary permits be obtained from any necessary outside agencies.
3. That all landscaping plans be revised and reviewed and approved by the Village Planning Consultants and the Community Development Director prior to a building permit being issued for the development.
4. That all Fire District comments be addressed prior to a building permit being issued for the development.
5. That the photometric plans be approved by the Village Engineering Consultants and the Public Works Director/Village Engineer prior to a building permit being issued for the development.
6. That the final architectural design be approved by the Community Development Director prior to a building permit being issued for the development.

SECTION THREE: That the following departures from the Zoning Ordinance are hereby granted:

1. Section 9-6B-5 – Increasing the maximum lot area from 3.0 Acres to 15.78 Acres.
2. Section 9-6B-5 – Reducing the side yard setback from 200 feet to 172.4 feet.
3. Section 9-6B-5 – Reducing the rear yard setback from 200 feet to 172.4 feet.
4. Section 9-6B-5 – Increasing the maximum building height from 35 feet to 42 feet.
5. Section 9-3-15C – Increasing the number of detached structures on the property from 0 to 1.
6. Section 9-17-6F – Reducing the landscaping buffer from 50 feet to 18.5 feet.

SECTION FOUR: That the recommendations of the Planning, Building and Zoning Commission, including any and all Findings of Fact, heretofore attached hereto as **Exhibit "C"**, are hereby adopted by the Mayor and Board of Trustees of the Village of Hawthorn Woods.

SECTION FIVE: That all ordinances and resolutions, or parts thereof, in conflict with the provisions of this Ordinance are, to the extent of such conflict, superseded by this Ordinance.

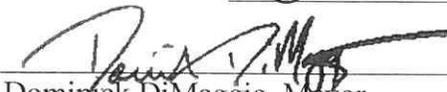
SECTION SIX: That this Ordinance shall be in full force and effect from and after its passage and approval as provided by law.

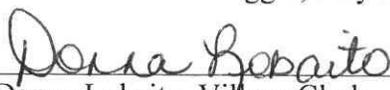
The foregoing Ordinance was passed by a roll call vote as follows:

AYES: Kaiser, Bayer, David, McCarthy, Ryceik, Hurst

NAYS: Ø

ABSENT AND NOT VOTING: Ø

APPROVED:   
Dominick DiMaggio, Mayor

ATTEST:   
Donna Lobaito, Village Clerk

PASSED: September 28, 2022

APPROVED: September 28, 2022

**EXHIBIT "A"**

**LEGAL DESCRIPTION OF SUBJECT PROPERTY**

PT SE 1/4 SW 1/4 LYG SWLY ROW OF GILMER RD SECTION 21 TOWNSHIP 44 RANGE 10

NE 1/4 NW 1/4 (EX PT LYG SLY OF C LN RTE 176 & GILMER RD & EX RTE 176 & EX DOC 4506434 & EX PT LYG NLY AND ELY OF INT OF GILMER RD & RTE 176) SECTION 28 TOWNSHIP 44 RANGE 10

**EXHIBIT "B"**

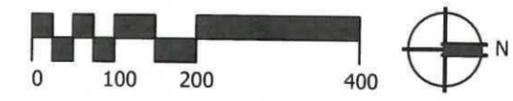
**DEVELOPMENT PLANS**



Sheet Schedule	
Sheet Number	Sheet Title
SP1	HAMMES HOLDINGS PARCEL LOCATIONS
SP2	PARCEL A STUDY AREA EXISTING CONDITIONS
SP3	FULL SITE LONG-TERM PLAN
L1	THE BARN AT HAWTHORN WOODS LANDSCAPE PLAN
L2	THE BARN AT HAWTHORN WOODS ENLARGEMENT PLAN
L3	LANDSCAPE DETAILS AND NOTES

EXISTING CONDITIONS:  
**HAMMES HOLDINGS PARCEL LOCATIONS**

27901 N. GILMER ROAD  
 HAWTHORN WOODS, ILLINOIS



client / owner  
**HH-HW-RE, LLC.**  
 project name  
 THE BARN AT  
 HAWTHORN WOODS

project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

seal / signature

landscape architect of record  
 TESKA ASSOCIATES, INC.  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.869.2015 f 847.869.2059

consultant 1  
 PROJECT 4 SERVICES, LLC  
 7722 HAWTHORN ROAD  
 MEQUON, WI 53097  
 414-731-0795

consultant 2  
 PEARSON, BROWN & ASSOCIATES, INC.  
 1850 W. WINCHESTER ROAD, SUITE 205  
 LIBERTYVILLE, IL 60548  
 847-367-6707

issue / revision	date	description
△	05-06-2022	INITIAL REVIEW
△		
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pm la cad

issue date April 28, 2022

sheet name  
 HAMMES HOLDINGS  
 PARCEL LOCATIONS

sheet number  
**SP1**



EXISTING CONDITIONS:  
**PARCEL A: THE BARN AT HAWTHORN WOODS**

27901 N. GILMER ROAD  
 HAWTHORN WOODS, ILLINOIS



client / owner  
**HH-HW-RE, LLC.**  
 project name  
**THE BARN AT  
 HAWTHORN WOODS**  
 project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

soil / signature

landscape architect of record  
 TESKA ASSOCIATES, INC.  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.869.2015 f 847.869.2059  
 consultant 1  
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 7722 HAWTHORN ROAD  
 MESQUON, WI 53097  
 414-731-0795  
 consultant 2  
 PEARSON, BROWN & ASSOCIATES, INC.  
 1850 W. WINCHESTER ROAD, SUITE 205  
 LIBERTYVILLE, IL 60048  
 847-367-6707

issue / revision	date	description
△	05-06-2022	INITIAL REVIEW
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issue date April 28, 2022  
 sheet name  
 PARCEL A STUDY AREA  
 EXISTING CONDITIONS  
 sheet number  
**SP2**



client / owner  
**HH-HW-RE, LLC.**  
 project name  
**THE BARN AT HAWTHORN WOODS**  
 project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

scale / signature

landscape architect of record  
 TESKA ASSOCIATES, INC.  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.869.2915 f 847.869.2099

contractor  
 PROJECT 4 SERVICES, LLC  
 7722 HAWTHORN ROAD  
 MISSOURI, WI 53097  
 414-731-0795

contractor  
 PEARSON, BROWN & ASSOCIATES, INC.  
 1850 W. WINCHESTER ROAD, SUITE 205  
 LIBERTYVILLE, IL 60468  
 847-367-4707

issue / revision	date	description
△	08-06-2022	INITIAL REVIEW
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preparer: jm    checker: la    cad: cad

issue date: April 28, 2022

sheet name: FULL SITE LONG-TERM PLAN

sheet number: **SP3**

CONCEPTUAL FULL SITE LONG-TERM PLAN:  
**PARCEL A**

27901 N. GILMER ROAD  
 HAWTHORN WOODS, ILLINOIS





client / owner  
**HH-HW-RE, LLC.**  
 project name  
**THE BARN AT HAWTHORN WOODS**  
 project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

landscape architect of record  
**TESKA ASSOCIATES, INC.**  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.868.2015 f 847.868.2059  
 consultant 1  
**PROJECT 4 SERVICES, LLC**  
 7722 HAWTHORN ROAD  
 MEGGQUON, WI 53097  
 414-731-0795  
 consultant 2  
**PEARSON, BROWN & ASSOCIATES, INC.**  
 1850 W. WINCHESTER ROAD, SUITE 305  
 LIBERTYVILLE, IL 60048  
 847-567-6707



- PROPOSED SITE LIGHTING, TYP.
- CEREMONY SITE
- EVENT BARN WEDDING VENUE
- LAKE COUNTY WETLAND INVENTORY
- SERVICE BAY
- 2-CAR GARAGE AND TRASH ENCLOSURE

- LAKE COUNTY FLOODWAY INVENTORY
- ACCESS ALIGNED WITH FREMONT CENTER ROAD
- R.O.W RESERVATION
- LAKE COUNTY FLOODPLAIN INVENTORY
- APPROXIMATE SEPTIC MOUNDS LOCATION

**CONCEPTUAL PLANT SCHEDULE:**

SHADE TREE	BOTANICAL / COMMON NAME	SIZE
	Acer rubrum "Red Sunset" / Red Sunset Maple Acer saccharum "Legacy" / Legacy Sugar Maple Celastrus laciniosus "Slayena" / Slayena Honey Locust Quercus rubra / Red Oak Thuja occidentalis "Littleleaf Lunula" Ulmus x "Proctor" / American Elm	3" cal., D48
	Acer freemanii "Amelbrom" / Freeman Maple Celtis bicuspidata / Nuttall's Tree Quercus robur "Royal Prince" / Royal Prince English Oak	3" cal., D48
	CRATAEGUS CRUS-GALLI / Cockspur Hawthorn CRATAEGUS PHAENOCARPUM / Washington Hawthorn MALUS x "Red Jade" / Red Jade Crab Apple PYRUS CALLERYANA "Charcoalace" / Charcoalace Pear SYRINGA RATIOLATA / Japanese Tree Lilac	8 - 10' HT. D48/Multi Stem
	Juniperus chinensis "Kataloon" / Kataloon Chinese Juniper Picea abies / Norway Spruce Picea pungens "Glauca" / Colorado Blue Spruce Pseudotsuga menziesii / Douglas Fir Thuja occidentalis "American Arborvitae" Thuja occidentalis "Smaragd" / Emerald Green Arborvitae Thuja plicata "Green Giant" / Western Red Cedar	8 - 10' HT. D48/Multi Stem
	Diospyros maritima "Wintersgreen" / Wintersgreen Boxwood Cornus sericea "Kelsey" / Kelsey Dogwood Cotoneaster acutifolius / Falsing Cotoneaster Hydrangea paniculata "Tardiva" / Tardiva Hydrangea Hydrangea arborescens / Oakleaf Hydrangea Juniperus chinensis "Sea Green" / Sea Green Juniper Rhus aromatica "Gro-Low" / Gro-Low Sumac Rosa acutifolia "Nearly Wild" / Nearly Wild Rose Spiraea x bunata "Anthony Waterer" / Anthony Waterer Spiraea Syringa meyeri "Palibin" / Dwarf Korean Lilac Taxus x media "Eurobor" / Eurobor Yew Viburnum trilobum "Daisy Compact" / Daisy's Compact American Cranberry Bush Weigela florida "Red Prince" / Red Prince Weigela	2-5' HT. D48 / Container
	Asar canadensis-amelica / New England Asar Cercocarpus verticillata "Moonbeam" / Moonbeam tickseed Echinacea purpurea / Purple Coneflower Hemerocallis x "Happy Returns" / Happy Returns Daylily Heuchera moranthe "Fascio Purple" / Fascio Purple coralbells Hosta fortunei "Frances" / Frances's Hosta Rudbeckia hirta "Goldsturm" / Goldsturm Black-eyed Susan	1 G Container

**PARKING**

PARKING: 105  
 ADA PARKING: 4  
 PARKING TOTAL: 109

**PROPOSED IDOT SEED RESTORATION LOCATIONS & MIX**

LOCATION	SEED MIX
DETENTION BASIN	IDOT 4B
DISTURBED SLOPES	IDOT 3
NEW CONSTRUCTION AREAS (PARKING LOTS, BARN AND CEREMONY SITE)	IDOT 1
ALL OTHER AREAS OF DISTURBANCE	IDOT 4A

\*FINAL QUANTITIES OF SEED NEEDED AND LOCATIONS TO BE DETERMINED FOR FINAL SUBMITTAL.

**SITE INFORMATION:**

ZONING: \_\_\_\_\_  
 TOTAL SITE AREA: 15.779 AC.  
 NUMBER OF REGULAR PARKING STALLS: 106  
 NUMBER OF HANDICAP PARKING STALLS: 4  
 TOTAL NUMBER OF STALLS: 110

**ORDINANCE LANDSCAPE REQUIREMENTS**  
 PROVIDE LANDSCAPE PLANTING ISLANDS SPACED NO FURTHER THAN 100' APART, HAVING A MINIMUM LENGTH OF 17' AND A MINIMUM WIDTH OF 9'.  
 MATERIAL: \_\_\_\_\_ REQUIRED \_\_\_\_\_ PROVIDED \_\_\_\_\_  
 PARKING ISLANDS PROVIDED: LESS THAN 100' EVERY 99'

**ORDINANCE LANDSCAPE REQUIREMENTS**  
 TREE REPLACEMENT / PROTECTION: TREE QUANTITIES REQUIRED FOR PROTECTED TREES, ETC.  
 MATERIAL: \_\_\_\_\_ REQUIRED \_\_\_\_\_ PROVIDED \_\_\_\_\_  
 FINAL TREE REPLACEMENT CALCULATIONS WILL BE COMPLETED UPON RECEIPT OF TREE SURVEY AND WILL BE PROVIDED AT FINAL LANDSCAPE SUBMITTAL.

**ORDINANCE LANDSCAPE REQUIREMENTS**  
 ONE SHADE/CANOPY TREE AT A MINIMUM OF 3" CALIPER WILL BE PROVIDED FOR EVERY ONE THOUSAND (1,000) S.F. OF OPEN SPACE.  
 MATERIAL: \_\_\_\_\_ REQUIRED \_\_\_\_\_ PROVIDED \_\_\_\_\_  
 FINAL TREE REPLACEMENT CALCULATIONS WILL BE COMPLETED UPON RECEIPT OF TREE SURVEY AND WILL BE PROVIDED AT FINAL LANDSCAPE SUBMITTAL.

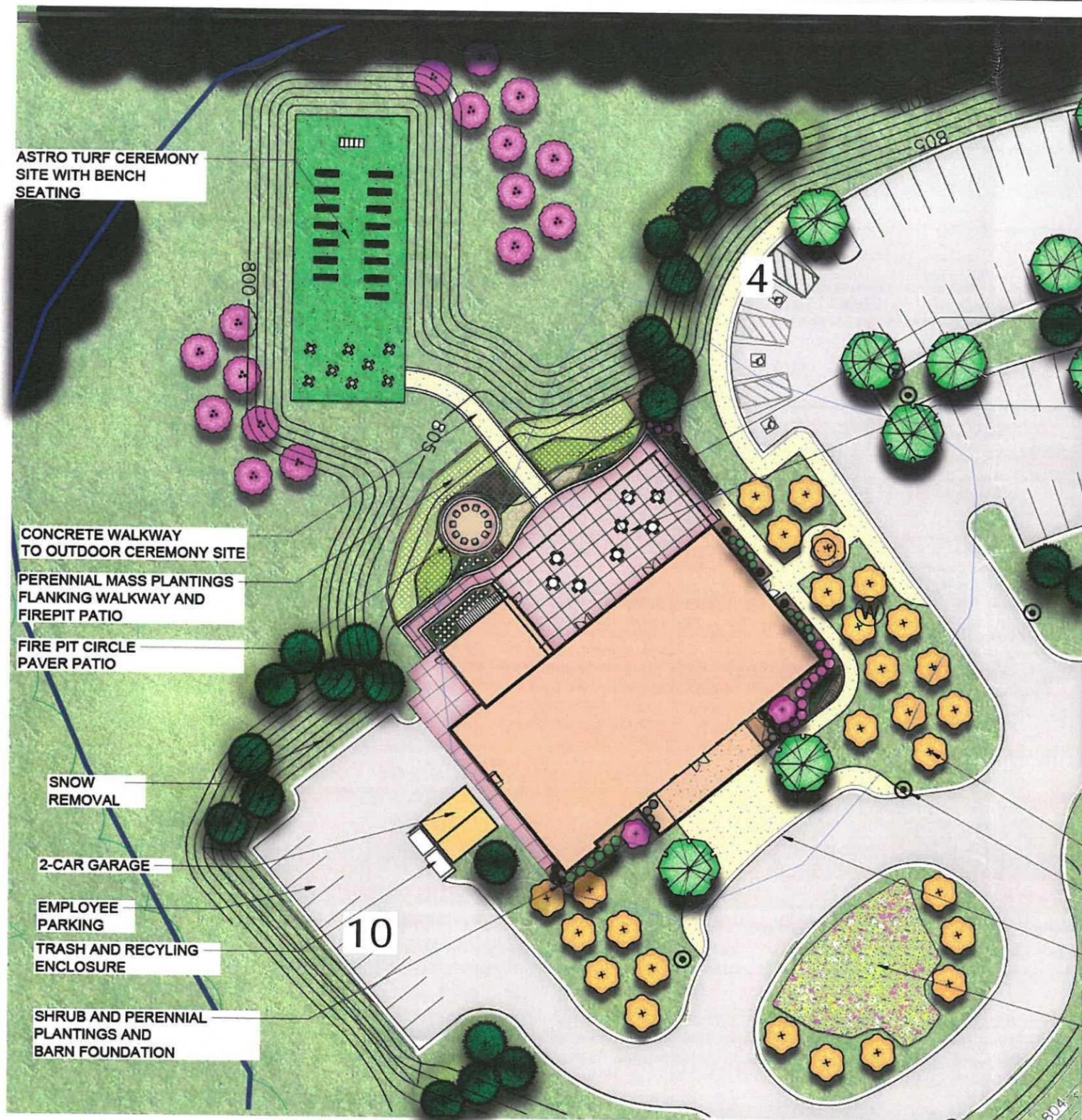
**CONCEPTUAL LANDSCAPE PLAN:  
 THE BARN AT HAWTHORN WOODS**

27901 N. GILMER ROAD  
 HAWTHORN WOODS, ILLINOIS



Issue / revision	date	description
△	08-08-2022	INITIAL REVIEW
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issue date: April 28, 2022  
 sheet name: THE BARN AT HAWTHORN WOODS LANDSCAPE PLAN  
 sheet number: L1



CONCEPTUAL PLANT SCHEDULE:

SHADE TREE	BOTANICAL / COMMON NAME	SIZE
●	<i>Acer rubrum</i> 'Red Sunset' / Red Sunset Maple	3" cal., D&B
	<i>Acer saccharum</i> 'Legacy' / Legacy Sugar Maple	
	<i>Gleditsia inaequalis</i> 'Skyline' / Skyline Honey Locust	
	<i>Quercus bicolor</i> / Swamp White Oak	
	<i>Quercus rubra</i> / Red Oak	
	<i>Ulmus x 'Frontier'</i> / American Elm	
SHADE TREE 2	BOTANICAL / COMMON NAME	SIZE
●	<i>Acer fraxinum</i> 'Armstrong' / Freeman Maple	3" cal., D&B
	<i>Crataegus bitorata</i> / Maidenhair Tree	
	<i>Quercus robur</i> 'Royal Prince' / Royal Prince English Oak	
ORNAMENTAL	BOTANICAL / COMMON NAME	SIZE
●	<i>Crataegus crus-galli</i> / Cockspur Hawthorn	8 - 10' HT.
	<i>Crataegus phaeopyrum</i> / Washington Hawthorn	D&B/Multi Stem
	<i>Malus x 'Red Jade'</i> / Red Jade Crab Apple	
	<i>Pyrus calleryana</i> 'Chantrelle' / Chantrelle Pear	
	<i>Syringa reticulata</i> / Japanese Tree Lilac	
EVERGREEN	BOTANICAL / COMMON NAME	SIZE
●	<i>Juniperus chinensis</i> 'Keteleer' / Keteleer Chinese Juniper	8 - 10' HT.
	<i>Picea abies</i> / Norway Spruce	D&B/Multi Stem
	<i>Picea pungens</i> 'Glauca' / Colorado Blue Spruce	
	<i>Pseudotsuga monsonii</i> / Douglas Fir	
	<i>Thuja occidentalis</i> / American Arborvitae	
FOUNDATION PLANTING	BOTANICAL / COMMON NAME	SIZE
●	<i>Buxus microphylla</i> 'Wintergreen' / Wintergreen Boxwood	2-3' HT.
	<i>Cornus sericea</i> 'Kelsey' / Kelsey Dogwood	D&B / Container
	<i>Cotoneaster acuminatus</i> / Faking Cotoneaster	
	<i>Hydrangea paniculata</i> 'Tardiva' / Tardiva Hydrangea	
	<i>Hydrangea quercifolia</i> / Oakleaf Hydrangea	
	<i>Juniperus chinensis</i> 'Sea Green' / Sea Green Juniper	
	<i>Rhus aromatica</i> 'Gro-Low' / Gro-Low Sumac	
	<i>Rosa acicularis</i> 'Nicky Wild' / Nicky Rose	
	<i>Syringa x bursalis</i> 'Anthony Waterer' / Anthony Waterer Syringa	
	<i>Syringa meyeri</i> 'Palibin' / Dwarf Korean Lilac	
<i>Taxus x media</i> 'Everlow' / Everlow Yew		
<i>Viburnum tinifolium</i> 'Savoy Compact' / Savoy's Compact American Cranberry Bush		
<i>Wigandia florata</i> 'Red Prince' / Red Prince Wigandia		
PERENNIAL	BOTANICAL / COMMON NAME	SIZE
■	<i>Aster novae-angliae</i> / New England Aster	1 G Container
	<i>Coreopsis verticillata</i> 'Moonbeam' / Moonbeam Tickseed	
	<i>Echinacea purpurea</i> / Purple Coneflower	
	<i>Hemerocallis x 'Happy Returns'</i> / Happy Returns Daylily	
	<i>Heuchera moranensis</i> 'Falsco Purple' / Falsco Purple Coralbells	
	<i>Hosta fortunei</i> 'Frances' / Frances's Hosta	
	<i>Rudbeckia fulgida</i> 'Goldstern' / Goldstern Black-eyed Susan	

Note: Conceptual Plant Schedule for whole site has been duplicated here for reference on this sheet.

CONCEPTUAL LANDSCAPE PLAN ENLARGEMENT  
**THE BARN AT HAWTHORN WOODS**

27901 N. GILMER ROAD  
 HAWTHORN WOODS, ILLINOIS



client / owner  
**HH-HW-RE, LLC.**  
 project name  
**THE BARN AT HAWTHORN WOODS**  
 project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

lead / signature

landscape architect of record  
**TESKA ASSOCIATES, INC.**  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.869.2015 f 847.869.2059

contractor  
**PROJECT 4 SERVICES, LLC**  
 7722 HAWTHORN ROAD  
 MCGONKAL, WI 53007  
 414-731-0795

contractor  
**PEARSON, BROWN & ASSOCIATES, INC.**  
 1850 W. WINCHESTER ROAD, SUITE 205  
 LIBERTYVILLE, IL 60048  
 847-367-6707

issue / revision	date	description
△	08-06-2022	INITIAL REVIEW
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issue date April 28, 2022

sheet name  
**THE BARN AT HAWTHORN WOODS ENLARGEMENT PLAN**

sheet number  
**L2**



Client / owner  
**HH-HW-RE, LLC.**  
 project name  
**THE BARN AT HAWTHORN WOODS**  
 project address  
 27901 N. GILMER ROAD  
 HAWTHORN WOODS, IL

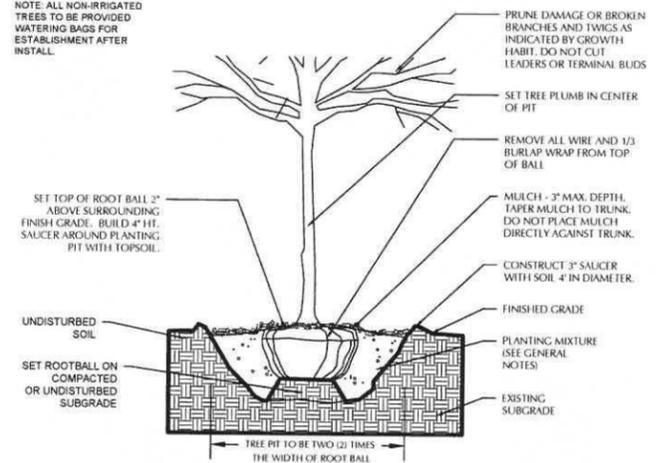
scale / signature

landscape architect of record  
**TESKA ASSOCIATES, INC.**  
 627 GROVE STREET  
 EVANSTON, IL 60201  
 p 847.869.2015 f 847.869.2059

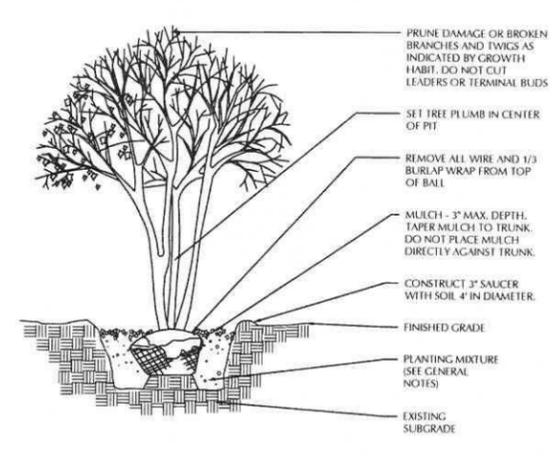
consultant 1  
**PROJECT 4 SERVICES, LLC**  
 7722 HAWTHORN ROAD  
 MEGQUON, WI 53097  
 414-731-0795

consultant 2  
**PEARSON, BROWN & ASSOCIATES, INC.**  
 1850 W. WINCHESTER ROAD, SUITE 205  
 LIBERTYVILLE, IL 60048  
 847-367-6707

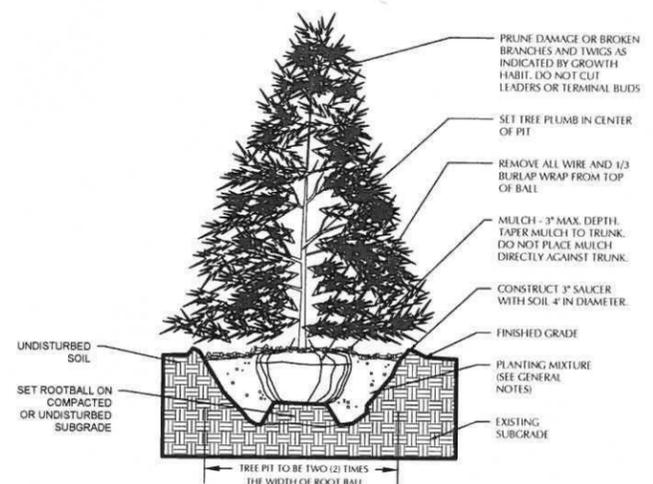
NOTE: ALL NON-IRRIGATED TREES TO BE PROVIDED WATERING BAGS FOR ESTABLISHMENT AFTER INSTALL.



1 TYP. DECIDUOUS TREE PLANTING DETAIL  
 SCALE: NTS



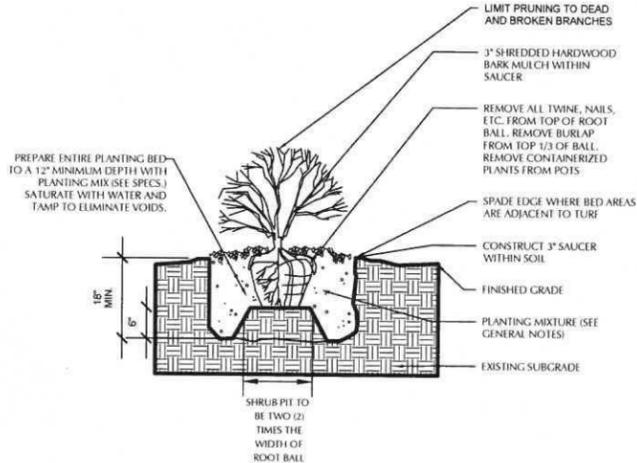
2 TYP. ORNAMENTAL TREE PLANTING DETAIL  
 SCALE: NTS



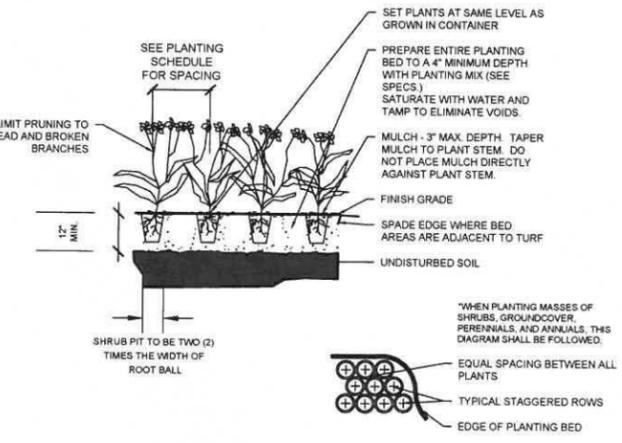
3 TYP. EVERGREEN TREE PLANTING DETAIL  
 SCALE: NTS

LANDSCAPE GENERAL NOTES:

- PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL NOTIFY J.U.L.I.E. (811) OR (800) 892.0123 TO DETERMINE THE LOCATION OF ANY UNDERGROUND UTILITIES, WHICH MAY AFFECT PROPOSED SITE WORK. CONTRACTOR SHALL NOTIFY THE OWNER/LANDSCAPE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES, OBSTACLES AND/OR PROBLEMS.
- VERIFICATION OF DIMENSIONS AND GRADES, BOTH EXISTING AND PROPOSED, SHALL BE THE CONTRACTOR'S RESPONSIBILITY PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL NOTIFY THE OWNER/LANDSCAPE ARCHITECT OF ANY DISCREPANCIES.
- ALL SURFACE DRAINAGE SHALL BE DIRECTED AWAY FROM STRUCTURES. SURFACE DRAINAGE SHALL BE DIRECTED TO EXISTING CATCH BASINS DESIGNATED FOR THE COLLECTION OF SURFACE RUN-OFF.
- PLANT MATERIAL SIZES SHOWN ON PLANT SCHEDULE ARE MINIMUM ACCEPTABLE SIZES. ALL PLANT MATERIAL SHALL BE OF SPECIMEN QUALITY. NO 'PARK GRADE' MATERIAL WILL BE ACCEPTED.
- ALL PLANT MATERIAL SHALL BE OBTAINED FROM AN APPROVED NORTHERN ILLINOIS NURSERY WITH HEAVY CLAY SOILS.
- ALL PLANT MATERIAL SHALL CONFORM TO AMERICAN STANDARD FOR NURSERY STOCK AS SPONSORED BY THE AMERICAN ASSOCIATION OF NURSERYMEN AND APPROVED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)
- IF SPECIFIED SPECIES AND/ OR QUALITY OF PLANTS ARE NOT AVAILABLE AT THE TIME OF ORDERING, THE LANDSCAPE ARCHITECT, AT HIS/HER DISCRETION, MAY SUBSTITUTE SIMILAR PLANTS WITH THE SAME WHOLESALE VALUE.
- ALL PLANTS TO BE BALLED IN BURLAP (B&B) OR CONTAINER GROWN (CG) AS SPECIFIED IN PLANT SCHEDULE. ALL NYLON/PLASTIC/BURLAP ROOT WRAPPING MATERIAL AND METAL WIRE BASKETS SHALL BE REMOVED.
- SOIL TO BE USED FOR THE PLANTING MEDIUM FOR THE PROJECT SHALL BE FERTILE, WELL-DRAINED, OF UNIFORM QUALITY, FREE OF STONES OVER 1" IN DIAMETER, STICKS, OILS, CHEMICALS, PLASTER, CONCRETE AND OTHER DELETERIOUS MATERIAL.
- ALL LANDSCAPE MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE CODES AND ORDINANCES.
- ALL LANDSCAPE MATERIALS SHALL BE INSTALLED IN CONFORMANCE WITH THE ACCEPTED INDUSTRY'S STANDARD 'BEST MANAGEMENT PRACTICE' TECHNIQUES AS IDENTIFIED BY THE ILLINOIS LANDSCAPE CONTRACTORS ASSOCIATION (ILCA).
- THE OWNER AND/OR LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ANY PLANT MATERIAL IN POOR CONDITION/FORM OR NOT INSTALLED ACCORDING TO 'BEST MANAGEMENT PRACTICE' TECHNIQUES.
- THE LANDSCAPE CONTRACTOR SHALL PREPARE PLANTING BEDS BY ADDING SOIL AMENDMENTS TO TOPSOIL MIX IN THE FOLLOWING QUANTITIES: TOPSOIL MIX FOR TREES & SHRUBS SHALL BE THREE (3) PARTS TOPSOIL, ONE (1) PART PEAT, AND ONE (1) PART SAND. TOPSOIL MIX FOR PERENNIALS & GROUNDCOVER SHALL BE THREE (3) PARTS TOPSOIL, ONE (1) PART SAND, AND TWO (2) PARTS COMPOST.
- ALL WOODY PLANTINGS TO RECEIVE 3" OF SHREDDED HARDWOOD MULCH. ALL HERBACEOUS PLANTINGS TO RECEIVE 2" OF LEAF COMPOST.
- CONTRACTOR SHALL WATER PLANTS IMMEDIATELY AFTER PLANTING. FLOODING PLANTS TWICE DURING FIRST TWENTY-FOUR HOURS AFTER PLANTING.
- ALL ROAD AND WALK SURFACES SHALL BE KEPT CLEAR OF MUD AND DEBRIS AT ALL TIMES.
- CONTRACTOR SHALL REPAIR IN KIND ANY AREAS DAMAGED AS A RESULT OF LANDSCAPE OPERATIONS.
- GUARANTEE SPECIFICATIONS ARE AS FOLLOWS: THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A BONDED WRITTEN ONE-YEAR WARRANTY AGREEMENT BEGINNING ON THE FIRST DAY OF THE OWNER'S POSSESSION. THIS AGREEMENT SHALL PROVIDE FOR THE REPLACEMENT OF DEAD OR DYING PLANT MATERIAL. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A TYPED LIST OF SPECIFIC MAINTENANCE INSTRUCTIONS FOR EACH TYPE OF PLANT INSTALLED WITH THE WRITTEN AGREEMENT AND BOND.



4 TYP. SHRUB PLANTING DETAIL  
 SCALE: NTS



5 TYP. PERENNIAL PLANTING DETAIL  
 SCALE: NTS

PROPOSED IDOT SEED RESTORATION LOCATIONS & MIX

LOCATION	SEED MIX	TONS / SQ.
DETENTION BASIN	IDOT 4B	TBD
DISTURBED SLOPES	IDOT 3	TBD
NEW CONSTRUCTION AREAS (PARKING LOTS, BARN AND CEREMONY SITE)	IDOT 1	TBD
ALL OTHER AREAS OF DISTURBANCE	IDOT 4A	TBD

\*FINAL QUANTITIES OF SEED NEEDED AND LOCATIONS TO BE DETERMINED FOR FINAL SUBMITTAL.

issue / revision	date	description
△	05-06-2022	INITIAL REVIEW
△		
△		
△		
△		
△		
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△		

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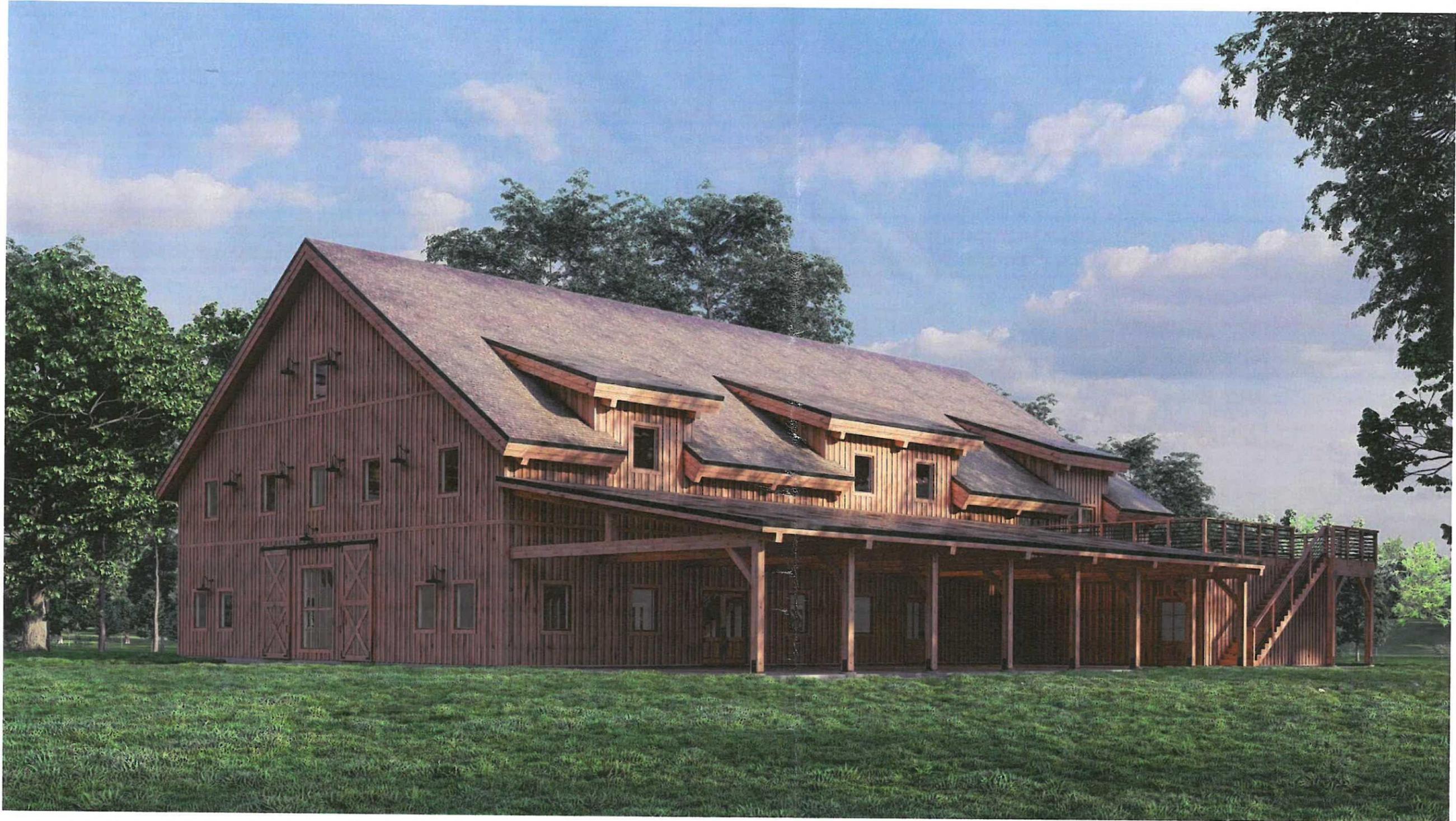
issue date April 28, 2022

sheet name

LANDSCAPE DETAILS AND NOTES

sheet number

L3



**MIKE HAMMES**  
-112X60' EVENT BARN CENTER-

- CONCEPT DRAWING SET -

**CUSTOMER:**  
MIKE HAMMES

**SALES REP:**  
SALES REP

**JOB CODE:**  
MH1221-2

**REVISION & DATE:**  
REV 0.4

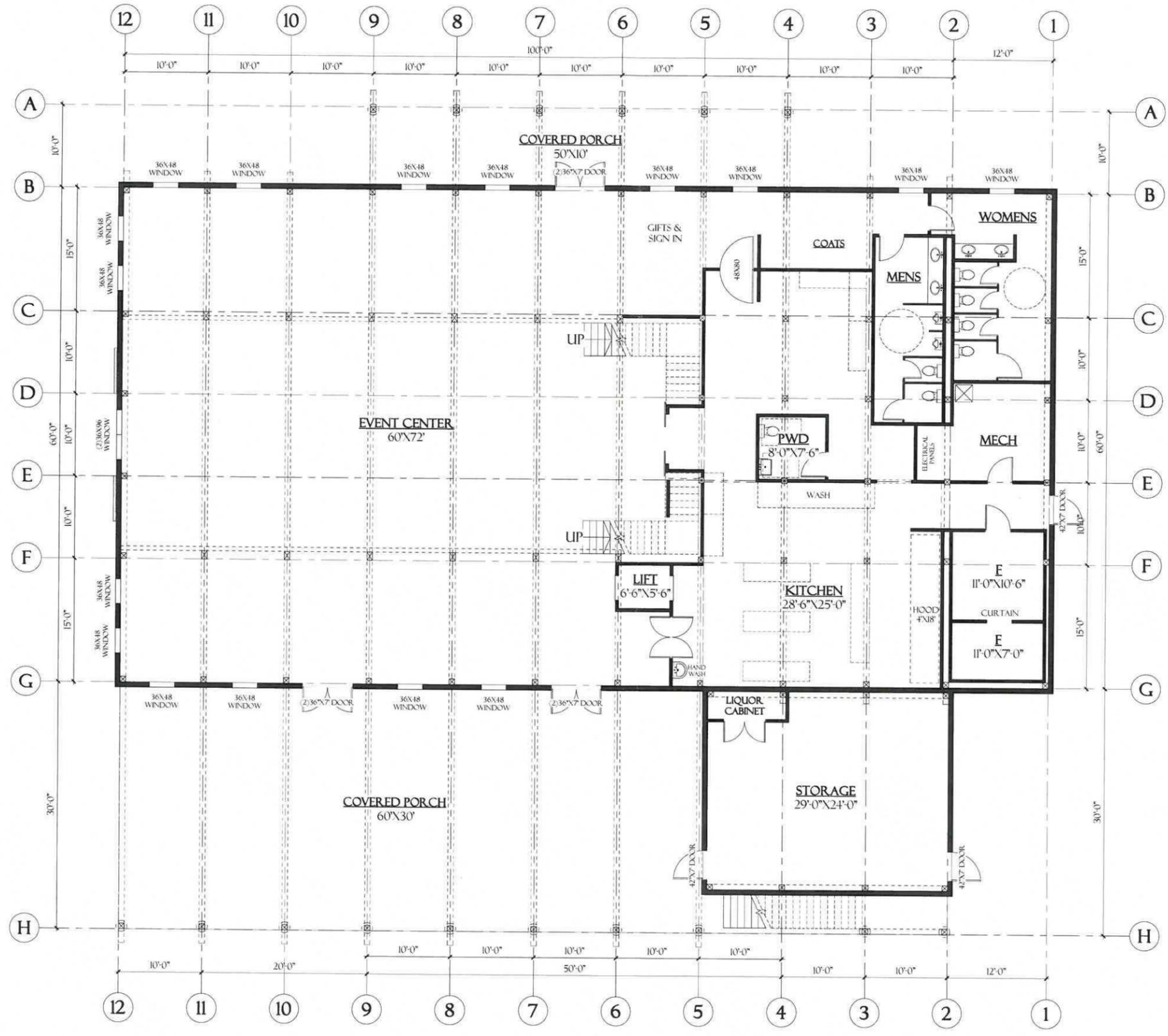
**PROJECT ADDRESS:**  
TBD

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IN PROJECT CLARIFICATION AND INITIAL CONSTRUCTION  
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CONSENT.

DETAILS

**A-000**

COVER SHEET



**MAIN FLOOR PLAN**  
SCALE: 1:76

**MIKE HAMMES**  
-112X60 EVENT BARN CENTER-

- CONCEPT DRAWING SET -

**CUSTOMER:**  
MIKE HAMMES

**SALES REP:**  
SALES REP

**JOB CODE:**  
MH1221-2

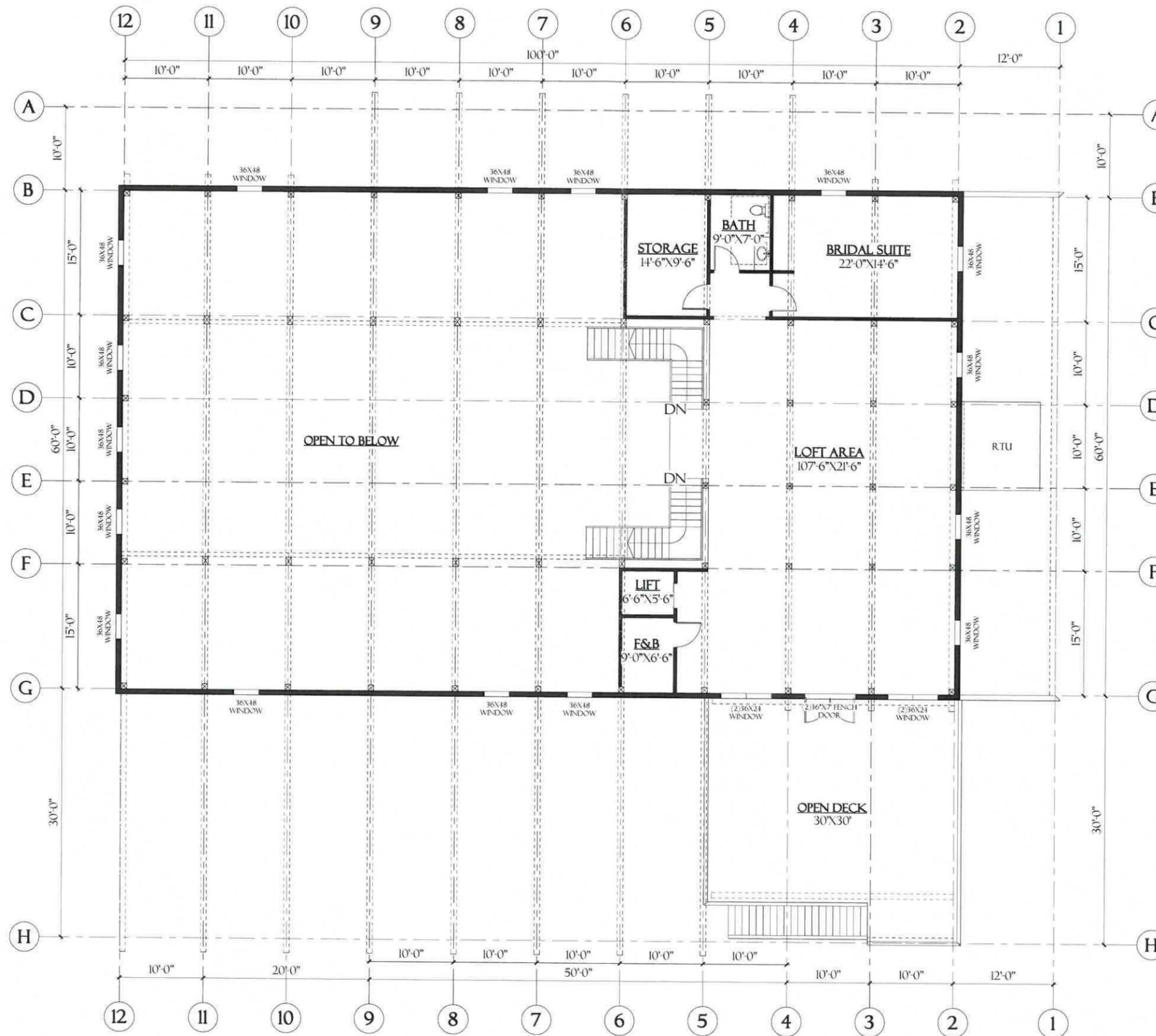
**REVISION & DATE:**  
REV 04

**PROJECT ADDRESS:**  
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DETAILS

**MIKE HAMMES**  
-112X60' EVENT BARN CENTER-



**LOFT FLOOR PLAN**  
SCALE: 1:76

- CONCEPT DRAWING SET -

**CUSTOMER:**  
MIKE HAMMES

**SALES REP:**  
SALES REP

**JOB CODE:**  
MH1221-2

**REVISION & DATE:**  
REV 04

**PROJECT ADDRESS:**  
TBD

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DETAILS

**MIKE HAMMES**

-112X60' EVENT BARN CENTER-

- CONCEPT DRAWING SET -

**CUSTOMER:**

MIKE HAMMES

**SALES REP:**

SALES REP

**JOB CODE:**

MHA1221-2

**REVISION & DATE:**

REV 0.4

**PROJECT ADDRESS:**

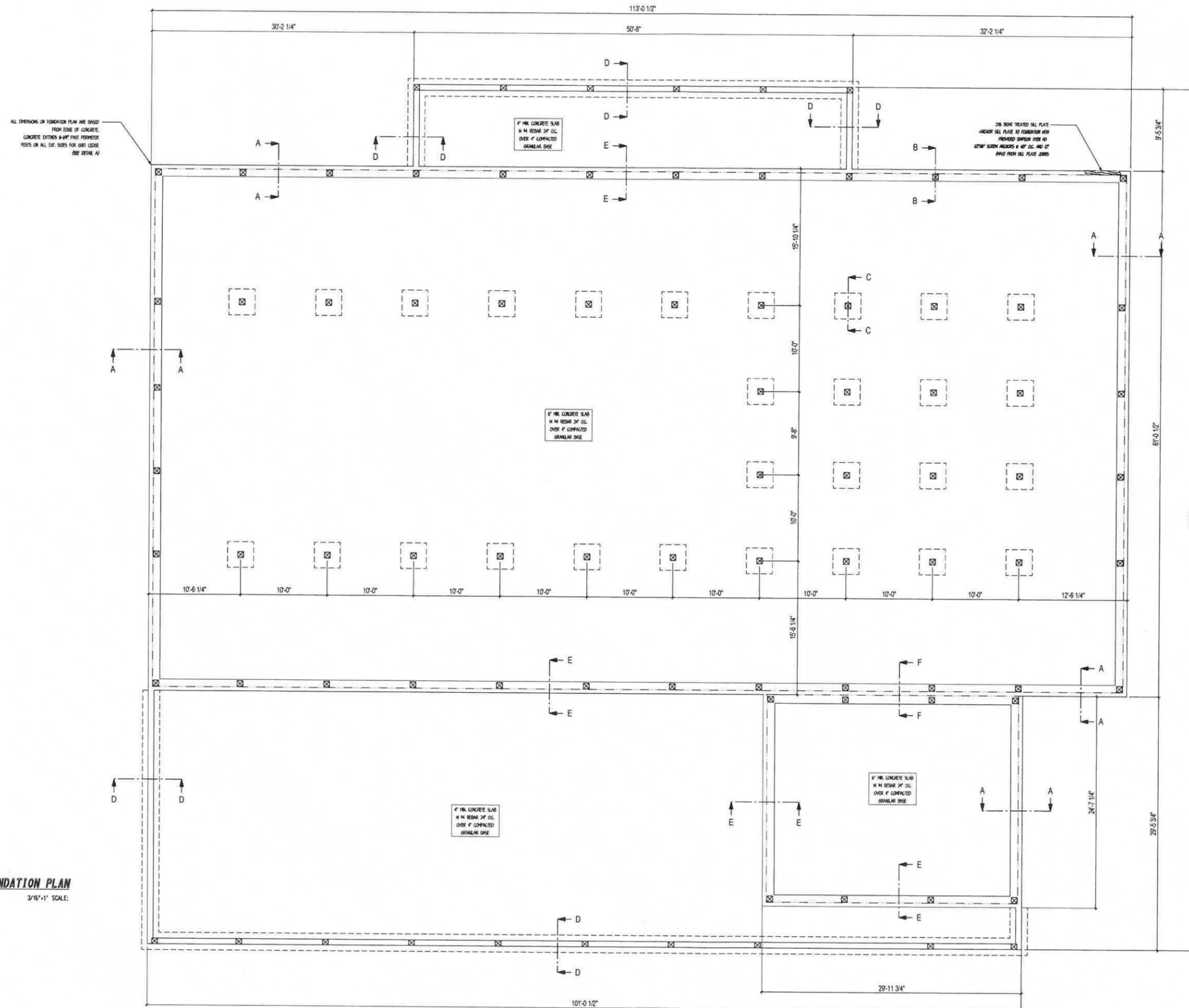
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CONSENT.

DETAILS

**A-103**

LOFT FLOOR PLAN



ALL DIMENSIONS ON FOUNDATION PLAN ARE BASED  
FROM EDGE OF CONCRETE.  
CONCRETE EXTENDS 6-1/4\"/>

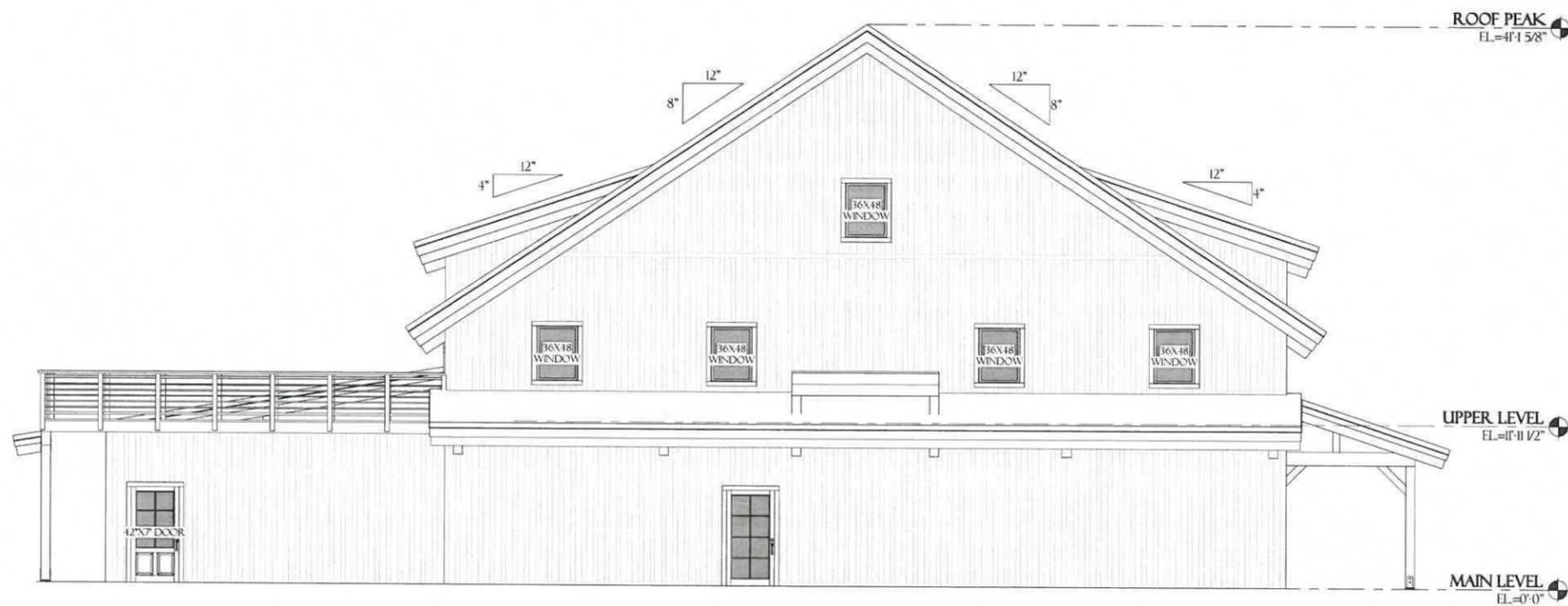
**FOUNDATION PLAN**  
3/16\"/>

**SCREW ANCHOR INFORMATION**

NOTES:  
1. USED FOR POST ATTACHMENT.  
2. USED TO ATTACH CEDAR SILL TO CONCRETE.  
3. USE 1/2\"/>



**E1 | FRONT ELEVATION**  
SCALE: 3/16" = 1'-0"



**E2 | RIGHT ELEVATION**  
SCALE: 3/16" = 1'-0"

**MIKE HAMMES**  
-112X60' EVENT BARN CENTER-

- CONCEPT DRAWING SET -

**CUSTOMER:**

MIKE HAMMES

**SALES REP:**

SALES REP

**JOB CODE:**

MHAI221-2

**REVISION & DATE:**

REV 0.4

**PROJECT ADDRESS:**

TBD

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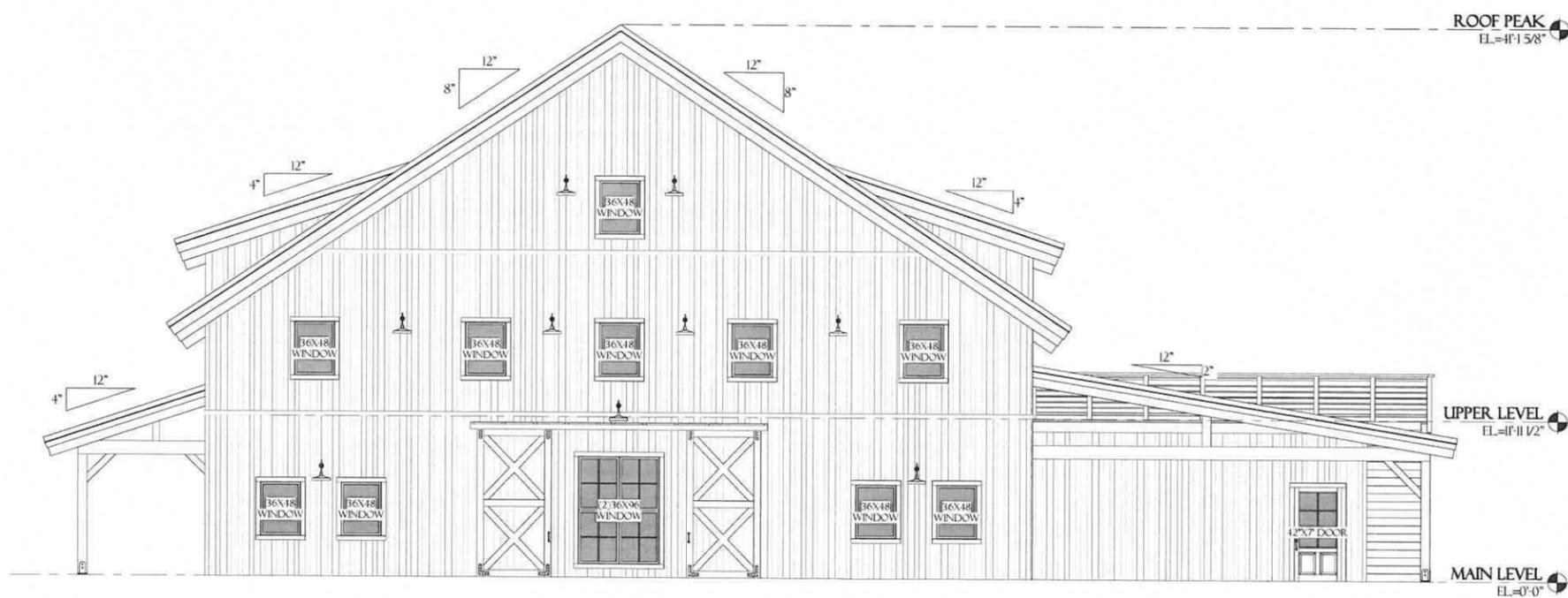
DETAILS

**A-201**

ELEVATION



**E3 | BACK ELEVATION**  
SCALE: 3/16" = 1'-0"



**E4 | LEFT ELEVATION**  
SCALE: 3/16" = 1'-0"

**MIKE HAMMES**

-112X60' EVENT BARN CENTER-

- CONCEPT DRAWING SET -

**CUSTOMER:**  
MIKE HAMMES

**SALES REP:**  
SALES REP

**JOB CODE:**  
MH1221-2

**REVISION & DATE:**  
REV 04

**PROJECT ADDRESS:**  
TBD

DRAWINGS ARE PROVIDED TO ASSIST OUR CUSTOMERS  
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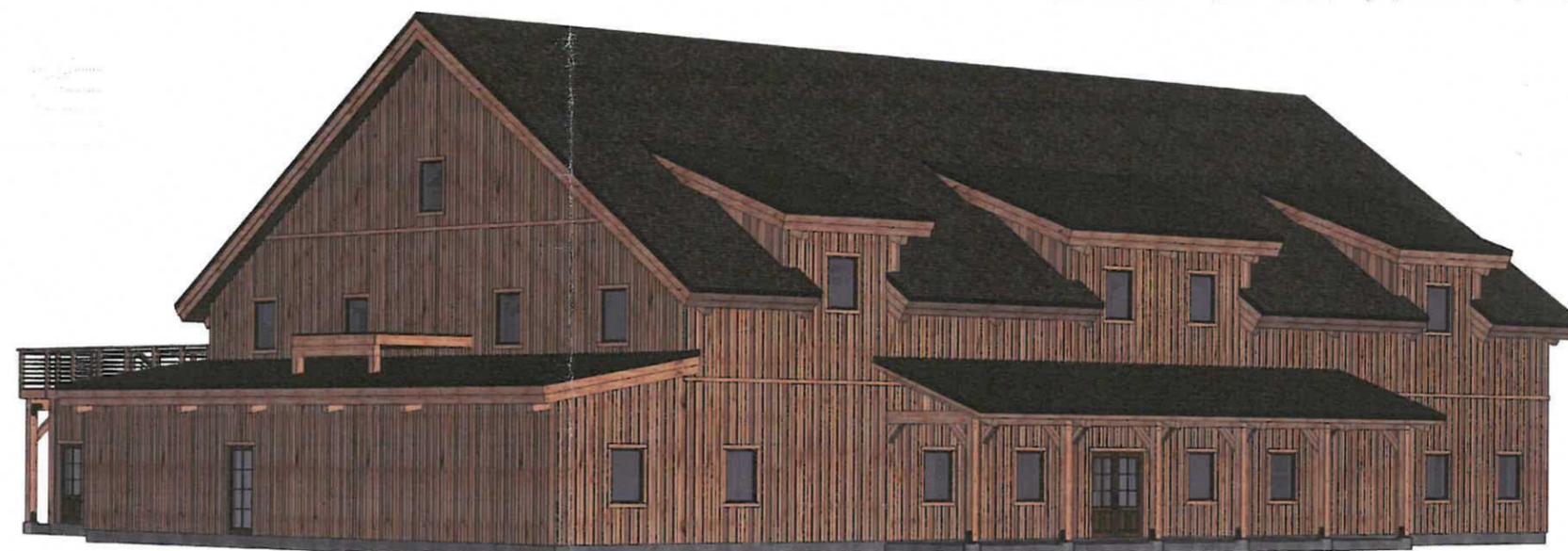
DETAILS

**A-202**

ELEVATION



**3D VIEW-FRONT/LEFT**  
3D PERSPECTIVE VIEW



**3D VIEW-FRONT/RIGHT**  
3D PERSPECTIVE VIEW

**MIKE HAMMES**

112X60 EVENT BARN CENTER

CONCEPT DRAWING SET

**CUSTOMER:**  
MIKE HAMMES  
**SALES REP:**  
SALES REP  
**JOB CODE:**  
MH122F2

**REVISION & DATE:**  
REV 0.4

**PROJECT ADDRESS:**  
TBD

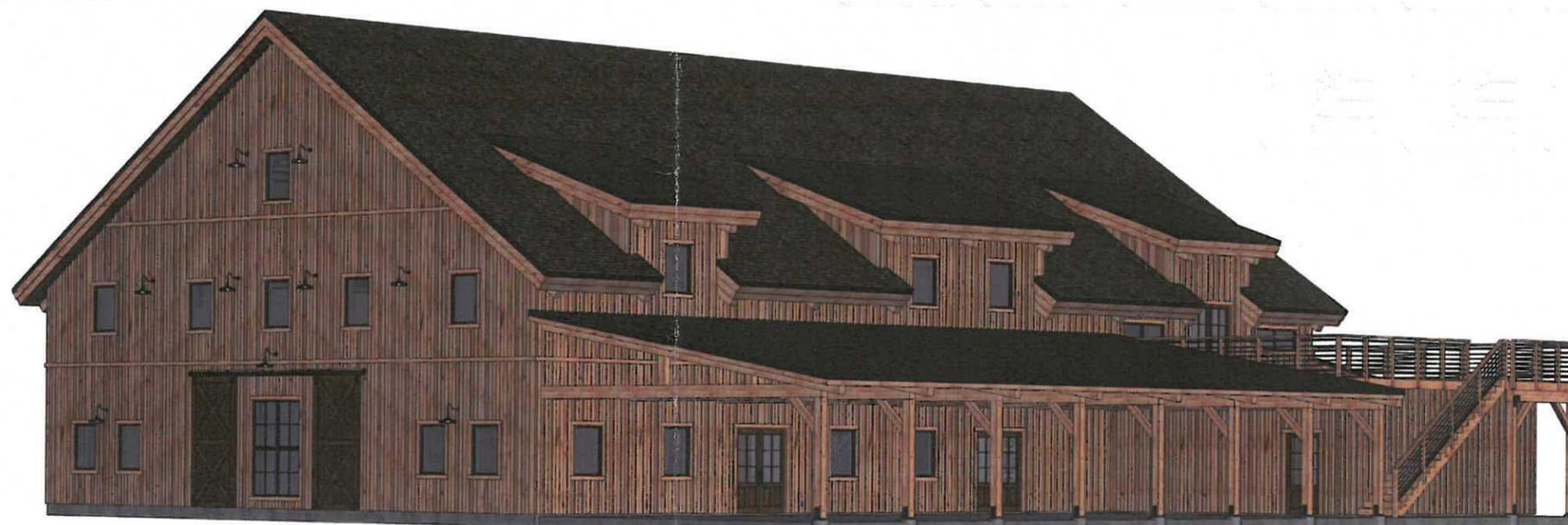
FOR AVISAGE ARE PROVIDED TO ASSIST OUR CUSTOMERS  
IN PROJECT CLARIFICATION AND INITIAL CONSTRUCTION  
BUDGETING. OUR AVISAGE ARE THE PROPERTY OF  
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CONSENT.

DETAILS

**D-501**  
PERSPECTIVE VIEW



**3D VIEW-REAR/RIGHT**  
3D PERSPECTIVE VIEW



**3D VIEW-REAR/LEFT**  
3D PERSPECTIVE VIEW

**MIKE HAMMES**

112'X60' EVENT BARN CENTER

CONCEPT DRAWING SET

**CUSTOMER:**  
MIKE HAMMES  
**SALES REP:**  
SALES REP  
**JOB CODE:**  
MH122F-2

**REVISION & DATE:**  
REV 0.4

**PROJECT ADDRESS:**  
TBD

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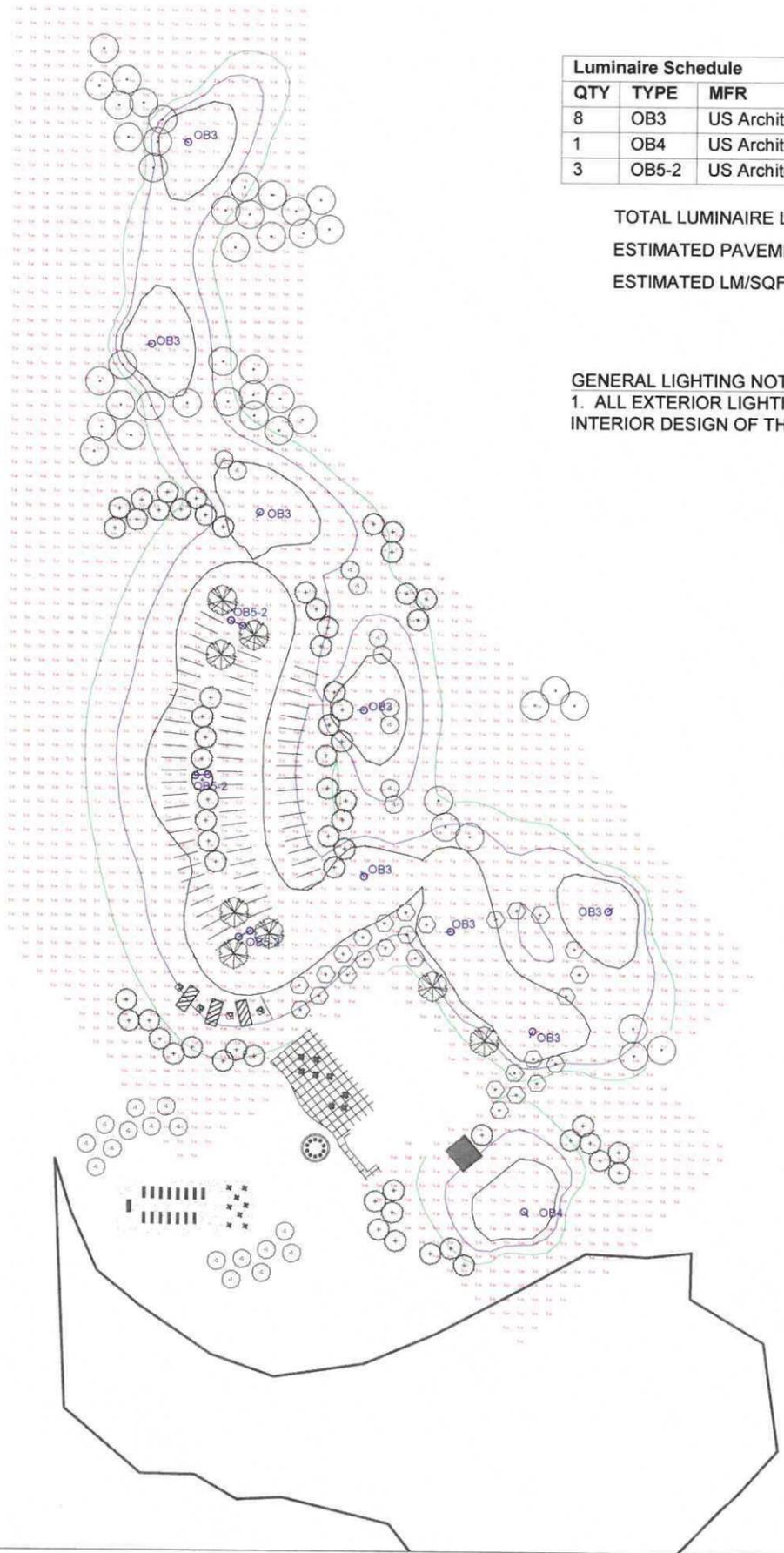
DETAILS

**D-502**

PERSPECTIVE VIEW



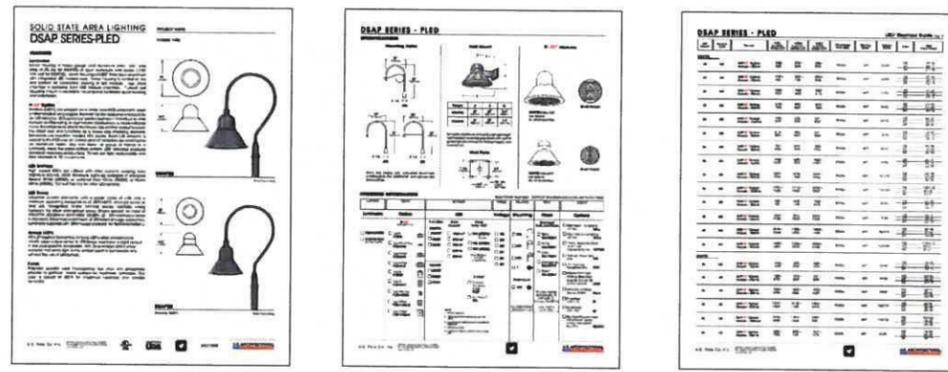
dark sky



Luminaire Schedule						
QTY	TYPE	MFR	PART NUMBER	LLF	Lum. Watts	Total Watts
8	OB3	US Architectural	DSAP20-PLED-III-W-48LED-525mA-WW-(volt)-(mount)-(finish) + POLE, OAH=20'	0.950	79	632
1	OB4	US Architectural	DSAP20-PLED-IV-FT-48LED-525mA-WW-(volt)-(mount)-(finish) + POLE, OAH=20'	0.950	79	79
3	OB5-2	US Architectural	(2) DSAP20-PLED-V-SQ-W-48LED-525mA-WW-(volt)-(mount)-(finish) + POLE, OAH=20'	0.950	79	474
					<b>GRAND TOTAL:</b>	<b>1,185 W</b>

TOTAL LUMINAIRE LUMENS: 153,300  
 ESTIMATED PAVEMENT AREA: ~74,000 SQFT  
 ESTIMATED LM/SQFT = 2.07

**GENERAL LIGHTING NOTES:**  
 1. ALL EXTERIOR LIGHTING IS TO BE ROUTED THROUGH THE BUILDING(BARN) LIGHTING CONTROL PANEL THAT IS TO BE PROVIDED WITH THE INTERIOR DESIGN OF THE BUILDING. THIS PANEL WILL HAVE TIMECLOCK AND PHOTOCELL FUNCTION. PANEL IS NOT SELECTED AT THIS TIME.



**TYPE OB3:**

LCS Zone	Lumens	%amp	%lum
FL (0-30)	624.9	N.A.	6.3
FM (30-60)	2832.0	N.A.	28.4
FH (60-80)	4055.1	N.A.	40.7
FVH (80-90)	256.0	N.A.	2.6
BL (0-30)	636.8	N.A.	6.4
BM (30-60)	1165.4	N.A.	11.7
BH (60-80)	362.8	N.A.	3.6
BVH (80-90)	28.0	N.A.	0.3
UL (90-100)	0.0	N.A.	0.0
UH (100-180)	0.0	N.A.	0.0
<b>Total</b>	<b>9961.0</b>	<b>N.A.</b>	<b>100.0</b>
BUG Rating	B2-U0-G3		

**TYPE OB4:**

LCS Zone	Lumens	%amp	%lum
FL (0-30)	642.3	N.A.	6.6
FM (30-60)	2730.6	N.A.	28.2
FH (60-80)	3989.7	N.A.	41.1
FVH (80-90)	236.2	N.A.	2.4
BL (0-30)	671.8	N.A.	6.9
BM (30-60)	981.5	N.A.	10.1
BH (60-80)	403.4	N.A.	4.2
BVH (80-90)	43.5	N.A.	0.4
UL (90-100)	0.0	N.A.	0.0
UH (100-180)	0.0	N.A.	0.0
<b>Total</b>	<b>9699.0</b>	<b>N.A.</b>	<b>100.0</b>
BUG Rating	B2-U0-G3		

**TYPE OB5-2:**

LCS Zone	Lumens	%amp	%lum
FL (0-30)	365.7	N.A.	3.4
FM (30-60)	1553.6	N.A.	14.6
FH (60-80)	3152.2	N.A.	29.6
FVH (80-90)	254.6	N.A.	2.4
BL (0-30)	365.7	N.A.	3.4
BM (30-60)	1553.6	N.A.	14.6
BH (60-80)	3152.2	N.A.	29.6
BVH (80-90)	254.6	N.A.	2.4
UL (90-100)	0.0	N.A.	0.0
UH (100-180)	0.0	N.A.	0.0
<b>Total</b>	<b>10652.2</b>	<b>N.A.</b>	<b>100.0</b>
BUG Rating	B4-U0-G3		

EVENT BARN	HAWTHORN WOODS, IL	SITE LIGHTING PLAN DECORATIVE OPTION	DRAWN BY: JS	DATE: 6 / 17 / 2022 SCALE: 1" = 50'-0"
#	DATE	COMMENTS	REVISIONS	







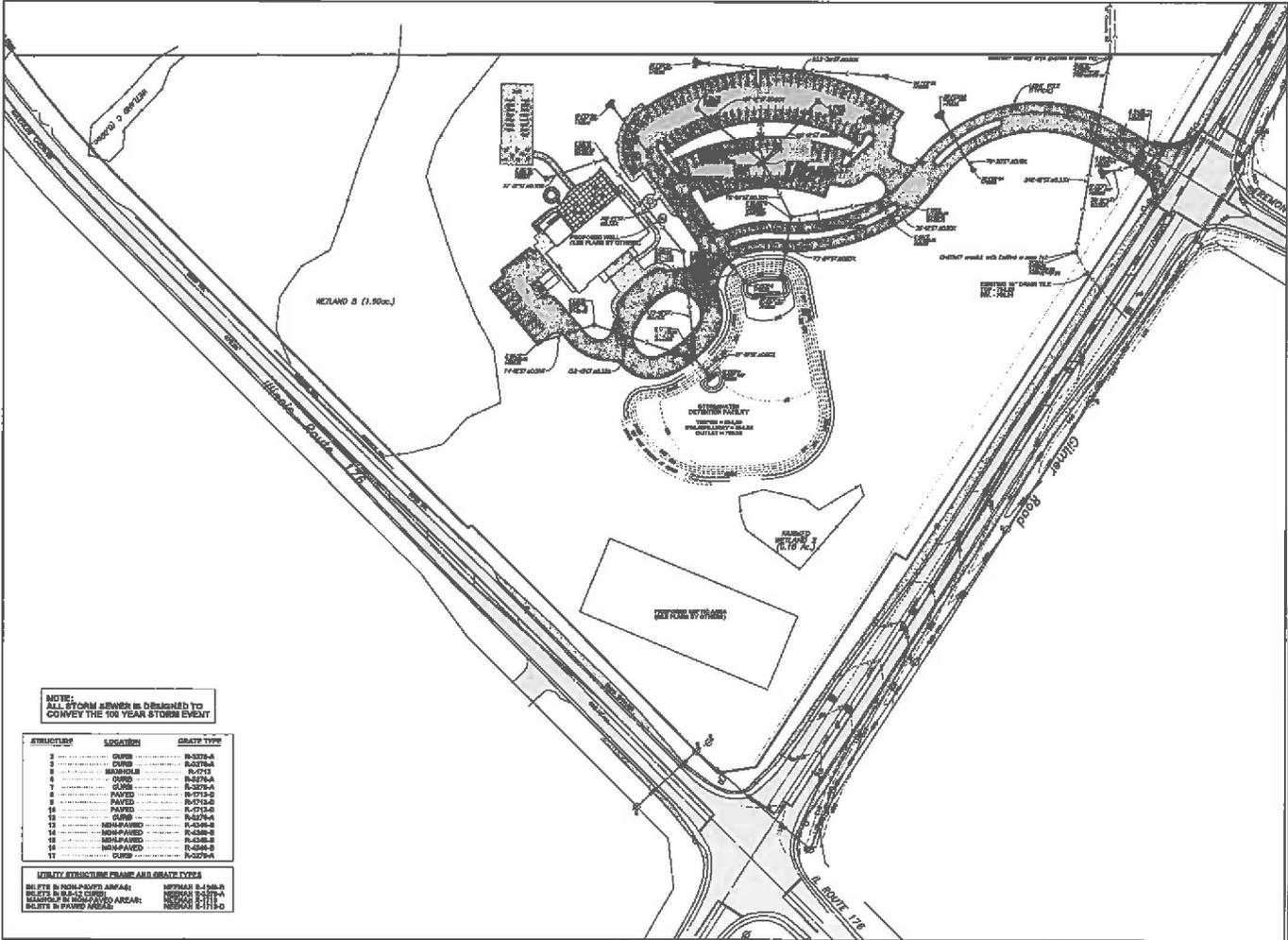














**NORTH**

**THE BARN AT HAWTHORN WOODS**

DESIGNED BY: PEARSON/BROWN & ASSOCIATES, INC.  
 PROJECT NO.: 100-100-0000-0000  
 SHEET NO.: 8 OF 8 SHEETS

**UTILITY PLAN**

DATE: 10/15/10  
 DRAWN BY: J. J. JAMES  
 CHECKED BY: J. J. JAMES  
 APPROVED BY: J. J. JAMES

NO.	DATE	DESCRIPTION

PROJECT NO.: 100-100-0000-0000  
 SHEET NO.: 8 OF 8 SHEETS

**NOTE:**  
 ALL STORM DRAINAGE IS DESIGNED TO CONVEY THE 100 YEAR STORM EVENT

STRUCTURE#	LOCATION	GRATE TYPE
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
5	.....	.....
6	.....	.....
7	.....	.....
8	.....	.....
9	.....	.....
10	.....	.....
11	.....	.....
12	.....	.....
13	.....	.....
14	.....	.....
15	.....	.....
16	.....	.....
17	.....	.....

**UTILITY STRUCTURE FRAME AND GRATE TYPES**

8" PTE IN NON-PAVED AREAS:	8" PTE IN 1" J.M.S.:
12" IN BLACK CURB:	12" IN 1" J.M.S.:
18" IN ASPHALT DRIVE AREAS:	18" IN 1" J.M.S.:
24" IN PAVED AREAS:	24" IN 1" J.M.S.:



# STORMWATER & FLOODPLAIN MANAGEMENT DESIGN REPORT

## THE BARN AT HAWTHORN WOODS HAWTHORN WOODS, ILLINOIS

### PREPARED FOR:

Project 4 Services, LLC  
7722 Hawthorne Road  
Mequan, WI 53097

SEPTEMBER 16, 2022  
REVISED OCTOBER 25, 2022



1850 W. Winchester Road, Suite 205, Libertyville, Illinois 60048 | P: (847) 367-8707 | F: (847) 367-2567  
Email: [pba@pearsonbrown.com](mailto:pba@pearsonbrown.com) | Website: [www.pearsonbrown.com](http://www.pearsonbrown.com)

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Runoff Volume Reduction.....	4
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### EXHIBITS:

- 1: Site Location
- 2: FEMA Flood Insurance Rate Map
- 3: USDA NRCS Soil Survey
- 4: Lake County 1-ft Topography & Aerial Photography
- 5: Existing Conditions
- 6: Hydrologic Disturbance
- 7: Pond Tributary Area
- 8: Wetland Buffer Exhibit

### APPENDICES:

- Tab 1: Pond Design Calculations
- Tab 2: Floodplain Fill & Compensatory Storage Calculations
- Tab 3: Floodway Analysis
- Tab 4: IWLC Wetland Hydrology Calculations
- Tab 5: Storm Sewer Design Calculations
- Tab 6: Stormwater Management System Maintenance Plan

## **INTRODUCTION**

Pearson, Brown and Associates (PBA) prepared the stormwater management design analysis for the proposed development on Gilmer Road in Hawthorn Woods, Illinois. The stormwater management design calculations are prepared in accordance with the Lake County Watershed Development Ordinance (WDO).

## **PROJECT UNDERSTANDING**

The subject property consists of two parcels of land totaling 15.78-acres, located at the intersection of Gilmer Road and Freemont Center Road in Hawthorn Woods, Illinois as shown on Exhibit 1. The proposed development includes converting the existing farm field to an entertainment barn venue consisting of the barn venue building, patio, ceremony area, and parking. After discussions with the Lake County Department of Transportation (LCDOT) it was determined that access to the property must be located at the intersection with Freemont Center Road to complete the fourth leg of the signalized intersection. The effective Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) identifies Zone AE floodplain and floodway onsite that originates from the offsite Davis Lake Drain, as shown on Exhibit 2. The floodplain and floodway along the south side of Gilmer Road extends eastward from Davis Lake Drain across the proposed access location. Exhibit 3 identifies the USDA NRCS soil boundaries, while Exhibit 4 shows the Lake County 2017 aerial topography on the 2020 aerial photography with drainage flow directional arrows.

## **EXISTING CONDITIONS**

The entire property drains west to Davis Lake Drain, then north across Gilmer Road, and ultimately to Manitou Creek and the Fox River. Exhibit 5 depicts the existing conditions including the FEMA mapped floodplain and floodway, as well as the existing 100-year BFE based on a recently completed ground topography. The 100-year BFE according to the FEMA FIS is 804.90 while the 10-year BFE is 798.20. According to the Lake County WDO, the Manitou Creek watershed has allowable release rates that are reduced to 0.02 cfs/acre and 0.09 cfs/acre for the 2-year and 100-year storm events respectively.

There are multiple wetlands identified on the property totaling 2.15 acres. Of these 2 smaller wetlands are proposed to be completely impacted as part of the development that total 0.19 acres. Wetland permitting for the impacts will be required for the impacts and submittals will be completed separately by the project certified wetland specialist.

## **DETENTION VOLUME DETERMINATION**

Due to the reduced release rate criteria for the Manitou Creek watershed, Bentley's PondPack hydrologic modelling software is used to determine the detention requirements for the project. The required detention storage for the development is provided in a single detention basin located in the central portion of the site.

The hydrologically disturbed area (including any proposed offsite impervious), as shown on Exhibit 6, is used in the model along with the actual pond stage storage and theoretical outlet control structure. The outlet control structure is designed to release at the maximum allowable rate, calculated by multiplying the hydrologically disturbed area by 0.02 cfs and 0.09 cfs per acre for the 2-year and 100-year 24-hour storm events respectively. The Pond tributary area is limited to onsite areas only, and does not receive any drainage from offsite areas. Therefore, a Detention Volume Safety Factor (DVSF) does not apply to the required detention volumes.

Results of the model show that 2.21 acre-ft of detention storage is required for the proposed development while the proposed pond provides 2.98 acre-feet of storage from the outlet elevation of 799.30 to the spillway elevation of 804.90.

Detention design calculations including PondPack model output, detailed input parameters, and supporting data can be found in Appendix 1.

## **POND OUTLET RESTRICTOR SIZING**

Since the Pond is within the Manitou Creek watershed, the proposed outlet control structure must be designed to release at or below the allowable rates of 0.02 cfs/ac (2-year) and 0.09 cfs/ac (100-year) for the entire pond tributary area that is identified on Exhibit 7. A theoretical restrictor sizing worksheet is provided in Appendix 1 that shows a 1.35" lower and 2.50" upper restrictor is required in order to meet the allowable release rates. Since these restrictors are below the minimum 4.00" diameter recommended in Section 507.03 of the WDO, an additional analysis is provided in Appendix 1 to determine the actual release rates when utilizing a single restrictor smaller than the 4" minimum size. With an actual pond tributary area of 3.90 acres the allowable release rates are 0.08 cfs (2-year) and 0.35 cfs (100-year). A single 2.35-inch restrictor with clogging protection the 100yr allowable rate of 0.35 cfs when the basin stage reaches the spillway crest level. [The 2yr level release from the 2.35 inch is 0.24 cfs.]

The watershed/pond tributary area for the detention basin is very minor when compared to upstream watershed of Davis Lake Drain. Therefore, the Pond is designed to outlet at elevation of 799.30, which is above the 10-year floodplain elevation for Davis Lake Drain of 798.20, but below the 100-year floodplain of 804.90. With this vast difference in watersheds, the proposed pond has time to peak and drain down well before Davis Lake Drain will peak, therefore no additional tailwater is assumed. As required by the WDO, detention storage will be provided in addition to the required compensatory storage, and any floodplain storage lost due to construction of the pond will be compensated for separately.

## **EMERGENCY SPILLWAY DESIGN**

An emergency spillway is provided and designed to pass the 100-year unattenuated critical duration inflow with at least 1-foot of freeboard from the spillway high water to the top of berm as required by the WDO. Emergency Spillway Design Calculations can be found in Appendix 1. The spillway is proposed to be much wider than needed in order to reduce the velocity and also reduce the risk of erosion.

## **FLOODPLAIN FILL AND COMPENSATORY STORAGE**

As identified on Exhibits 2 and 5, much of the property contains floodplain that extends from Davis Lake Drain. Proposed grading will fill parts of the existing floodplain and provide compensatory storage at a ratio of 1.2:1 as required by section 704.01 of the WDO. Floodplain fill for the development is limited to between the 10-year and 100-year flood elevations, no fill is proposed below the 10-year flood elevation of Davis Lake Drain. Proposed grading activities, including the entire detention basin, creates a total of 5.31 acre-feet of floodplain fill, that requires 6.37 acre-feet (120% of the floodplain fill) of compensatory storage. The development will create 6.45 acre-feet of compensatory storage in various locations of the site.

The Davis Lake 100-year floodplain across the entire property is a consistent elevation of 804.90. Due to the odd shape of the floodplain and the consistent water surface elevation, the most effective way to calculate the floodplain fill and compensatory storage volume, is to break out the site into sections. Then treat it similar to a detention basin and take areas at a maximum contour interval of 1-foot, essentially cutting horizontal cross-sections of each area every 1-foot, and using the average end area method to determine the storage. Detailed exhibits and calculations for the floodplain fill and compensatory storage can be found in Appendix 2.

## **FLOODWAY ANALYSIS**

Based on the FEMA studied and effective Zone AE, the floodway for Davis Lake Drain extends onto the property and across the proposed access location at Freemont Center Road. According to the FEMA FIS the floodway in this area is a consistent flat elevation for 4 cross-sections upstream of Gilmer Road, essentially creating a level pool. The 100-year peak flow rate in the FIS model is conveyed through the existing culvert, and also overtops Gilmer Road. Floodplain/floodway impacts due to proposed grading activities is located substantially away and off to the side of the main Davis Lake Drain's primary conveyance zone that is located at the culvert and overtopping zone. While the official floodway is wide upstream of Gilmer Road and appears to extend eastward onto the site, the areas off to the side are acting as storage zones that allow stormwater to back up and access while the main conveyance zone needs to cross Gilmer Road. Any fill in this storage zone will be compensated for at 120% thus, providing more available storage in proposed conditions than the existing conditions.

Although the area immediately upstream of Gilmer Road will be impacted, the critical culvert crossing, and roadway overtop weir will not be affected or modified. Since these are the critical items that determine the floodplain and floodway elevation,

for an area that extends much further upstream than this development, the floodway and floodplain elevations will not be affected by the proposed activities.

Since the FIS and current effective maps were created, the previously existing 87-ft long 48-in CMP culvert has been replaced by a 97-ft long 72-in RCP culvert. We performed calculations on both the overtop and currently existing culvert. We can confirm that the size increase and reduction in roughness coefficient greatly affects the capacity of the culvert crossing. In fact, the current existing 72-in RCP culvert has capacity to convey the entire 364 cfs peak 100-year flow rate, eliminating the need to overtop Gilmer Road. Additional documentation for the floodway analysis are provided in Appendix 3.

## **WETLAND HYDROLOGY**

According to Section 1006.01 of the WDO, hydrology to the preserved Farmed Wetland 2 must be maintained. The development design shall maintain between 80% and 150% of the existing condition, 2-year, 24-hour storm event runoff volume from the on-site tributary drainage area to the preserved Isolated Waters of Lake County. An analysis of the hydrology is provided in Appendix 4 and identifies that 81% of the runoff volume is being maintained. Please note that the runoff volume has been reduced mainly because the runoff curve number for the proposed open space is less than the existing farm field. Although this brings down the overall volume of runoff, it will create a benefit to the wetland by stabilizing the area and minimizing sedimentation and erosion.

## **RUNOFF VOLUME REDUCTION HIERARCHY**

Runoff Volume Reduction (RVR) standards described in Section 503 of the WDO apply to this development and are met.

Article 5, Section 503.01 of the WDO requires that all development be designed in accordance with the Runoff Volume Reduction (RVR) Hierarchy listed in that section. The hierarchy has been applied to the design of the development as follows:

- *Preservation and enhancement of the stormwater management benefits of the natural resource features of the development site (e.g., areas of Hydrologic Soil Groups A and B, floodplains, Waters of the United States, Isolated Waters of Lake County, channels, drainageways, prairies, savannas, and woodlands);*

Multiple wetlands exist on the property, two of which are farmed wetlands, one that is anticipated to be an IWLC, and 2 that are anticipated to be ACOE waters of the US that total 2.15 acres. Wetland impacts will be limited to 0.19 acres that are necessary for grading of the compensatory storage areas. Floodplain exists on the property, and any fill within the floodplain will be compensated for onsite at a ratio of 1.2:1. The entire property is currently being farmed, while in proposed conditions, all areas outside of the impervious surface will be revegetated, and some areas will incorporate native vegetation, that both are an improvement when compared to the existing farm field.

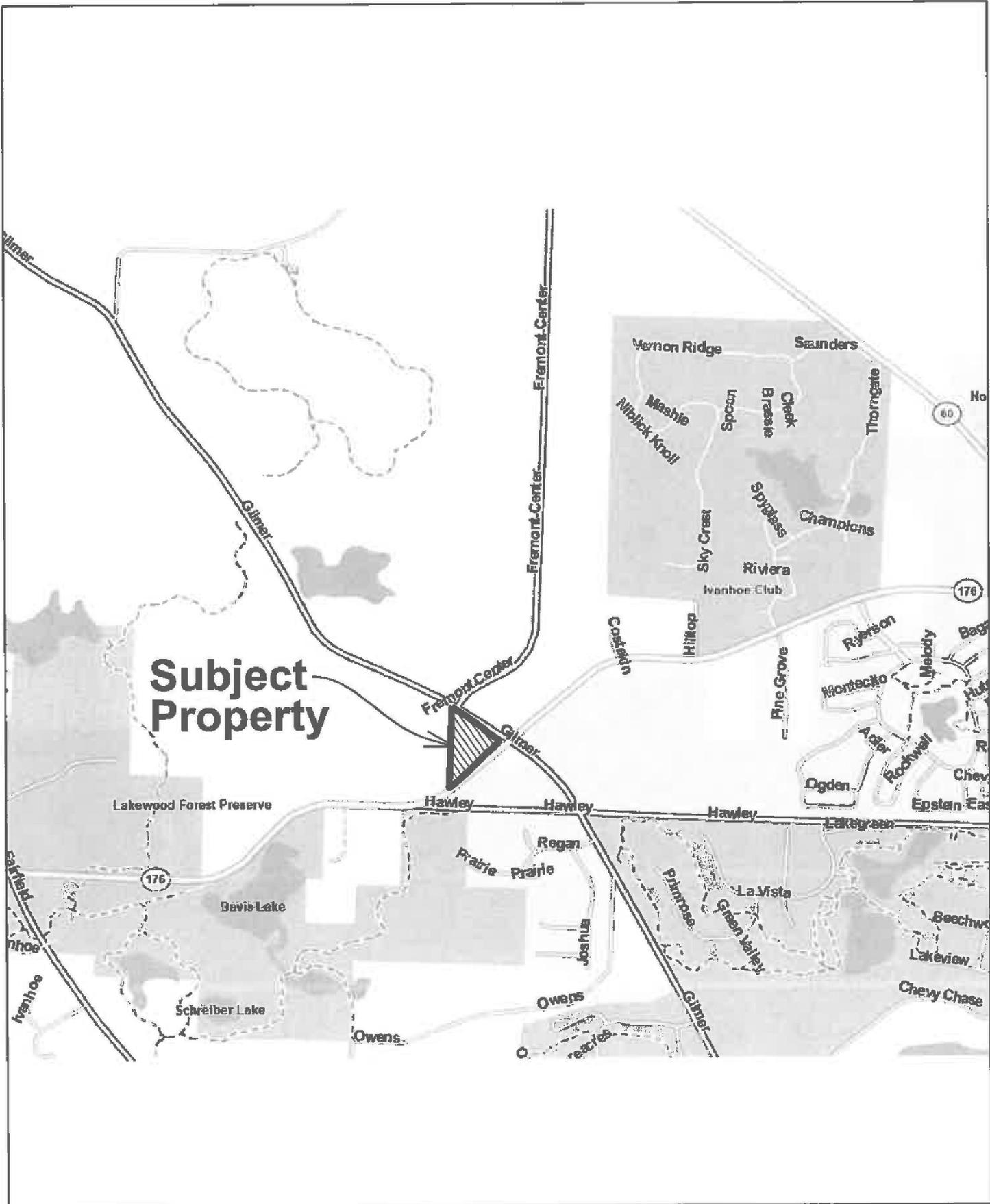
- *Minimization or disconnection of impervious surfaces;*  
Impervious area is a function of the overlying community zoning. Runoff from the site is generally directed to vegetated areas and the proposed detention basin that will be planted in native vegetation, before discharging the site.
- *Enhancement of the infiltration and storage characteristics of the development site using appropriate best management practices;*  
As mentioned above, the site is currently being farmed, while in proposed conditions the site will be revegetated and landscaped, with some areas incorporating native vegetation to enhance the infiltration and stability of the site.
- *The use of open channels with native vegetation to convey stormwater runoff;*  
Runoff is generally directed to open vegetated swales where possible.
- *Structural measures that provide water quality and volume reduction;*  
No structural measures are proposed.
- *Structural measures that provide only volume reduction or other rainwater harvesting practices;*  
No structural measures are proposed.
- *Measures that provide water quality and quantity control;*  
The storm sewer system includes catch basins that provide sumps to capture solids/pollutants. The detention basin incorporates forebays at each inlet, and is planted in native vegetation to help filter runoff and stabilize the soil. A flat drainage swale planted in native vegetation is proposed where the detention basin discharges that provides water quality by allowing stormwater time to filter out solids and capture pollutants.
- *Measures that provide only quantity control.*  
No measures other than those mentioned above are proposed strictly for quantity control.

According to Section 503.02 of the WDO the Isolated Wetland Hydrology Credit, allows 100% of the existing 2-year, 24-hour runoff volume to a preserved IWLC if the Hydrology and water quality treatment requirements are met.

Wetland 2 is being preserved, and as identified in Appendix 4, 81% of the existing 2-year 24-hour runoff volume is being preserved. With a preserved volume of 8,276 c.f. and a total proposed new impervious of 2.3 acres, this yields a credit of 3,598 c.f. per acre of new impervious. According to Appendix O of the WDO, that amounts to nearly 90% of annual rainfall events captured.

## **WATER QUALITY**

The storm sewer system includes catch basins that provide sumps to capture solids/pollutants. The detention basin incorporates forebays at each inlet, and is planted in native vegetation to help filter runoff and stabilize the soil. A flat drainage swale planted in native vegetation is proposed where the detention basin discharges. This provides water quality by allowing stormwater time to filter out solids and capture pollutants. In addition to these measures, a BMP snout device is proposed in the storm sewer system to capture hydrocarbons from the proposed parking areas.



**Subject  
Property**

**PEARSON, BROWN & ASSOCIATES, INC.**  
**CONSULTING ENGINEERS**  
 1850 W. WINCHESTER ROAD - SUITE 205  
 LIBERTYVILLE, IL. 60048  
 PHONE: (847) 367-6707  
 FAX: (847) 367-2567  
 E-MAIL ADDRESS: pbs@pearsonbrown.com

**NORTH**   
  
 SCALE: NTS

TITLE:  
**LOCATION MAP**

PROJECT:  
**THE BARN AT HAWTHORN WOODS**  
 HAWTHORN WOODS, IL

PROJECT NO.: 2229

EXHIBIT  
**1**  
 DATE: 08/16/22



Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, FTD, NOAA, USGS, RC, and other top contributors, and the GIS User Community  
 Wil Route 176 A38 A38 Hawley St



Lake County, Illinois



Map Printed on 9/12/2022



N

<p><b>Flood Hazard Zones</b></p> <p><b>Zone Type</b></p> <ul style="list-style-type: none"> <li>1% Annual Chance Flood Hazard</li> <li>0.2% Annual Chance Flood Hazard</li> <li>Future Conditions 1% Annual Chance Flood Hazard</li> <li>Area with Reduced Risk Due to Levee</li> <li>Regulatory Floodway</li> <li>Special Floodway</li> </ul>	<p><b>Area of Undetermined Flood Hazard</b></p> <p><b>Flood Hazard Boundaries</b></p> <p><b>Line Type</b></p> <ul style="list-style-type: none"> <li>Limit Lines</li> <li>SFHA / Flood Zone Boundary</li> <li>Other Boundaries</li> </ul>	<p><b>General Structures</b></p> <p><b>Structure Type</b></p> <ul style="list-style-type: none"> <li>Flood Structure</li> <li>Bridge</li> <li>Dam, Weir, Jetty</li> <li>Other Structure</li> <li>Levees</li> <li>Political Jurisdictions</li> </ul>	<p><b>Base Flood Elevations</b></p> <p><b>Cross-Sections</b></p> <p><b>LOMAs</b></p> <p><b>Revalidation Status</b></p> <ul style="list-style-type: none"> <li>Incorporated</li> <li>Superseded</li> <li>Not incorporated</li> </ul> <p><b>LOMRs Status</b></p> <ul style="list-style-type: none"> <li>Effective</li> <li>Exp. Paired Lines</li> </ul>	<ul style="list-style-type: none"> <li>No Revalidation Status</li> <li>Reevaluated</li> <li>Contact Community for Revalidation Status</li> </ul>
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**Disclaimer:** The selected feature may not occur anywhere in the current map extent. A Registered Land Surveyor should be consulted to determine the precise location of property boundaries on the ground. This map does not constitute a regulatory determination and is not a base for engineering design. This map is intended to be viewed and printed in color.













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## **APPENDIX 1**

### **POND DESIGN CALCULATIONS**

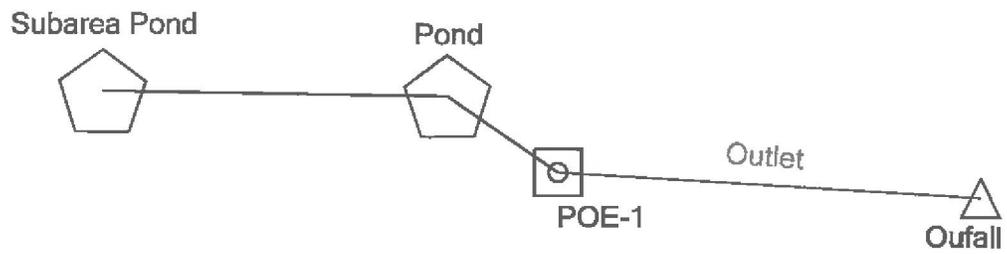
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**DETENTION VOLUME DETERMINATION  
PONDPACK MODEL - INPUT DATA & OUTPUT SUMMARY**

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**Scenario: 100yr 24hr**



## **Detention Determination\_2-Year and 100-Year\_Summary-Input Data**

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### **Project Summary**

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Title	The Barn at Hawthorn Woods
Engineer	AKZ
Company	Pearson, Brown & Associates, Inc.
Date	9/14/2022

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Notes

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## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Master Network Summary

### Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Subarea Pond	2yr 24hr	2	0.847	16.000	1.18
Subarea Pond	100yr 24hr	100	2.778	16.000	3.41

### Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Oufall	2yr 24hr	2	0.847	24.150	0.09
Oufall	100yr 24hr	100	2.778	24.100	0.41

### Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond (IN)	2yr 24hr	2	0.847	16.000	1.18	(N/A)	(N/A)
Pond (OUT)	2yr 24hr	2	0.847	24.150	0.09	802.06	0.734
Pond (IN)	100yr 24hr	100	2.778	16.000	3.41	(N/A)	(N/A)
Pond (OUT)	100yr 24hr	100	2.778	24.100	0.41	804.21	2.385

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Time-Depth Curve

Return Event: 2 years

Label: LC\_B75\_2yr-24hr

Storm Event: 24hr

Scenario: 2yr 24hr

Time-Depth Curve: 24hr	
Label	24hr
Start Time	0.000 hours
Increment	1.000 hours
End Time	24.000 hours
Return Event	2 years

### CUMULATIVE RAINFALL (in)

Output Time Increment = 1.000 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.000	0.068	0.144	0.223	0.305
5.000	0.391	0.480	0.565	0.656	0.761
10.000	0.879	1.033	1.214	1.467	1.740
15.000	2.038	2.334	2.612	2.836	2.997
20.000	3.110	3.184	3.242	3.292	3.340

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Time-Depth Curve

Return Event: 100 years

Label: LC\_B75\_100yr-24hr

Storm Event: 24hr

Scenario: 100yr 24hr

Time-Depth Curve: 24hr	
Label	24hr
Start Time	0.000 hours
Increment	1.000 hours
End Time	24.000 hours
Return Event	100 years

### CUMULATIVE RAINFALL (in)

Output Time Increment = 1.000 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.000	0.176	0.369	0.572	0.782
5.000	1.004	1.231	1.449	1.683	1.952
10.000	2.256	2.651	3.115	3.764	4.466
15.000	5.229	5.990	6.701	7.278	7.691
20.000	7.980	8.171	8.318	8.447	8.570

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Time of Concentration Calculations

Return Event: 100 years

Label: Subarea Pond

Storm Event: 24hr

Scenario: 100yr 24hr

### Time of Concentration Results

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#### Segment #1: TR-55 Sheet Flow

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Hydraulic Length	60.00 ft
Manning's n	0.240
Slope	0.017 ft/ft
2 Year 24 Hour Depth	3.340 in
Average Velocity	0.10 ft/s
Segment Time of Concentration	0.165 hours

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#### Time of Concentration (Composite)

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Time of Concentration (Composite)	0.165 hours
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## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Time of Concentration Calculations

Return Event: 100 years

Label: Subarea Pond

Storm Event: 24hr

Scenario: 100yr 24hr

### ==== SCS Channel Flow

$$T_c = \frac{L_f}{V}$$
$$R = \frac{Q_a}{W_p}$$
$$V = \frac{1.49 * (R^{2/3}) * (S_f^{0.5})}{n}$$

Where:

$(L_f / V) / 3600$

R= Hydraulic radius  
Aq= Flow area, square feet  
Wp= Wetted perimeter, feet  
V= Velocity, ft/sec  
Sf= Slope, ft/ft  
n= Manning's n  
Tc= Time of concentration, hours  
Lf= Flow length, feet

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Runoff CN-Area

Return Event: 100 years

Label: Subarea Pond

Storm Event: 24hr

Scenario: 100yr 24hr

### Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open Space (HSG D, Good)	80.000	2.3000	0.00	0.00	80.000
Impervious - Onsite & Offsite	98.000	2.3000	0.00	0.00	98.000
COMPOSITE AREA & WEIGHTED CN -->	(N/A)	4.6000	(N/A)	(N/A)	89.000

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Elevation vs. Volume Curve

Return Event: 100 years

Label: Pond

Storm Event: 24hr

Scenario: 100yr 24hr

### Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
799.22	0.000
799.30	0.001
800.00	0.020
801.00	0.210
802.00	0.690
803.00	1.420
804.00	2.210
804.95	3.020
805.00	3.070
806.00	3.970
806.50	4.450

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Outlet Input Data

Return Event: 2 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 2yr 24hr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	799.22 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	806.50 ft

### Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	799.22	806.50
Orifice-Circular	Orifice - 2	Forward	TW	802.08	806.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Outlet Input Data

Return Event: 2 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 2yr 24hr

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	799.22 ft
Orifice Diameter	1.45 in
Orifice Coefficient	0.600
Structure ID: Orifice - 2	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	802.08 ft
Orifice Diameter	2.80 in
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	40
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Composite Rating Curve  
 Label: Outlet Pond 1  
 Scenario: 2yr 24hr

Return Event: 2 years  
 Storm Event: 24hr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
799.22	0.00	(N/A)	0.00
799.32	0.01	(N/A)	0.00
799.42	0.02	(N/A)	0.00
799.52	0.03	(N/A)	0.00
799.62	0.03	(N/A)	0.00
799.72	0.04	(N/A)	0.00
799.82	0.04	(N/A)	0.00
799.92	0.04	(N/A)	0.00
800.02	0.05	(N/A)	0.00
800.12	0.05	(N/A)	0.00
800.22	0.05	(N/A)	0.00
800.32	0.06	(N/A)	0.00
800.42	0.06	(N/A)	0.00
800.52	0.06	(N/A)	0.00
800.62	0.06	(N/A)	0.00
800.72	0.07	(N/A)	0.00
800.82	0.07	(N/A)	0.00
800.92	0.07	(N/A)	0.00
801.02	0.07	(N/A)	0.00
801.12	0.07	(N/A)	0.00
801.22	0.08	(N/A)	0.00
801.32	0.08	(N/A)	0.00
801.42	0.08	(N/A)	0.00
801.52	0.08	(N/A)	0.00
801.62	0.08	(N/A)	0.00
801.72	0.09	(N/A)	0.00
801.82	0.09	(N/A)	0.00
801.92	0.09	(N/A)	0.00
802.02	0.09	(N/A)	0.00
802.08	0.09	(N/A)	0.00
802.12	0.10	(N/A)	0.00
802.22	0.12	(N/A)	0.00
802.32	0.17	(N/A)	0.00
802.42	0.20	(N/A)	0.00
802.52	0.22	(N/A)	0.00
802.62	0.23	(N/A)	0.00
802.72	0.25	(N/A)	0.00
802.82	0.27	(N/A)	0.00
802.92	0.28	(N/A)	0.00
803.02	0.29	(N/A)	0.00
803.12	0.31	(N/A)	0.00
803.22	0.32	(N/A)	0.00

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Composite Rating Curve

Return Event: 2 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 2yr 24hr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
803.32	0.33	(N/A)	0.00
803.42	0.34	(N/A)	0.00
803.52	0.35	(N/A)	0.00
803.62	0.36	(N/A)	0.00
803.72	0.37	(N/A)	0.00
803.82	0.38	(N/A)	0.00
803.92	0.39	(N/A)	0.00
804.02	0.40	(N/A)	0.00
804.12	0.41	(N/A)	0.00
804.22	0.42	(N/A)	0.00
804.32	0.42	(N/A)	0.00
804.42	0.43	(N/A)	0.00
804.52	0.44	(N/A)	0.00
804.62	0.45	(N/A)	0.00
804.72	0.46	(N/A)	0.00
804.82	0.46	(N/A)	0.00
804.92	0.47	(N/A)	0.00
805.02	0.48	(N/A)	0.00
805.12	0.49	(N/A)	0.00
805.22	0.49	(N/A)	0.00
805.32	0.50	(N/A)	0.00
805.42	0.51	(N/A)	0.00
805.52	0.51	(N/A)	0.00
805.62	0.52	(N/A)	0.00
805.72	0.53	(N/A)	0.00
805.82	0.53	(N/A)	0.00
805.92	0.54	(N/A)	0.00
806.02	0.55	(N/A)	0.00
806.12	0.55	(N/A)	0.00
806.22	0.56	(N/A)	0.00
806.32	0.56	(N/A)	0.00
806.42	0.57	(N/A)	0.00
806.50	0.58	(N/A)	0.00

### Contributing Structures

None Contributing
Orifice - 1





## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Outlet Input Data  
 Label: Outlet Pond 1  
 Scenario: 100yr 24hr

Return Event: 100 years  
 Storm Event: 24hr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	799.22 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	806.50 ft

### Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	799.22	806.50
Orifice-Circular	Orifice - 2	Forward	TW	802.08	806.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Outlet Input Data

Return Event: 100 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 100yr 24hr

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	799.22 ft
Orifice Diameter	1.45 in
Orifice Coefficient	0.600
Structure ID: Orifice - 2	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	802.08 ft
Orifice Diameter	2.80 in
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	40
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Composite Rating Curve

Return Event: 100 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 100yr 24hr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
799.22	0.00	(N/A)	0.00
799.32	0.01	(N/A)	0.00
799.42	0.02	(N/A)	0.00
799.52	0.03	(N/A)	0.00
799.62	0.03	(N/A)	0.00
799.72	0.04	(N/A)	0.00
799.82	0.04	(N/A)	0.00
799.92	0.04	(N/A)	0.00
800.02	0.05	(N/A)	0.00
800.12	0.05	(N/A)	0.00
800.22	0.05	(N/A)	0.00
800.32	0.06	(N/A)	0.00
800.42	0.06	(N/A)	0.00
800.52	0.06	(N/A)	0.00
800.62	0.06	(N/A)	0.00
800.72	0.07	(N/A)	0.00
800.82	0.07	(N/A)	0.00
800.92	0.07	(N/A)	0.00
801.02	0.07	(N/A)	0.00
801.12	0.07	(N/A)	0.00
801.22	0.08	(N/A)	0.00
801.32	0.08	(N/A)	0.00
801.42	0.08	(N/A)	0.00
801.52	0.08	(N/A)	0.00
801.62	0.08	(N/A)	0.00
801.72	0.09	(N/A)	0.00
801.82	0.09	(N/A)	0.00
801.92	0.09	(N/A)	0.00
802.02	0.09	(N/A)	0.00
802.08	0.09	(N/A)	0.00
802.12	0.10	(N/A)	0.00
802.22	0.12	(N/A)	0.00
802.32	0.17	(N/A)	0.00
802.42	0.20	(N/A)	0.00
802.52	0.22	(N/A)	0.00
802.62	0.23	(N/A)	0.00
802.72	0.25	(N/A)	0.00
802.82	0.27	(N/A)	0.00
802.92	0.28	(N/A)	0.00
803.02	0.29	(N/A)	0.00
803.12	0.31	(N/A)	0.00
803.22	0.32	(N/A)	0.00

## Detention Determination\_2-Year and 100-Year\_Summary-Input Data

Subsection: Composite Rating Curve

Return Event: 100 years

Label: Outlet Pond 1

Storm Event: 24hr

Scenario: 100yr 24hr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
803.32	0.33	(N/A)	0.00
803.42	0.34	(N/A)	0.00
803.52	0.35	(N/A)	0.00
803.62	0.36	(N/A)	0.00
803.72	0.37	(N/A)	0.00
803.82	0.38	(N/A)	0.00
803.92	0.39	(N/A)	0.00
804.02	0.40	(N/A)	0.00
804.12	0.41	(N/A)	0.00
804.22	0.42	(N/A)	0.00
804.32	0.42	(N/A)	0.00
804.42	0.43	(N/A)	0.00
804.52	0.44	(N/A)	0.00
804.62	0.45	(N/A)	0.00
804.72	0.46	(N/A)	0.00
804.82	0.46	(N/A)	0.00
804.92	0.47	(N/A)	0.00
805.02	0.48	(N/A)	0.00
805.12	0.49	(N/A)	0.00
805.22	0.49	(N/A)	0.00
805.32	0.50	(N/A)	0.00
805.42	0.51	(N/A)	0.00
805.52	0.51	(N/A)	0.00
805.62	0.52	(N/A)	0.00
805.72	0.53	(N/A)	0.00
805.82	0.53	(N/A)	0.00
805.92	0.54	(N/A)	0.00
806.02	0.55	(N/A)	0.00
806.12	0.55	(N/A)	0.00
806.22	0.56	(N/A)	0.00
806.32	0.56	(N/A)	0.00
806.42	0.57	(N/A)	0.00
806.50	0.58	(N/A)	0.00

### Contributing Structures

None Contributing
Orifice - 1





## **Detention Determination\_2-Year and 100-Year\_Summary-Input Data**

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## **POND VOLUME, RESTRICTOR SIZING, AND SPILLWAY DESIGN**

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## Detention Pond Outlet Design - Theoretical Restrictor

### Allowable Release Rate Calculation

#### Pond Data

Tributary Area	3.90	AC
Pond Bottom	799.30	FT
2-YR HWL	802.06	FT
100-YR HWL	804.21	FT
Emergency Overflow Elevation	804.95	FT

<u>2-Yr</u>			<u>100-YR</u>		
Allowed Release Rate:	0.02	CFS/AC	Allowed Release Rate:	0.09	CFS/AC
Q <sub>2-YR</sub> Allowable =	0.08	CFS	Q <sub>100-YR</sub> Allowable =	0.35	CFS

**2-YR Orifice**  
 $Q_{2-YR} = CA(2gH)^{1/2}$

C =	0.61
g =	32.22
Outlet Elev =	799.22 FT
Diameter =	1.35 IN
Area =	0.0099 FT <sup>2</sup>

**100-YR Orifice**

$Q_{2-YR} = CA(2gH)^{1/2}$

C =	0.61
g =	32.22
Outlet Elev =	802.10 FT
Diameter =	2.50 IN
Area =	0.0341 FT <sup>2</sup>

**Overflow Weir**

$Q_{Weir} = CLH^{3/2}$

C =	3.3
Weir Elev =	804.90 FT
Weir Length =	125.0 FT

#### Outlet Stage-Discharge Rating

Elev. (FT)	H <sub>2-YR</sub> (FT)	Q <sub>2-YR</sub> (CFS)	H <sub>100-YR</sub> (FT)	Q <sub>100-YR</sub> (CFS)	H <sub>Weir</sub> (FT)	Q <sub>Weir</sub> (CFS)	Q <sub>Total</sub> (CFS)
799.30	0.00	0.00					0.00
799.50	0.22	0.02					0.02
800.00	0.72	0.04					0.04
800.50	1.22	0.05					0.05
801.00	1.72	0.06					0.06
801.50	2.22	0.07					0.07
802.00	2.72	0.08					0.08
802.06	2.78	0.08					0.08
802.50	3.22	0.09	0.30	0.09			0.18
803.00	3.72	0.09	0.80	0.15			0.24
803.50	4.22	0.10	1.30	0.19			0.29
804.00	4.72	0.11	1.80	0.22			0.33
804.21	4.93	0.11	2.01	0.24			0.34
804.50	5.22	0.11	2.30	0.25			0.36
804.90	5.62	0.12	2.70	0.27			0.39

**100-Yr Detention Volume Required: 2.39 AC-FT**

**100-Yr Detention Volume Provided to Spillway Elevation: 3.02 AC-FT**

**Note:**

Both upper and lower restrictors are smaller than the recommended minimum 4-inch diameter.

## Detention Pond Outlet Design - Proposed Restrictor

### Allowable Release Rate Calculation

#### Pond Data

Tributary Area	3.90	AC
Pond Bottom	799.30	FT
Elevation where 2-yr volume is met	802.06	FT
Elevation where 100-yr volume is met	804.21	FT
Emergency Overflow Elevation	804.95	FT

<u>2-Yr</u>			<u>100-YR</u>		
Allowed Release Rate:	0.02	CFS/AC	Allowed Release Rate:	0.09	CFS/AC
$Q_{2-YR}$ Allowable =	0.08	CFS	$Q_{100-YR}$ Allowable =	0.35	CFS

**2-YR Orifice**  
 $Q_{2-YR} = CA(2gH)^{1/2}$

C =	0.61
g =	32.22
Outlet Elev =	799.22 FT
Diameter =	2.35 IN
Area =	0.0301 FT <sup>2</sup>

**100-YR Orifice**  
 $Q_{2-YR} = CA(2gH)^{1/2}$

C =	0.61
g =	32.22
Outlet Elev =	802.10 FT
Diameter =	0.00 IN
Area =	0.0000 FT <sup>2</sup>

**Overflow Weir**  
 $Q_{Weir} = CLH^{3/2}$

C =	3.3
Weir Elev =	804.95 FT
Weir Length =	100.0 FT

#### Outlet Stage-Discharge Rating

Elev. (FT)	$H_{2-YR}$ (FT)	$Q_{2-YR}$ (CFS)	$H_{100-YR}$ (FT)	$Q_{100-YR}$ (CFS)	$H_{Weir}$ (FT)	$Q_{Weir}$ (CFS)	$Q_{Total}$ (CFS)
799.30	0.00	0.00					0.00
799.50	0.18	0.06					0.06
800.00	0.68	0.12					0.12
800.50	1.18	0.16					0.16
801.00	1.68	0.19					0.19
801.50	2.18	0.22					0.22
802.00	2.68	0.24					0.24
802.06	2.74	0.24					0.24
802.50	3.18	0.26	0.40	0.00			0.26
803.00	3.68	0.28	0.90	0.00			0.28
803.50	4.18	0.30	1.40	0.00			0.30
804.00	4.68	0.32	1.90	0.00			0.32
804.21	4.89	0.33	2.11	0.00			0.33
804.50	5.18	0.34	2.40	0.00			0.34
804.95	5.63	0.35	2.85	0.00			0.35

An orifice smaller than the minimum 4-inch is required...

therefore one 2.35" diameter orifice is proposed with clogging protection.

The restrictor is sized such that the allowable release rate of 0.35 cfs is released when the pond is at the spillway crest HWL to ensure the basin release is not exceeded even when

## POND EMERGENCY SPILLWAY DESIGN

Weir sized to pass the peak unattenuated inflow to the detention basin

$Q_{100}$  = Peak unattenuated pond inflow

$Q_{100}$  = CIA (Rational Formula)

C-Factor = 0.64 (2.04 ac impervious at 0.95 & 1.86 ac pervious at 0.30)

$T_c$  = 10 min

Intensity (100-yr) = 10.80 in/hr

Area = 3.90 acres

**$Q_{100} = 26.96$  CFS**

TOP OF BERM



### USE WEIR FORMULA

$Q = CLH^{3/2}$  Flow in outer triangular areas is ignored.

KNOWN

$Q = 26.96$  CFS

$H = 0.6$  FT Available Head with 1-ft of freeboard

$C = 3.0$

Solve  $L = 19$  FT Required Spillway length

**Use  $L = 100$  FT**  
**Velocity  $V = 1.35$  FT/SEC**

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## **APPENDIX 2**

### **FLOODPLAIN FILL & COMPENSATORY STORAGE CALCULATIONS**

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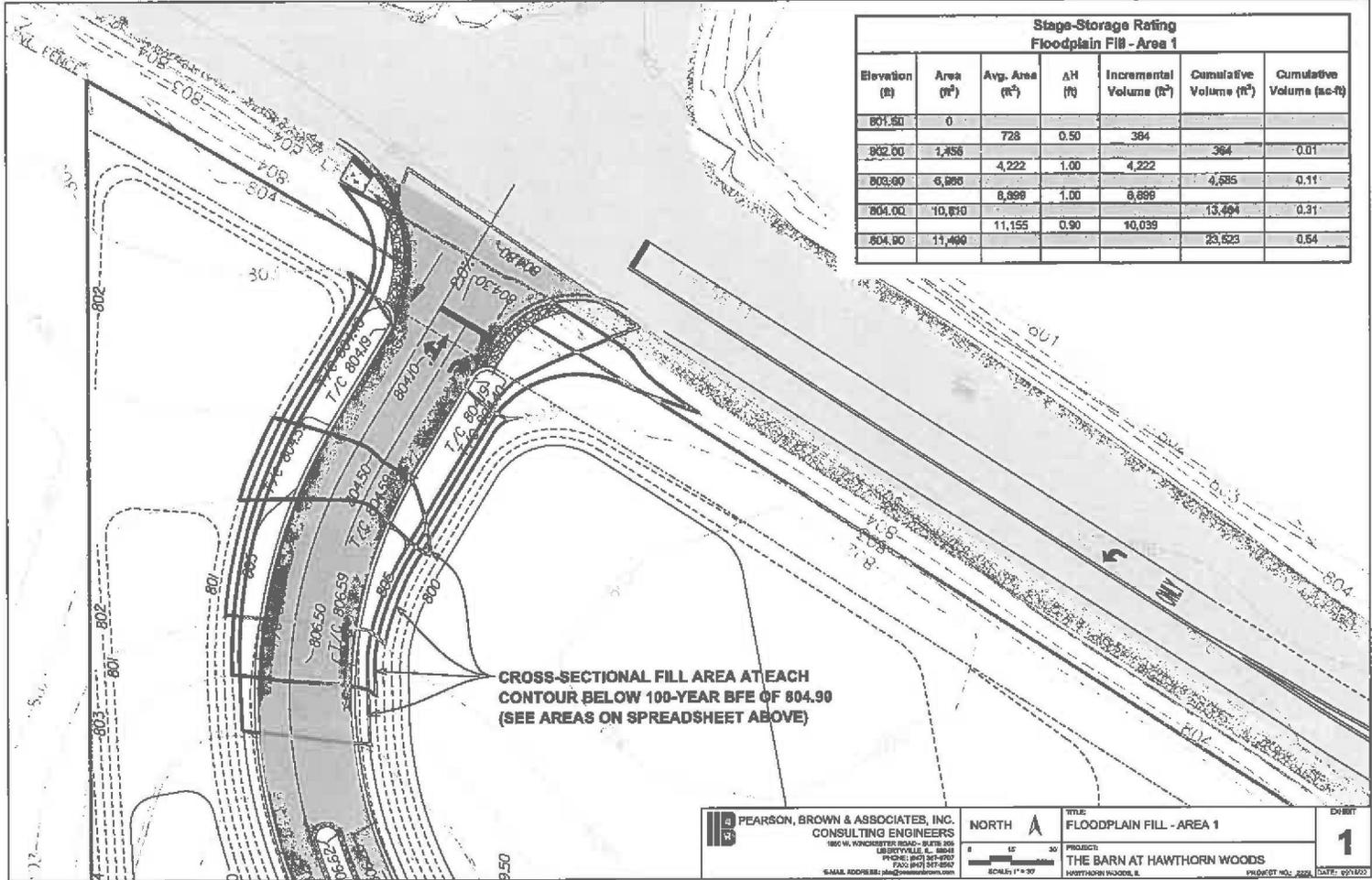
<b>Floodplain Fill Summary</b>	
Location	Floodplain Fill (acre-feet)
Area 1	0.54
Area 2	2.94
Area 3	1.28
Area 4	0.55
Total Floodplain Fill	5.31
Required Compensatory Storage	6.37

<b>Compensatory Storage Summary</b>	
Location	Floodplain Fill (acre-feet)
Area 1	1.58
Area 2	2.42
Area 3	1.19
Area 4	0.55
Area 5	0.71
Total Compensatory Storage Provided	6.45

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## FLOODPLAIN FILL CALCULATIONS

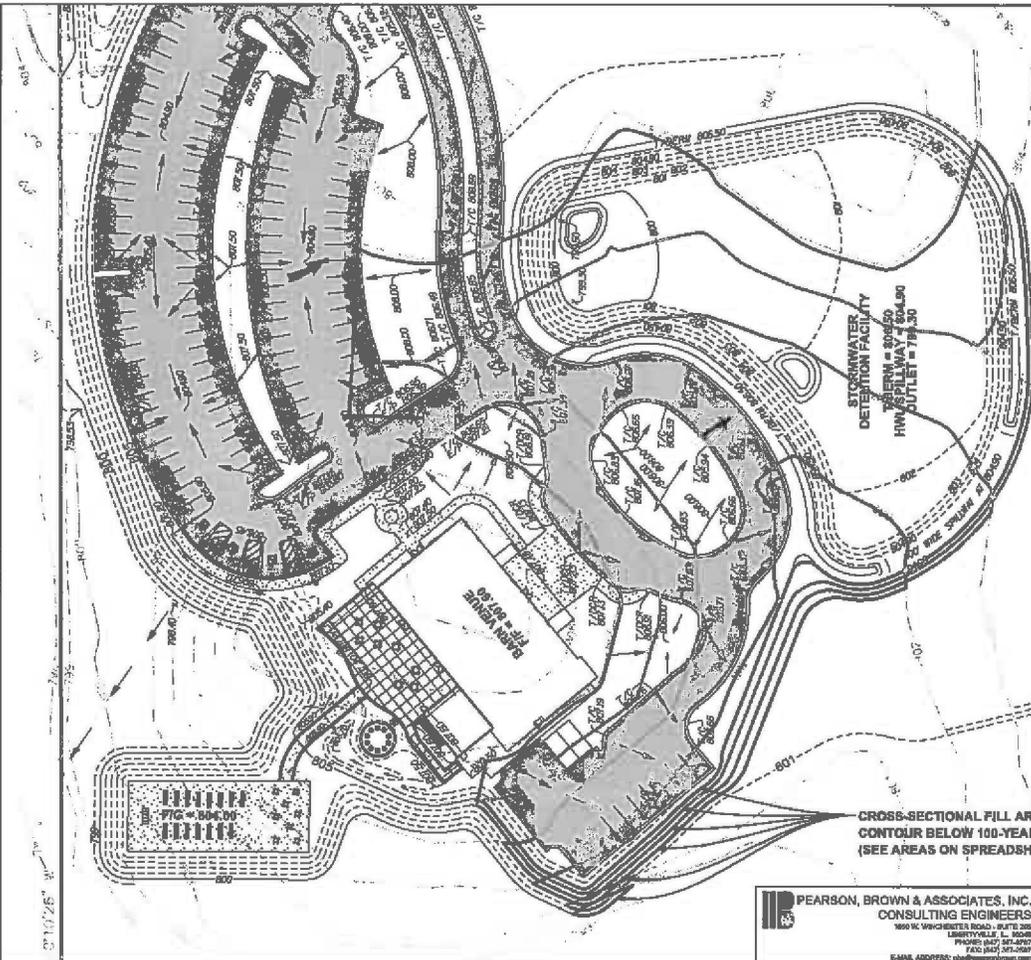
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Stage-Storage Rating Floodplain Fill - Area 1						
Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
801.50	0					
802.00	728	728	0.50	364	364	0.01
803.00	4,222	4,222	1.00	4,222	4,586	0.11
804.00	8,998	8,998	1.00	8,998	13,494	0.31
804.90	11,155	11,155	0.90	10,039	23,523	0.54

CROSS-SECTIONAL FILL AREA AT EACH  
CONTOUR BELOW 100-YEAR BFE OF 804.90  
(SEE AREAS ON SPREADSHEET ABOVE)

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS 180 W. KROCKBETTER ROAD - SUITE 206 LIBERTYVILLE, IL 61841 PHONE: (618) 343-4707 FAX: (618) 343-5502 E-MAIL: RICHIE@pearsonbrown.com	NORTH 0 15' 30' SCALE: 1" = 30'	TITLE: <b>FLOODPLAIN FILL - AREA 1</b>	EXHIBIT <b>1</b>
		PROJECT: <b>THE BARN AT HAWTHORN WOODS</b> HAWTHORN WOODS, IL	

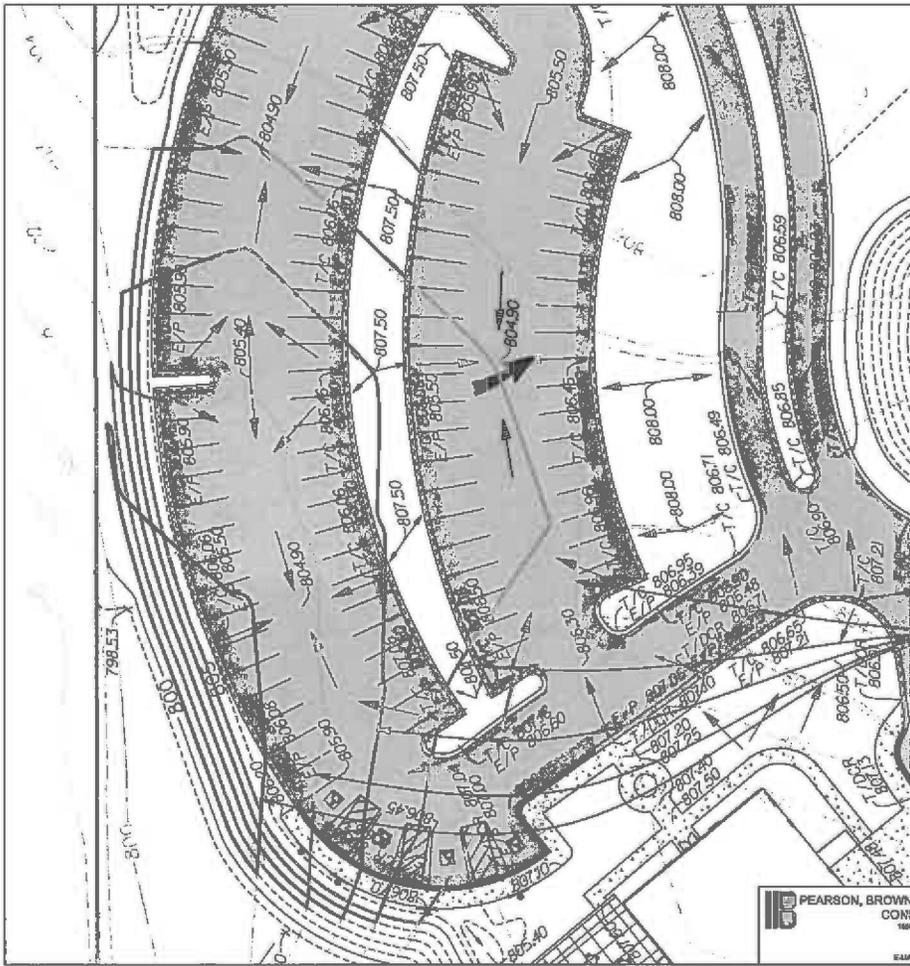


**Single-Storage Rating  
Floodplain Fill - Area 2**

Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
799.00	9	66	1.00	66	9	0.09
800.00	736	181	1.00	736	745	0.50
801.00	197	4,577	1.00	4,577	5,322	0.93
802.00	2,886	20,825	1.00	20,825	26,147	0.93
803.00	32,890	42,528	1.00	42,528	68,675	1.08
804.00	64,188	65,198	0.90	58,846	127,521	2.54

CROSS-SECTIONAL FILL AREA AT EACH  
CONTOUR BELOW 100-YEAR BFE OF 804.90  
(SEE AREAS ON SPREADSHEET ABOVE)

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <small>1800 W. WASHINGTON ROAD, SUITE 200          LIBERTYVILLE, IL 62556          PHONE: (618) 597-4900          FAX: (618) 597-2058          EMAIL ADDRESS: pba@pearsonbrown.com</small>	NORTH 	TITLE: <b>FLOODPLAIN FILL - AREA 2</b>	SHEET <b>2</b>
	SCALE: 1" = 30' PROJECT: <b>THE BARN AT HAWTHORN WOODS</b> <small>HAWTHORN WOODS, IL</small>	PROJECT NO.: 0000 DATE: 08/2022	

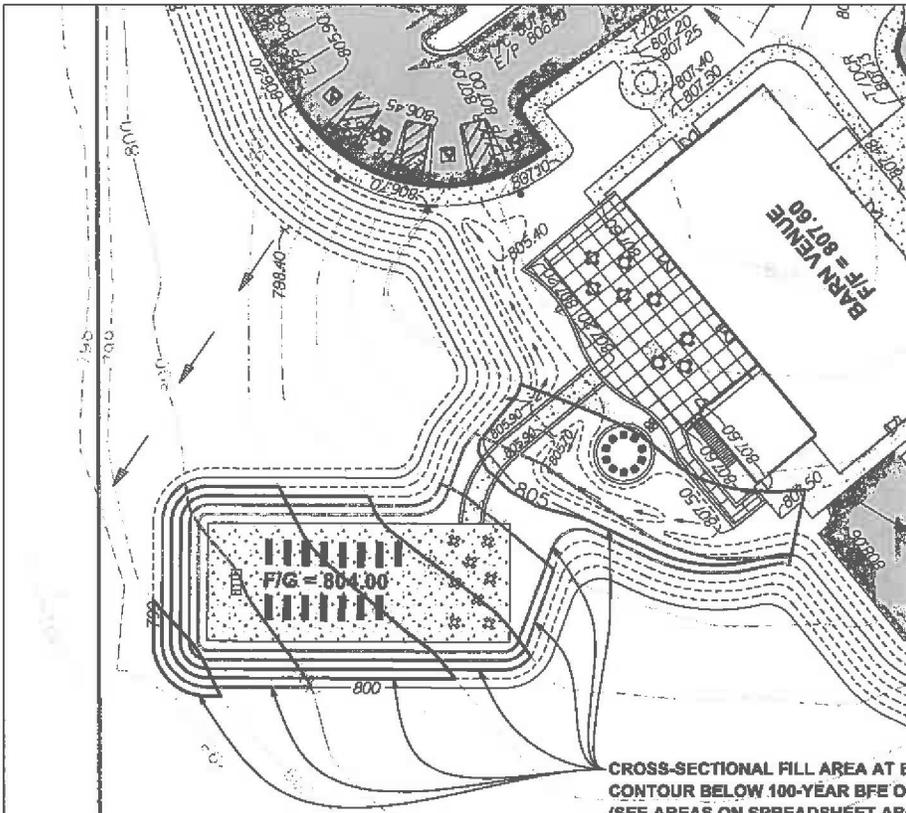


**Stage-Storage Rating  
Floodplain Fill - Area 3**

Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
800.50	0					
801.00	2,455	1,228	0.50	614	614	0.01
802.00	6,982	4,704	1.00	4,704	5,317	0.12
803.00	13,098	10,025	1.00	10,025	15,342	0.35
804.00	21,891	17,515	1.00	17,515	32,857	0.73
804.90	28,310	25,521	0.90	23,058	55,915	1.28

**CROSS-SECTIONAL FILL AREA AT EACH  
CONTOUR BELOW 100-YEAR BFE OF 804.90  
(SEE AREAS ON SPREADSHEET ABOVE)**

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <small>1800 W. WINDSORSTER ROAD - SUITE 300          LIBERTYVILLE, IL 61898          PHONE: (618) 324-4723          FAX: (618) 324-5867          E-MAIL: ADDRESS: pba@pearsonbrown.com</small>	NORTH	804.90 <b>FLOODPLAIN FILL - AREA 3</b> PROJECT: <b>THE BARN AT HAWTHORN WOODS</b> <small>HAWTHORN WOODS, IL</small>	SHEET <b>3</b>
	SCALE: 1" = 30' <small>PROJECT NO.: 2204 DATE: 02/12/22</small>		



CROSS-SECTIONAL FILL AREA AT EACH  
CONTOUR BELOW 100-YEAR BFE OF 804.90  
(SEE AREAS ON SPREADSHEET ABOVE)

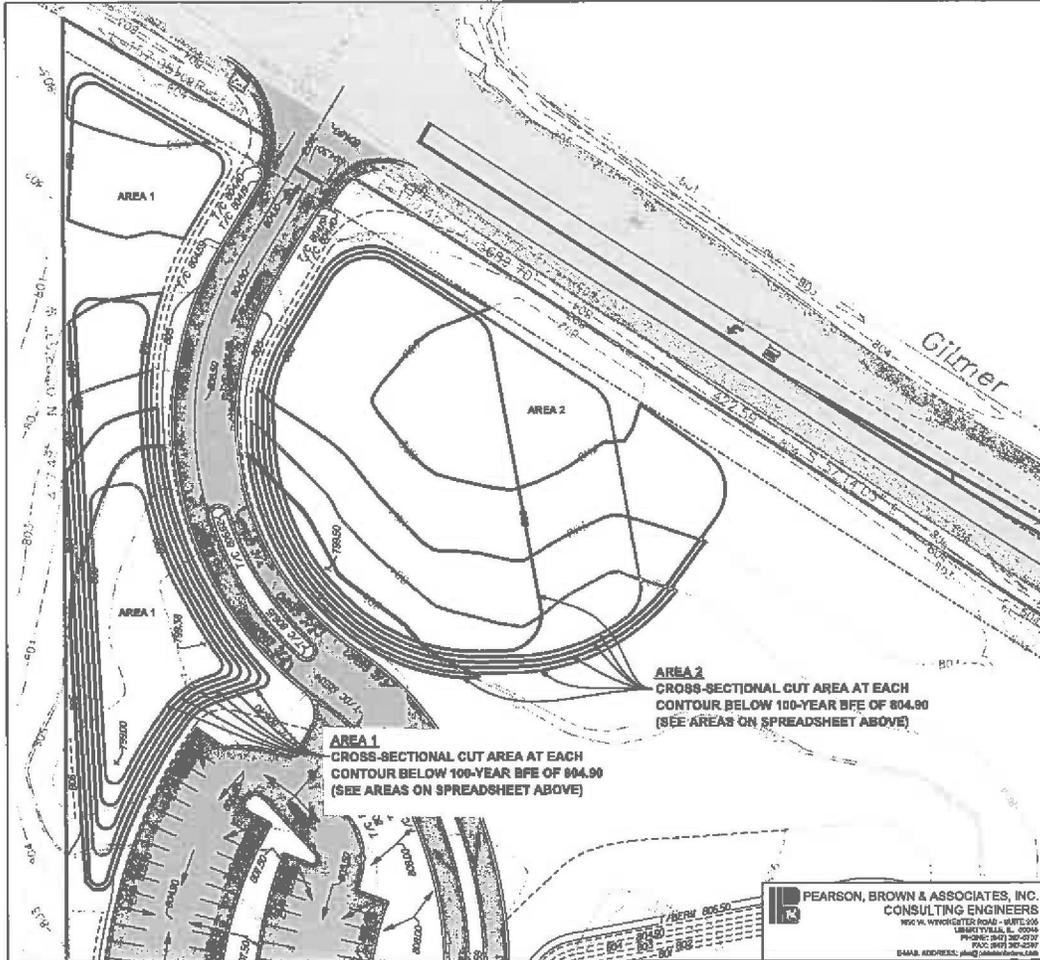
Stage-Storage Rating Area 4						
Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
798.20	0					
		188	0.80	134		
799.00	335		1.00	1,019	134	0.00
		1,019				
800.00	1,702		1.00	2,724	1,152	0.03
		2,724				
801.00	3,745		1.00	4,403	3,876	0.09
		4,403				
802.00	6,060		1.00	5,375	6,278	0.19
		5,375				
803.00	5,699		1.00	5,987	13,653	0.31
		5,987				
804.00	6,285		0.90	4,233	19,940	0.45
		4,704				
804.90	3,122				23,873	0.55

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <small>1885 W. WINCHESTER ROAD - SUITE 206          LEBANON, NH 03601          PHONE: (603) 382-4107          FAX: (603) 382-3007          E-MAIL ADDRESS: pba@pearsonbrown.com</small>	NORTH  SCALE: 1" = 30'	TITLE <b>FLOODPLAIN FILL - AREA 4</b>	EXHIBIT <h1 style="font-size: 2em; margin: 0;">4</h1>
		PROJECT: <b>THE BARN AT HAWTHORN WOODS</b> <small>HAWTHORN WOODS, N.H.</small>	

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## **COMPENSATORY STORAGE CALCULATIONS**

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Stage-Storage Rating Compensatory Storage - Area 1						
Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
798.00	0	3,155	1.00	3,155	3,155	0.04
800.00	4,969	4,729	1.00	9,729	12,884	0.17
801.00	11,148	14,607	1.00	25,737	37,621	0.51
802.00	18,385	18,279	1.00	44,006	81,627	1.10
803.00	24,273	22,883	1.00	66,509	148,136	2.01
804.00	29,059	22,300	1.00	95,439	243,575	3.29
804.90	33,843	21,273	0.90	111,845	355,420	4.78

Stage-Storage Rating Compensatory Storage - Area 2						
Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
798.00	0	11,425	0.00	0	0	0.00
800.00	28,848	27,853	1.00	27,853	27,853	0.37
801.00	38,860	31,824	1.00	59,677	87,530	1.16
802.00	45,782	29,883	1.00	87,413	174,943	2.31
803.00	51,574	26,300	1.00	113,713	288,656	3.86
804.00	56,028	23,000	0.90	121,700	410,356	5.43
804.90	60,718	21,273	0.90	130,318	540,674	7.21

PEARSON, BROWN & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
100 W. WYOMING STREET, SUITE 200  
LITTLE ROCK, AR 72202  
PHONE: (501) 382-0727  
FAX: (501) 382-0728  
EMAIL: ADDRESS: pba@pearsonbrown.com

**NORTH**

0 30' 60'

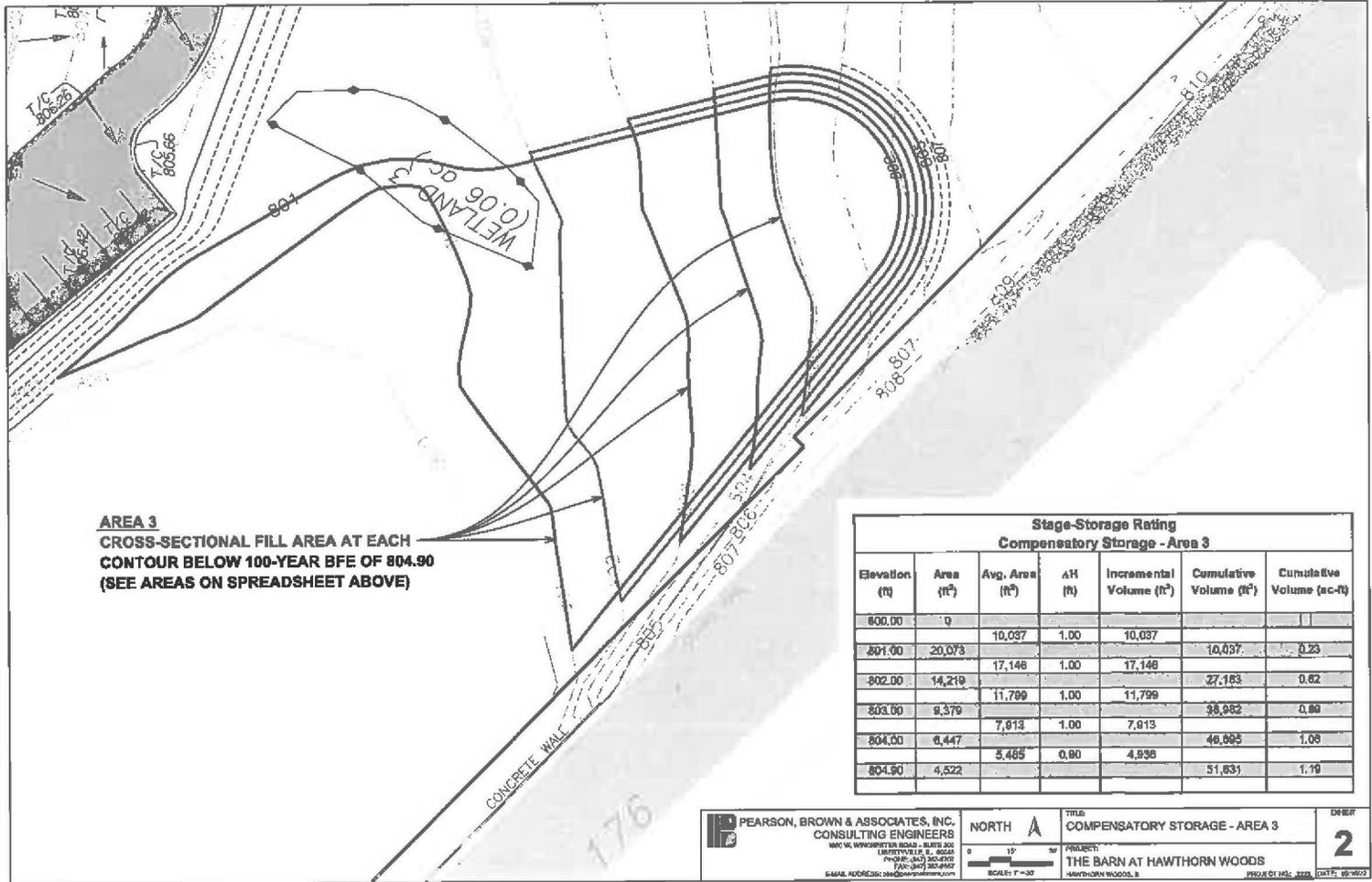
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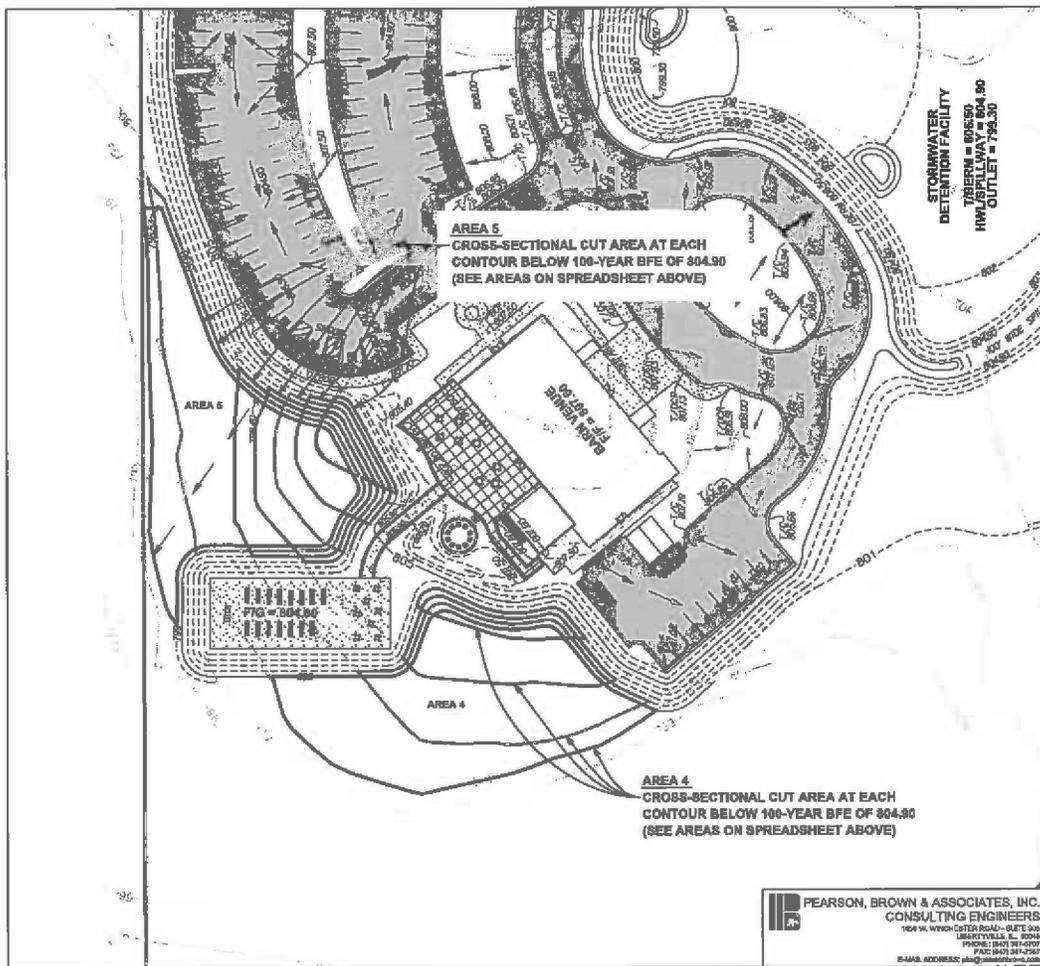
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PROJECT:  
THE BARN AT HAWTHORN WOODS  
HAWTHORN WOODS, AR

PROJECT NO.: 2008 DATE: 05/19/22

**1**





**Stage-Storage Rating  
Compensatory Storage - Area 4**

Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
799.00	0					
800.00	11,268	5,643	1.00	5,643	5,643	0.14
801.00	7,848	6,618	1.00	6,618	15,984	0.39
802.00	3,702	6,621	1.00	6,521	31,975	0.78
803.00	1,788	2,448	1.00	2,448	34,822	0.84
804.00	0	665	0.30	476	35,298	0.88

**Stage-Storage Rating  
Compensatory Storage - Area 5**

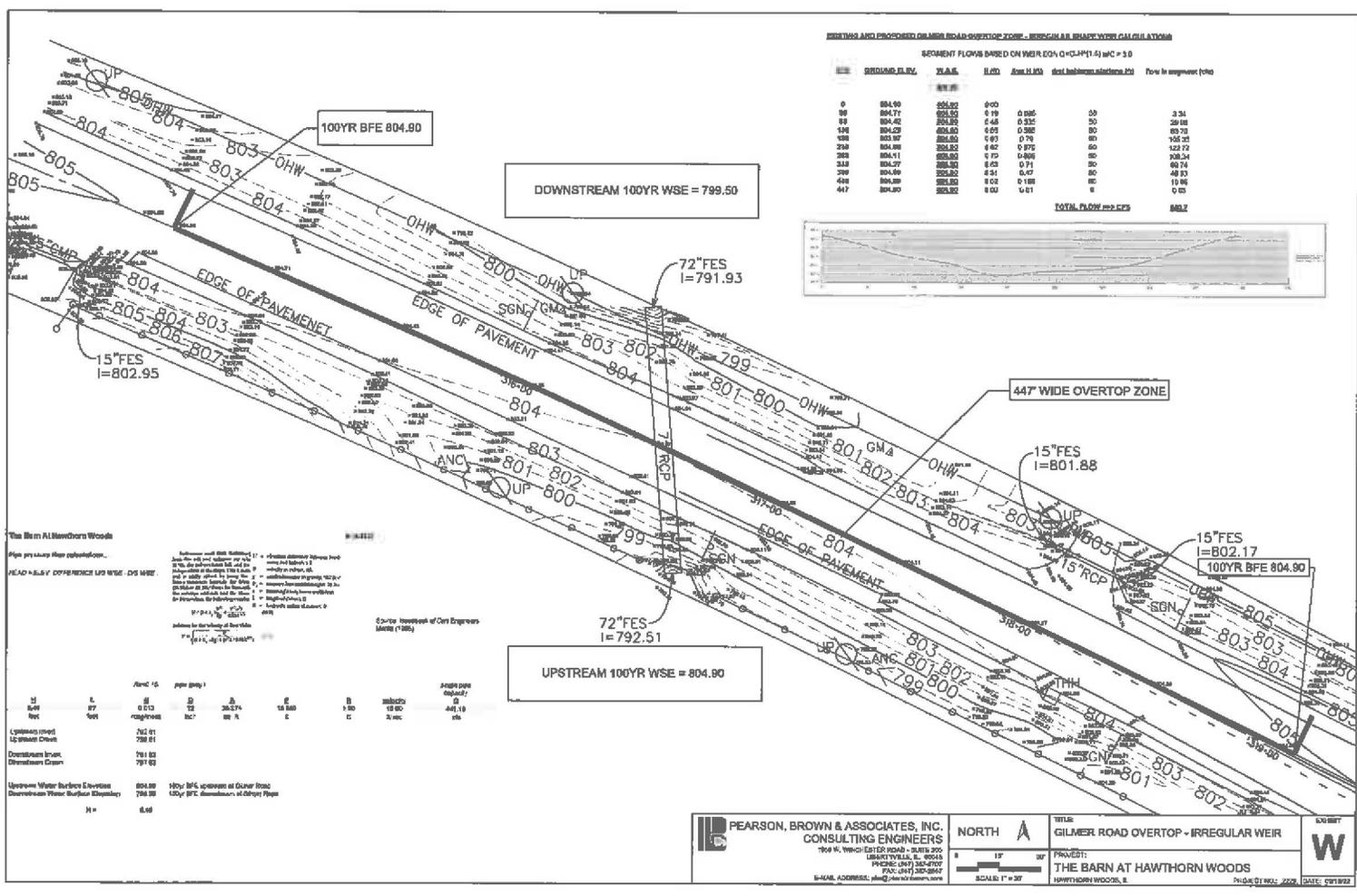
Elevation (ft)	Area (ft <sup>2</sup> )	Avg. Area (ft <sup>2</sup> )	ΔH (ft)	Incremental Volume (ft <sup>3</sup> )	Cumulative Volume (ft <sup>3</sup> )	Cumulative Volume (ac-ft)
799.00	11,268					
800.00	8,048	10,446	1.00	10,446	10,446	0.26
801.00	5,337	7,492	1.00	7,492	17,937	0.41
802.00	4,381	4,858	1.00	4,858	28,798	0.72
803.00	3,896	3,694	1.00	3,694	35,992	0.89
804.00	3,268	2,942	1.00	2,942	39,934	1.00
804.30	3,065	1,897	0.30	1,627	41,561	1.04

<p><b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS 104 W. WOODLAWN ROAD - SUITE 200 LIBERTYVILLE, IL 60540 PHONE: 630.271.0000 FAX: 630.271.0000 E-MAIL ADDRESS: pba@pearsonbrown.com</p>	<p>NORTH </p> <p>0 30' 60'</p> <p>SCALE: 1"=60'</p>	<p>TITLE: COMPENSATORY STORAGE - AREA 4 &amp; 5</p> <p>PROJECT: THE BARN AT HAWTHORN WOODS</p> <p>HAWTHORN WOODS, IL</p>	<p>3</p> <p>PROJECT NO.: 2206 DATE: 05/2012</p>
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**APPENDIX 3**  
**FLOODWAY ANALYSIS**

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**SETTING AND PROPOSED OVERTOP ROAD-OVERTOP ZONE - IRRREGULAR WEIR CALCULATIONS**

SECTION FLOW BASED ON WEIR EQUATION (H<sup>1.5</sup>) n=C = 3.0

STATION	ORDINARY H.W.	FLAME	DATE	Flow (cfs)	Flow in segment (cfs)
0	804.90	804.90	0+00	0.000	0.00
50	804.71	805.50	0+10	0.000	0.00
100	804.52	806.25	0+20	0.000	0.00
150	804.33	807.00	0+30	0.000	0.00
200	804.14	807.75	0+40	0.000	0.00
250	803.95	808.50	0+50	0.000	0.00
300	803.76	809.25	0+60	0.000	0.00
350	803.57	810.00	0+70	0.000	0.00
400	803.38	810.75	0+80	0.000	0.00
450	803.19	811.50	0+90	0.000	0.00
497	803.00	812.25	1+00	0.000	0.00
<b>TOTAL FLOW</b>				<b>0.00</b>	<b>0.00</b>



**The Barn At Hawthorn Woods**  
 Plans prepared by Pearson, Brown & Associates, Inc.  
 HEAD-TO-TOE DIFFERENCE AND WISE - DIS WISE

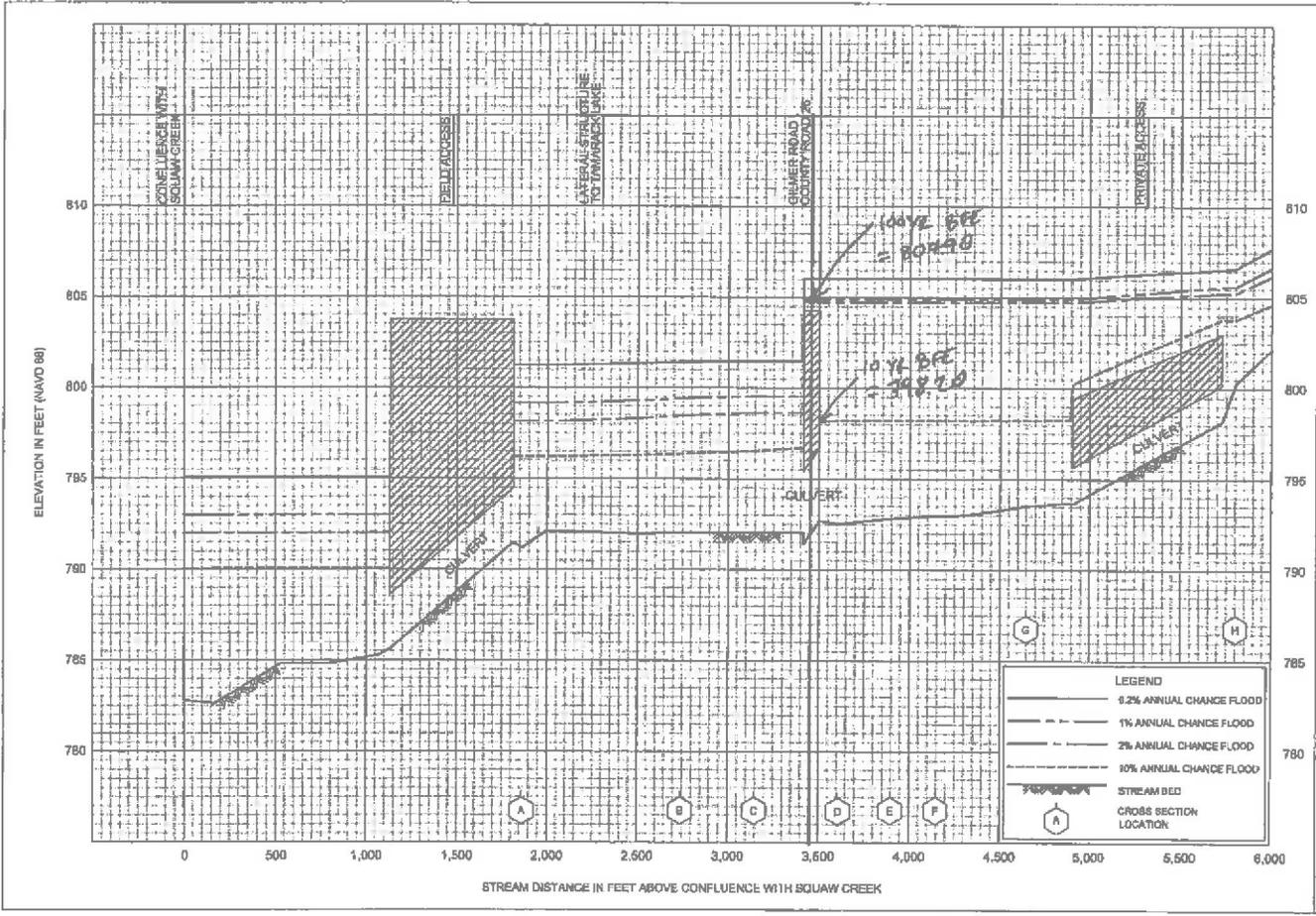
STATION	UPSTREAM	DOWNSTREAM	DIFFERENCE
UP 800	799.80	799.80	0.00
UP 801	799.80	799.80	0.00
UP 802	799.80	799.80	0.00
UP 803	799.80	799.80	0.00
UP 804	799.80	799.80	0.00
UP 805	799.80	799.80	0.00
UP 806	799.80	799.80	0.00
UP 807	799.80	799.80	0.00
UP 808	799.80	799.80	0.00
UP 809	799.80	799.80	0.00
UP 810	799.80	799.80	0.00
UP 811	799.80	799.80	0.00
UP 812	799.80	799.80	0.00
UP 813	799.80	799.80	0.00
UP 814	799.80	799.80	0.00
UP 815	799.80	799.80	0.00
UP 816	799.80	799.80	0.00
UP 817	799.80	799.80	0.00
UP 818	799.80	799.80	0.00
UP 819	799.80	799.80	0.00
UP 820	799.80	799.80	0.00
UP 821	799.80	799.80	0.00
UP 822	799.80	799.80	0.00
UP 823	799.80	799.80	0.00
UP 824	799.80	799.80	0.00
UP 825	799.80	799.80	0.00
UP 826	799.80	799.80	0.00
UP 827	799.80	799.80	0.00
UP 828	799.80	799.80	0.00
UP 829	799.80	799.80	0.00
UP 830	799.80	799.80	0.00
UP 831	799.80	799.80	0.00
UP 832	799.80	799.80	0.00
UP 833	799.80	799.80	0.00
UP 834	799.80	799.80	0.00
UP 835	799.80	799.80	0.00
UP 836	799.80	799.80	0.00
UP 837	799.80	799.80	0.00
UP 838	799.80	799.80	0.00
UP 839	799.80	799.80	0.00
UP 840	799.80	799.80	0.00
UP 841	799.80	799.80	0.00
UP 842	799.80	799.80	0.00
UP 843	799.80	799.80	0.00
UP 844	799.80	799.80	0.00
UP 845	799.80	799.80	0.00
UP 846	799.80	799.80	0.00
UP 847	799.80	799.80	0.00
UP 848	799.80	799.80	0.00
UP 849	799.80	799.80	0.00
UP 850	799.80	799.80	0.00
UP 851	799.80	799.80	0.00
UP 852	799.80	799.80	0.00
UP 853	799.80	799.80	0.00
UP 854	799.80	799.80	0.00
UP 855	799.80	799.80	0.00
UP 856	799.80	799.80	0.00
UP 857	799.80	799.80	0.00
UP 858	799.80	799.80	0.00
UP 859	799.80	799.80	0.00
UP 860	799.80	799.80	0.00
UP 861	799.80	799.80	0.00
UP 862	799.80	799.80	0.00
UP 863	799.80	799.80	0.00
UP 864	799.80	799.80	0.00
UP 865	799.80	799.80	0.00
UP 866	799.80	799.80	0.00
UP 867	799.80	799.80	0.00
UP 868	799.80	799.80	0.00
UP 869	799.80	799.80	0.00
UP 870	799.80	799.80	0.00
UP 871	799.80	799.80	0.00
UP 872	799.80	799.80	0.00
UP 873	799.80	799.80	0.00
UP 874	799.80	799.80	0.00
UP 875	799.80	799.80	0.00
UP 876	799.80	799.80	0.00
UP 877	799.80	799.80	0.00
UP 878	799.80	799.80	0.00
UP 879	799.80	799.80	0.00
UP 880	799.80	799.80	0.00
UP 881	799.80	799.80	0.00
UP 882	799.80	799.80	0.00
UP 883	799.80	799.80	0.00
UP 884	799.80	799.80	0.00
UP 885	799.80	799.80	0.00
UP 886	799.80	799.80	0.00
UP 887	799.80	799.80	0.00
UP 888	799.80	799.80	0.00
UP 889	799.80	799.80	0.00
UP 890	799.80	799.80	0.00
UP 891	799.80	799.80	0.00
UP 892	799.80	799.80	0.00
UP 893	799.80	799.80	0.00
UP 894	799.80	799.80	0.00
UP 895	799.80	799.80	0.00
UP 896	799.80	799.80	0.00
UP 897	799.80	799.80	0.00
UP 898	799.80	799.80	0.00
UP 899	799.80	799.80	0.00
UP 900	799.80	799.80	0.00

**PEARSON, BROWN & ASSOCIATES, INC.**  
 CONSULTING ENGINEERS  
 100 W. WINDY CREST ROAD - SUITE 200  
 WILMINGTON, DE 19810  
 PHONE: (302) 478-4700  
 FAX: (302) 382-8877

**TITLE:** GILMER ROAD OVERTOP - IRRREGULAR WEIR  
**PROJECT:** THE BARN AT HAWTHORN WOODS  
 HAWTHORN WOODS, DE

**SCALE:** 1" = 30'

**DATE:** 07/19/22



FLOOD PROFILES  
DAVIS LAKE DRAIN

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FEDERAL EMERGENCY MANAGEMENT AGENCY  
LAKE COUNTY, IL  
AND INCORPORATED AREAS

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Davis Lake Drain								
A	1,863	77	309	0.1	799.1	799.1	799.2	0.1
B	2,742	148	430	0.9	799.4	799.4	799.5	0.1
C	3,148	31	149	2.4	799.5	799.5	799.6	0.1
D	3,609	877	2,450	0.2	804.9	804.9	804.9	0.0
E	3,897	819	6,730	0.1	804.9	804.9	804.9	0.0
F	4,147	755	5,899	0.1	804.9	804.9	804.9	0.0
G	4,648	552	3,679	0.1	804.9	804.9	804.9	0.0
H	5,802	65	173	2.2	805.6	805.6	805.7	0.1
I	6,175	20	51	7.4	807.5	807.5	807.5	0.0
J	6,446	95	308	1.2	811.6	811.6	811.7	0.1
K	6,634	57	320	1.2	811.7	811.7	811.8	0.1
L	7,073	226	852	0.4	811.8	811.8	811.9	0.1
M	9,956	458	1,697	0.2	812.1	812.1	812.1	0.0

<sup>1</sup> Feet above confluence with Squaw Creek

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOODWAY DATA

TABLE 13

LAKE COUNTY, IL  
AND INCORPORATED AREAS

DAVIS LAKE DRAIN

**Table 9 - Summary of Discharges (continued)**

<u>Flooding Source and Location</u>	<u>Drainage Area (square miles)</u>	<u>Peak Discharges (cubic feet per second)</u>			
		<u>10-Percent- Annual-Chance</u>	<u>2-Percent- Annual-Chance</u>	<u>1-Percent- Annual-Chance</u>	<u>0.2-Percent- Annual-Chance</u>
<b>Bull Creek</b>					
At confluence with Des Plaines River	12.10	435	*	930	*
At St. Mary's Seminary Road	2.80	157	257	301	426
At U.S. Route 45	2.30	134	220	258	367
At Banbury Road	0.90	71	119	141	196
At Midlothian Road	0.80	65	*	129	*
<b>Bull Creek (near Waukegan)</b>					
At Railroad	6.06	996	1,516	1,760	2,385
At Talmadge Avenue	2.40	520	790	930	1,240
At Wilson Avenue	1.75	270	413	479	647
<b>Bull Creek Tributary</b>					
At State Highway 137	1.70	97	*	202	*
<b>Cross Lake Tributary</b>					
At the inlet to Cross Lake	0.20	73	130	154	208
<b>Davis Lake Drain</b>					
Just upstream of Gilmer Road	2.34	72	254	364	679
<b>Deer Lake Drain</b>					
At State Line Road	3.77	64	*	126	*
At U.S. Highway 45	3.50	60	*	119	*
At Deer Lake Spillway	3.08	54	*	107	*
<b>Des Plaines River</b>					
Approximately 0.98 mile downstream of Half Day Road	326.53	3,727	5,367	6,018	7,511
Approximately 1.98 miles downstream of Belvidere Road	275.74	3,385	5,134	5,865	7,705
Approximately 220 feet upstream of Belvidere Road	244.09	3,170	4,996	5,805	7,841
Approximately 500 feet downstream of Skokie Highway	234.61	3,027	4,836	5,644	7,723
Approximately 2,600 feet downstream of Wadsworth Road	223.20	2,926	4,671	5,491	7,595
Approximately 0.76 mile upstream of State Route 173	150.63	1,918	3,327	4,026	5,739
Approximately 400 feet downstream of the Illinois-Wisconsin state boundary	127.09	1,727	3,086	3,773	5,580

\* Data not available

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## **APPENDIX 4**

### **IWLC WETLAND HYDROLOGY CALCULATIONS**

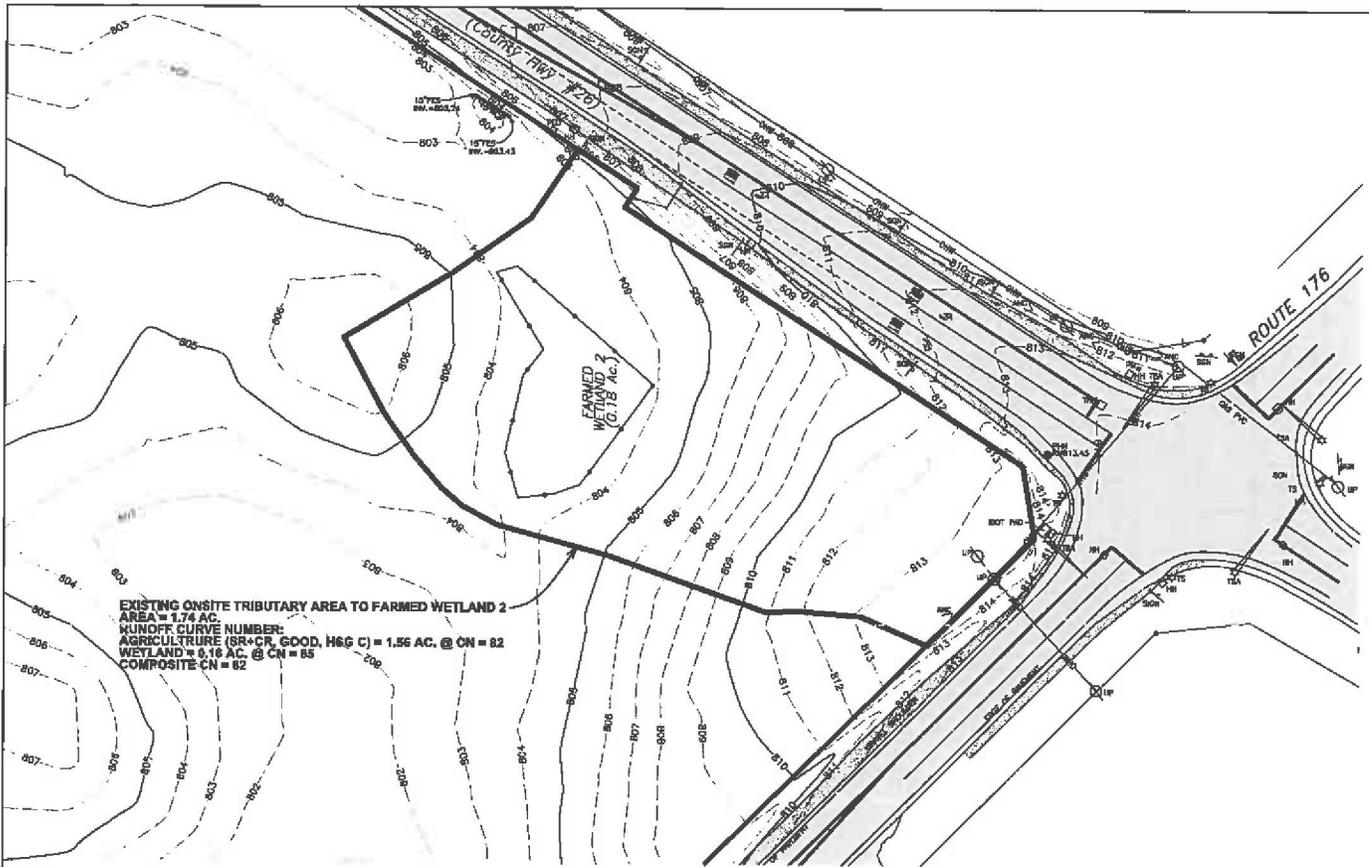
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### 80/150 Analysis for Farmed Wetland #2

EXISTING CONDITIONS				
Existing Tributary Area (acres) = <u>1.74</u>				
Existing Conditions Curve Number = <u>82</u>				
Event	Rainfall (in)	CN	Runoff (in)	Runoff Volume (ac-ft)
2-Year 24 Hour	3.34	82	1.662	0.24

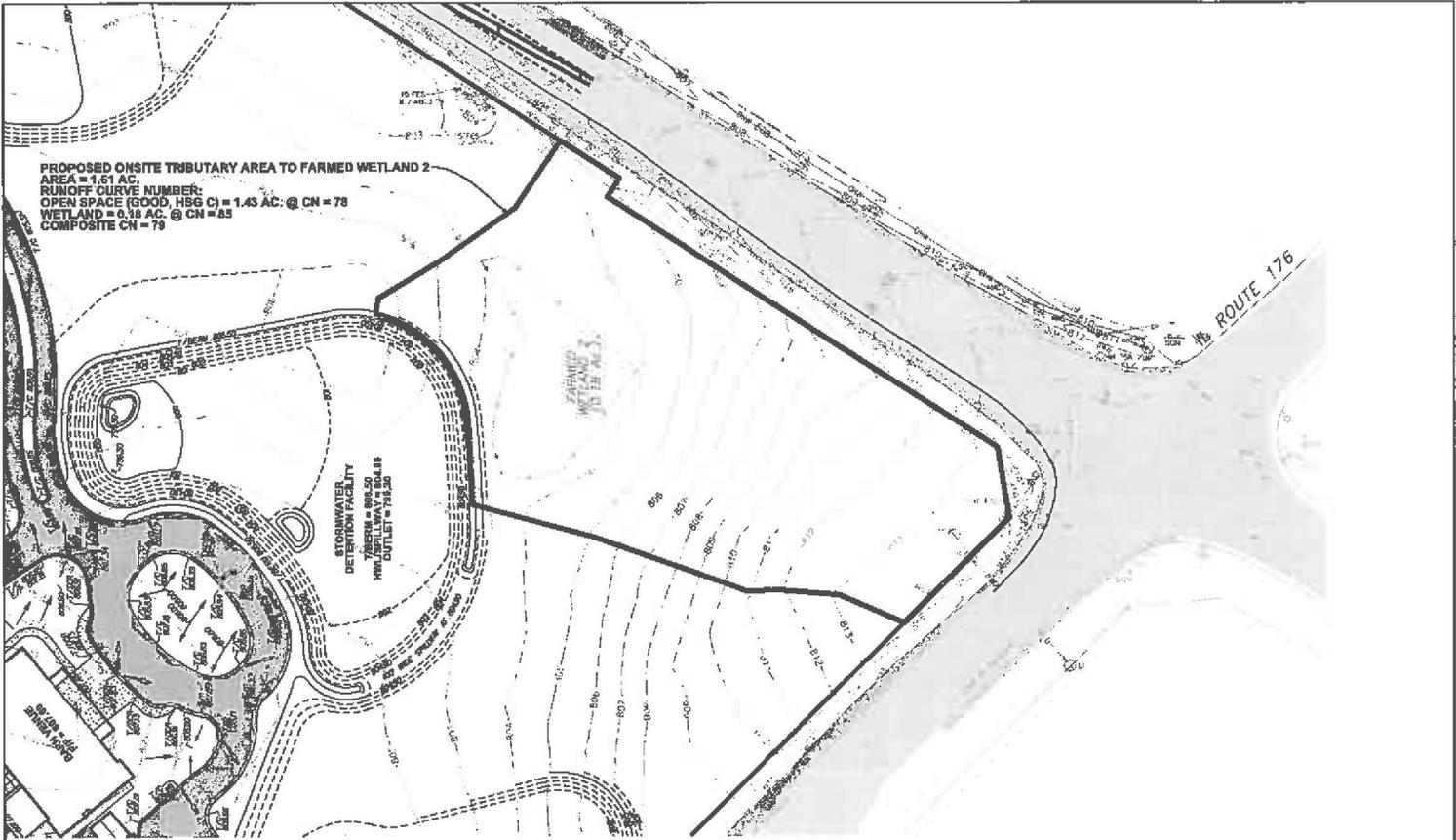
80/150 Compliance				
Proposed Tributary Area (acres) = <u>1.61</u>				
Event	Existing Runoff Volume (ac-ft)	Unit Runoff Volume (ac-ft/ac)	80% of Existing Volume (ac-ft)	150% of Existing Volume (ac-ft)
2-Year 24 Hour	0.24	0.139	0.19	0.36

PROPOSED CONDITIONS					
Proposed Tributary Area (acres) = <u>1.61</u>					
Proposed Conditions Curve Number = <u>79</u>					
Event	Rainfall (in)	CN	Runoff (in)	Runoff Volume (ac-ft)	Percent of Existing Volume
2-Year 24 Hour	3.34	79	1.450	0.19	81%



EXISTING ONSITE TRIBUTARY AREA TO FARMED WETLAND 2  
 AREA = 1.74 AC.  
 RUNOFF CURVE NUMBER:  
 AGRICULTURE (SR+CP, GOOD, H&G C) = 1.56 AC. @ CN = 82  
 WETLAND = 0.18 AC. @ CN = 85  
 COMPOSITE CN = 82

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <small>1800 W. HAWTHORN BLVD. SUITE 200          HAWTHORN, ILL. 60430          PHONE (815) 398-8700          FAX (815) 398-8877          EMAIL: AUCKLANDT@pearsonbrown.com</small>	NORTH	TITLE: <b>EXISTING WETLAND HYDROLOGY</b>	EX-001 
	SCALE: 1" = 60'	PROJECT: <b>THE BARN AT HAWTHORN WOODS</b> <small>HAWTHORN ILL 3008, L</small>	



PROPOSED ON-SITE TRIBUTARY AREA TO FARMED WETLAND 2  
 AREA = 1.61 AC.  
 RUNOFF CURVE NUMBER:  
 OPEN SPACE (GOOD, HSG C) = 1.43 AC. @ CN = 78  
 WETLAND = 0.18 AC. @ CN = 85  
 COMPOSITE CN = 79

STORMWATER  
 DETENTION FACILITY  
 TYPICAL = 80x50  
 MIN. SLOPE = 0.4%  
 OUTLET = 75x30

FARMED  
 WETLAND

ROUTE 176

<b>PEARSON, BROWN &amp; ASSOCIATES, INC.</b> CONSULTING ENGINEERS <small>1560 MC VINCE-WESTER ROAD - SUITE 204          LIBERTYVILLE, I.E. 60342          PHONE: (312) 382-4707          FAX: (312) 352-0507          EMAIL: ADR@pearsonbrown.com</small>	NORTH  SCALE: 1" = 60'	TITLE <b>EXISTING WETLAND HYDROLOGY</b>	<b>B</b> <small>EX-007</small>
		PROJECT <b>THE BARN AT HAWTHORN WOODS</b> <small>HAWTHORN WOODS, IL</small>	

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**APPENDIX 5**  
**STORM SEWER DESIGN CALCULATIONS**

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STORM SEWER DESIGN CALCULATIONS

The Barn at Newborn Woods

Job #:

2328

Prepared by:

AKZ

Date:

#####

Pearson, Brown & Associates Inc.  
Libertyville, IL 60048

From	To	Individual Sub-area Pickup (sq-ft)	Area Total (sq-ft)	Individual Sub-area Runoff Factor	CFA Multiplier	Sum of CFA to segment	Weighted C-factor (Sum of CFA x C by runoff)	Time of Concentration Inlet	Channel	Total	Intensity (in./hr.)	C-FA Flow (cfs)	Diameter (in.)	Minimum Required Slope (%)	PLAN Design Slope (%)	Capacity (cfs)	Velocity (ft/sec)
<b>100 YEAR STORM DESIGN</b>																	
3	2	0.89	0.89	0.99	0.97	0.87	0.80	8	0	8	12.36	0.88	18	0.0026	0.6080	2.69	5.22
2	1	0.88	0.18	0.99	0.97	0.14	0.06	8	0	8	12.36	1.78	12	0.0026	0.6080	2.83	3.22
<b>100 YEAR STORM DESIGN</b>																	
10	8	0.39	0.39	0.87	0.36	0.33	0.57	8	0	8	12.36	3.12	12	0.0077	0.6080	3.20	4.07
8	8	0.29	0.28	0.88	0.24	0.24	0.58	8	0	8	12.36	2.84	12	0.0088	0.6080	3.20	4.07
5	8	0.87	1.14	0.76	0.43	0.89	0.61	8	0	8	12.36	11.54	24	0.0028	0.6030	12.48	3.88
7	8	0.31	0.31	0.79	0.17	0.17	0.19	8	0	8	12.36	2.08	12	0.0033	0.6080	2.58	3.22
8	8	0.57	0.88	0.74	0.37	0.44	0.18	8	0	8	12.36	5.43	18	0.0071	0.6080	5.19	4.72
8	4	0.00	1.22	0.80	0.00	1.26	0.19	0	0	0	12.36	16.72	24	0.0066	0.6085	18.28	5.60
<b>100 YEAR STORM DESIGN</b>																	
17	18	0.22	0.22	0.56	0.12	0.12	0.55	8	0	8	12.36	1.69	18	0.0016	0.6090	2.63	5.32
18	12	0.09	0.31	0.58	0.08	0.17	0.65	8	0	8	11.24	2.03	18	0.0010	0.6092	3.68	2.80
18	14	0.16	0.16	0.88	0.08	0.08	0.68	8	0	8	11.88	0.87	12	0.0007	0.6080	2.68	3.22
14	13	0.12	0.27	0.87	0.08	0.17	0.68	11	0	11	10.37	1.74	18	0.0067	0.6032	3.65	2.89
13	12	0.10	0.37	0.74	0.17	0.24	0.65	8	0	11	10.37	3.80	18	0.0068	0.6028	3.37	3.04
12	11	0.45	1.11	0.71	0.31	0.72	0.86	8	0	11	10.37	7.45	18	0.0080	0.6040	8.15	4.82
<b>100 YEAR STORM DESIGN</b>																	
24	22	0.88	2.88	0.81	2.88	2.88	0.61	28	0	28	8.04	14.68	36	0.0013	0.6016	16.93	3.24
22	21	0.80	0.80	0.45	0.29	0.29	0.45	22	0	22	7.38	3.88					
											0 FROM 22	14.68					
											TOTAL	17.32	36	0.0015	0.6020	18.35	5.76

**INDIVIDUAL SUB-AREA RUNOFF FACTOR DETERMINATION**

Date: 09-16-2022

Area		Acres	Factor	Multiple
To Structure #2	<i>total area</i>	0.08		
Grassy		0.00	0.45	0.0000
Impervious		0.08	0.90	0.0720
Total		0.08		0.0720
Sub area c-factor				0.90

Area		Acres	Factor	Multiple
To Structure #7	<i>total area</i>	0.21		
Grassy		0.05	0.45	0.0225
Impervious		0.16	0.90	0.1440
Total		0.21		0.1665
Sub area c-factor				0.79

Area		Acres	Factor	Multiple
To Structure #3	<i>total area</i>	0.08		
Grassy		0.00	0.45	0.0000
Impervious		0.08	0.90	0.0720
Total		0.08		0.0720
Sub area c-factor				0.90

Area		Acres	Factor	Multiple
To Structure #8	<i>total area</i>	0.57		
Grassy		0.19	0.45	0.0855
Impervious		0.38	0.90	0.3420
Total		0.57		0.4275
Sub area c-factor				0.75

Area		Acres	Factor	Multiple
To Structure #6	<i>total area</i>	0.37		
Grassy		0.13	0.45	0.0585
Impervious		0.24	0.90	0.2160
Total		0.37		0.2745
Sub area c-factor				0.74

Area		Acres	Factor	Multiple
To Structure #9	<i>total area</i>	0.28		
Grassy		0.03	0.45	0.0135
Impervious		0.25	0.90	0.2250
Total		0.28		0.2385
Sub area c-factor				0.85

Area		Acres	Factor	Multiple
To Structure #10	<i>total area</i>	<b>0.29</b>		
Grassy		0.02	<b>0.45</b>	0.0090
Impervious		0.27	<b>0.90</b>	0.2430
Total		0.29		0.2520
Sub area c-factor				<b>0.87</b>

Area		Acres	Factor	Multiple
To Structure #14	<i>total area</i>	<b>0.12</b>		
Grassy		0.04	<b>0.45</b>	0.0180
Impervious		0.08	<b>0.90</b>	0.0720
Total		0.12		0.0900
Sub area c-factor				<b>0.75</b>

Area		Acres	Factor	Multiple
To Structure #12	<i>total area</i>	<b>0.43</b>		
Grassy		0.14	<b>0.45</b>	0.0630
Impervious		0.29	<b>0.90</b>	0.2610
Total		0.43		0.3240
Sub area c-factor				<b>0.75</b>

Area		Acres	Factor	Multiple
To Structure #15	<i>total area</i>	<b>0.15</b>		
Grassy		0.03	<b>0.45</b>	0.0135
Impervious		0.12	<b>0.90</b>	0.1080
Total		0.15		0.1215
Sub area c-factor				<b>0.81</b>

Area		Acres	Factor	Multiple
To Structure #13	<i>total area</i>	<b>0.10</b>		
Grassy		0.06	<b>0.45</b>	0.0270
Impervious		0.04	<b>0.90</b>	0.0360
Total		0.10		0.0630
Sub area c-factor				<b>0.63</b>

Area		Acres	Factor	Multiple
To Structure #16	<i>total area</i>	<b>0.09</b>		
Grassy		0.05	<b>0.45</b>	0.0225
Impervious		0.04	<b>0.90</b>	0.0360
Total		0.09		0.0585
Sub area c-factor				<b>0.65</b>

Area		Acres	Factor	Multiple
To Structure #17	<i>total area</i>	0.22		
Grassy		0.02	0.45	0.0090
Impervious		0.20	0.90	0.1800
Total		0.22		0.1890
Sub area c-factor				0.86


Area		Acres	Factor	Multiple
To Structure #22	<i>total area</i>	0.80		
Grassy		0.80	0.45	0.3600
Impervious		0.00	0.90	0.0000
Total		0.80		0.3600
Sub area c-factor				0.45


Area		Acres	Factor	Multiple
To Structure #24	<i>total area</i>	5.06		
Grassy		4.33	0.45	1.9485
Impervious		0.73	0.90	0.6570
Total		5.06		2.6055
Sub area c-factor				0.51


**Time of Concentration Calculations**

Pearson, Brown & Associates Inc.  
Libertyville, IL 60048

sheet flow roughness coeffs - paved = 0.011, grassy = 0.240  
maximum sheet flow segment length = 100'

Job #:  
Prepared by:  
Date:

2229  
AKZ  
08/16/2022

**Surface Flow Time Calculations - SCS Methods...2yr, 24hr rainfall depth = 3.34" (LAKE CO,1 (Used for SCS flow time eqn...))**

FLOW TO STRUCTURE	FLOW TYPE	DESCRIPTION	COEF. n	LENGTH L	SLOPE s	SHALLOW CONCENTRATED VELOCITY (FT/SEC)	TIME	TIME	TIME USED
							hours	min	min
2	Sheet Flow	paved	0.011	100	0.0200		0.02	1	
	Shallow Concentrated	paved	N/A	12	0.0200	2.875	0.00	0	
						total	0.02	1	1
7	Sheet Flow	paved	0.011	100	0.0200		0.02	1	
	Shallow Concentrated	paved	N/A	25	0.0200	2.875	0.00	0	
						total	0.02	1	1
6	Sheet Flow	grassy	0.240	20	0.0750		0.04	2	
	Shallow Concentrated	paved	N/A	195	0.0060	1.575	0.63	2	
						total	0.67	4	5
7	Sheet Flow	grassy	0.240	12	0.0375		0.03	2	
	Shallow Concentrated	paved	N/A	125	0.0060	1.575	0.02	1	
						total	0.06	3	5
8	Sheet Flow	grassy	0.240	18	0.0100		0.07	4	
	Shallow Concentrated	paved	N/A	90	0.0110	2.132	0.01	1	
						total	0.08	5	5
9	Sheet Flow	grassy	0.240	7	0.0200		0.03	2	
	Shallow Concentrated	paved	N/A	80	0.0125	2.273	0.01	1	
						total	0.04	2	5
10	Sheet Flow	grassy	0.240	10	0.0100		0.05	3	
	Shallow Concentrated	paved	N/A	85	0.0118	2.208	0.01	1	
						total	0.06	4	5
12	Sheet Flow	grassy	0.240	28	0.0305		0.07	4	
	Shallow Concentrated	paved	N/A	170	0.0108	2.113	0.02	1	
						total	0.09	6	5
13	Sheet Flow	grassy	0.240	20	0.0100		0.08	5	
	Shallow Concentrated	unpaved	N/A	0	0.0100	1.813	0.00	0	
						total	0.08	5	5
14	Sheet Flow	grassy	0.240	50	0.0100		0.18	11	
	Shallow Concentrated	unpaved	N/A	0	0.0100	1.813	0.00	0	
						total	0.18	11	11
15	Sheet Flow	grassy	0.240	55	0.0235		0.14	8	
	Shallow Concentrated	unpaved	N/A	0	0.0100	1.813	0.00	0	
						total	0.14	8	8
16	Sheet Flow	grassy	0.240	25	0.0100		0.10	6	
	Shallow Concentrated	unpaved	N/A	0	0.0100	1.813	0.00	0	
						total	0.10	6	5
17	Sheet Flow	paved	0.011	100	0.0215		0.02	1	
	Shallow Concentrated	paved	N/A	20	0.0215	2.981	0.00	0	
						total	0.02	1	5
22	Sheet Flow	grassy	0.240	100	0.0100		0.31	18	
	Shallow Concentrated	unpaved	N/A	100	0.0100	1.813	0.02	1	
		unpaved	N/A	150	0.0033	0.827	0.04	3	
						total	0.37	22	22
24	Sheet Flow	grassy	0.240	100	0.0034		0.47	28	
	Shallow Concentrated	unpaved	N/A	190	0.0034	0.941	0.06	3	
		unpaved	N/A	180	0.0098	1.207	0.04	2	
		unpaved	N/A	230	0.0100	1.884	0.04	2	
						total	0.61	37	35

**STORM SEWER INLET CAPACITY CALCULATIONS - VALLEY LOCATIONS**

Pearson, Brown & Associates Inc.  
 Libertyville, IL 60048

Job # 2220  
 Prepared by: AKZ  
 Date: 08/18/2022  
 Rev: 10/24/2022

\*PAVED\* NON-CURB VALLEY LOCATIONS: NEENAH R-1723, w/ TY. D GRATE (0.98 S.F. OPEN AREA) \*\* weir length = 6 feet  
 \*CURB\* VALLEY LOCATIONS: NEENAH R-3278-A (1.20 S.F. OPEN AREA) \*\* weir length = 4.6 feet  
 \*YARD\* VALLEY LOCATIONS: NEENAH R-4348-B (1.10 S.F. OPEN AREA) \*\* weir length = 6 feet

Note: For low head values less than or equal to 6" (0.42') weir capacity controls - Capacity based on  $Q = CLH^{3/2}$  standard weir equation

Flow to Structure #	Individual Sub-area Pickup (ac.)	Individual Sub-area Runoff Factor	Time of Concentration (Inlet Time Only)	Intensity (In./hr.)	DIRECT FLOW Q=CIA Floor (cfs)	UPSTREAM FLOW (cfs)	TOTAL REQUIRED FLOW (cfs)	LOCATION	WEIR COE: C	WEIR PERIMETER (ft "L")	HEAD ON GRATE "H" (ft)	SINGLE STRUCTURE INLET CAPACITY (cfs)	# OF STRUCTURES	TOTAL INLET CAPACITY (cfs)
								"PAVED", "CURB", OR "YARD"						
2	0.06	0.90	5	12.36	0.59	0.00	0.59	CURB	3.30	4.60	0.18	0.97	1	0.97
3	0.06	0.90	5	12.36	0.59	0.00	0.59	CURB	3.30	4.60	0.18	0.97	1	0.97
6	0.37	0.74	5	12.36	3.38	0.00	3.38	CURB	3.30	4.60	0.37	3.42	1	3.42
7	0.21	0.79	5	12.36	2.06	0.00	2.06	CURB	3.30	4.60	0.27	2.13	1	2.13
8	0.57	0.75	5	12.36	5.28	0.00	5.28	PAVED	3.30	6.00	0.42	5.38	1	5.38
9	0.28	0.85	5	12.36	2.94	0.00	2.94	PAVED	3.30	6.00	0.29	3.09	1	3.09
10	0.29	0.87	5	12.36	3.12	0.00	3.12	PAVED	3.30	6.00	0.30	3.26	1	3.26
12	0.43	0.76	6	11.84	3.82	0.00	3.82	CURB	3.30	4.60	0.40	3.84	1	3.84
13	0.10	0.83	5	12.36	0.78	0.00	0.78	YARD	3.30	6.00	0.12	0.82	1	0.82
14	0.12	0.75	11	10.37	0.93	0.00	0.93	YARD	3.30	6.00	0.13	0.93	1	0.93
15	0.15	0.81	8	11.19	1.36	0.00	1.36	YARD	3.30	6.00	0.17	1.39	1	1.39
16	0.09	0.85	8	11.84	0.89	0.00	0.89	YARD	3.30	6.00	0.11	0.72	1	0.72
17	0.22	0.86	8	12.36	2.34	0.00	2.34	CURB	3.30	4.60	0.29	2.37	1	2.37

**STORM SEWER INLET CAPACITY CALCULATIONS - VALLEY LOCATIONS**

Pearson, Brown & Associates Inc.  
 Libertyville, IL 60048

Job # 2220  
 Prepared by: AKZ  
 Date: 08/19/2021  
 Rev: 10/24/2022

\*PAVED\* NON-CURB VALLEY LOCATIONS: NEENAH R-1733, w/ TY, D GRATE (0.90 S.F. OPEN AREA)  
 \*CURB\* VALLEY LOCATIONS: NEENAH R-3378-A (1.20 S.F. OPEN AREA)  
 \*YARD\* VALLEY LOCATIONS: NEENAH R-4345-B (1.10 S.F. OPEN AREA)

Note: The calculations provide on this spreadsheet are based on the open area of the grates and the orifice equation.

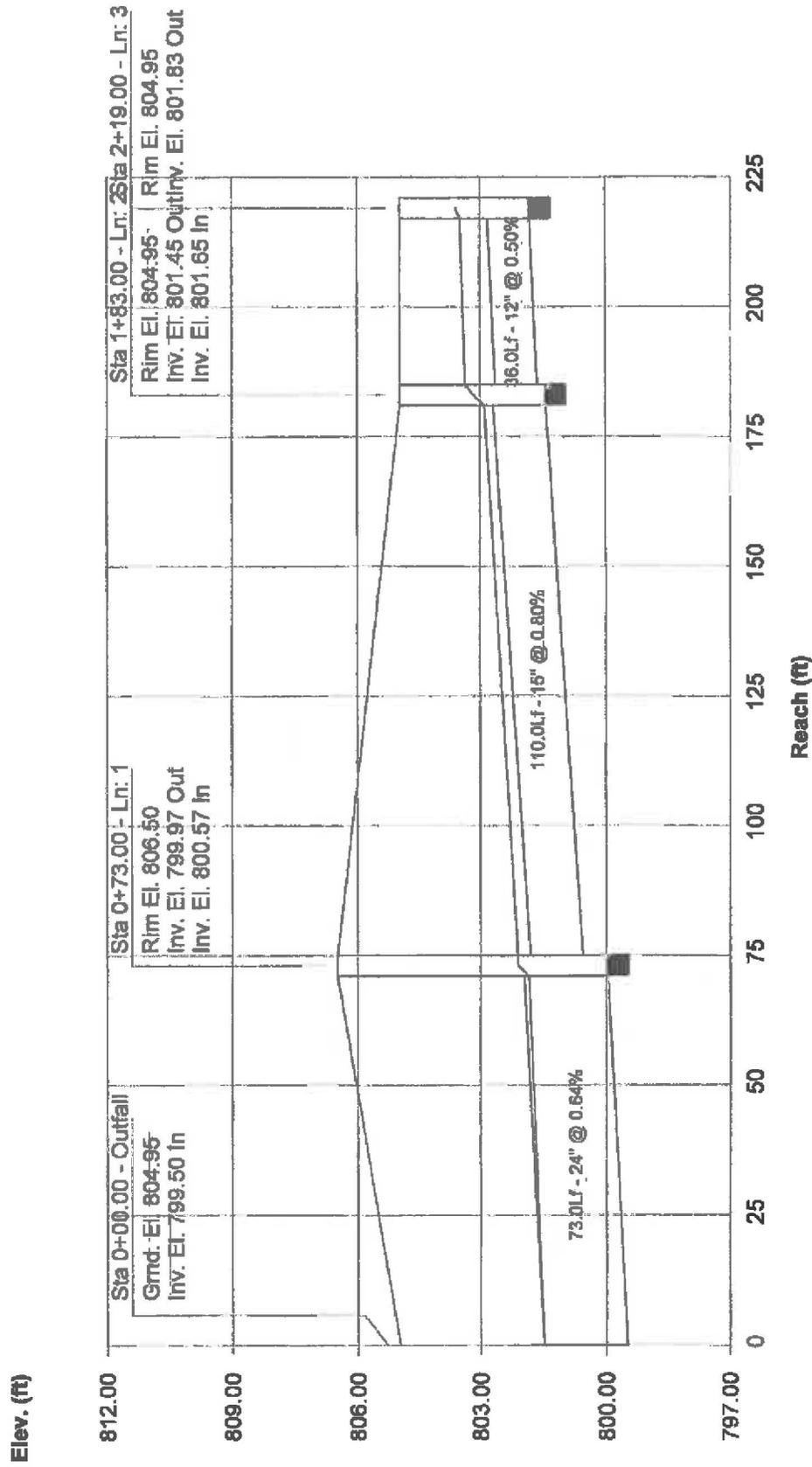
Orifice Equation

Please refer also to another spreadsheet for unit equation based results

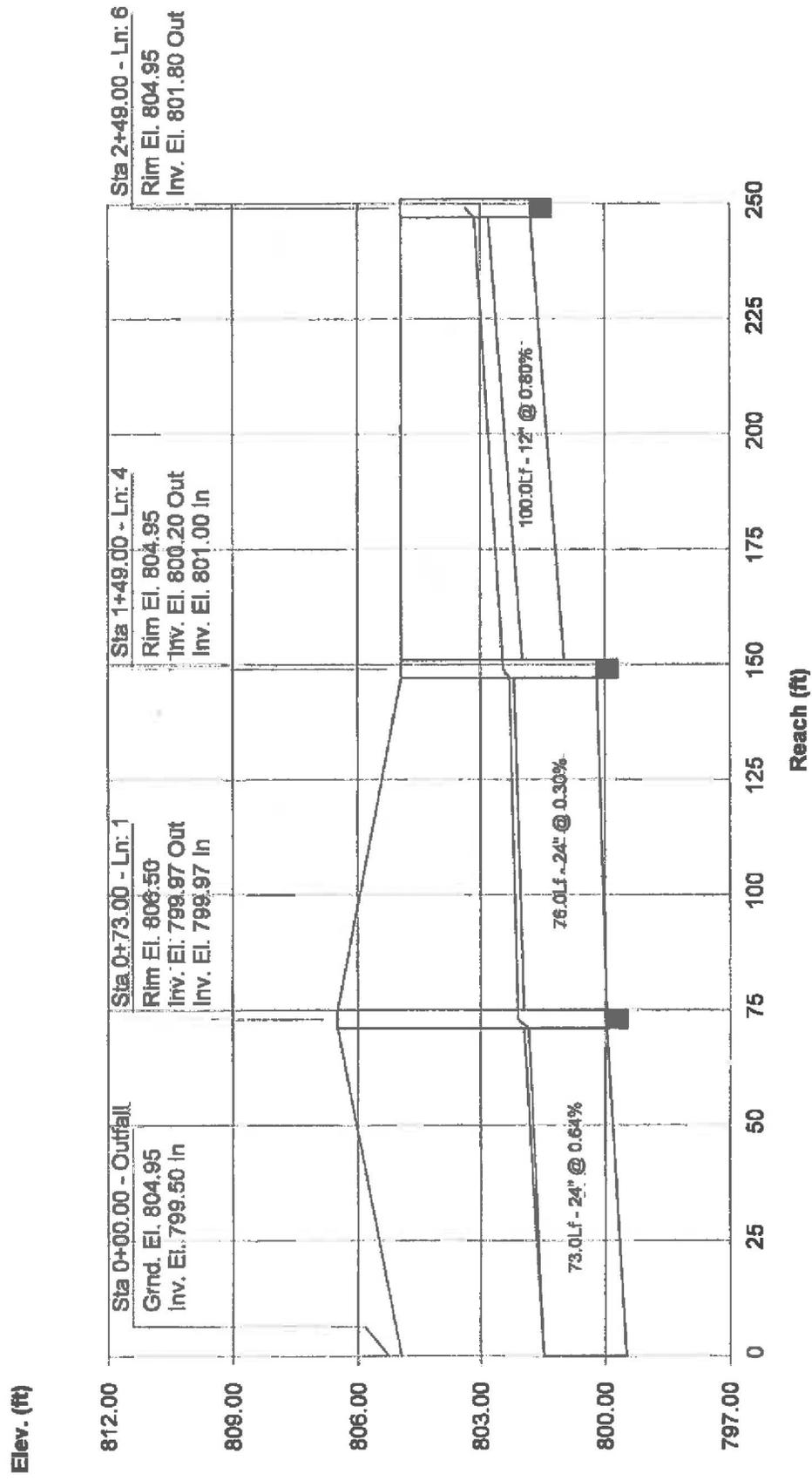
Flow to Structure #	Individual Sub-area Pickup (ac.)	Individual Sub-area Runoff Factor	Time of Concentration Inlet Time Only	Intensity (In./hr.)	DIRECT FLOW Q=CIA Flow (cfs)	UPSTREAM FLOW (cfs)	TOTAL REQUIRED FLOW (cfs)	LOCATION "PAVED", "CURB", OR "YARD"	Orifice coef. C	Open Area (sq) "A"	HEAD ON GRATE "H" (ft)	SINGLE STRUCTURE INLET CAPACITY (cfs)	# OF STRUCTURES	TOTAL INLET CAPACITY (cfs)
2	0.08	0.80	5	12.36	0.89	0.00	0.89	CURB	0.60	1.20	0.10	1.83	1	1.83
3	0.06	0.90	5	12.36	0.89	0.00	0.89	CURB	0.60	1.20	0.10	1.83	1	1.83
6	0.37	0.74	5	12.36	3.35	0.00	3.35	CURB	0.60	1.20	0.38	3.42	1	3.42
7	0.21	0.79	5	12.36	2.05	0.00	2.05	CURB	0.60	1.20	0.13	2.08	1	2.08
8	0.57	0.75	5	12.36	5.28	0.00	5.28	PAVED	0.60	0.90	0.38	2.67	2	5.34
9	0.28	0.85	5	12.36	2.94	0.00	2.94	PAVED	0.60	0.90	0.45	2.94	1	2.94
10	0.29	0.87	5	12.36	3.12	0.00	3.12	PAVED	0.60	0.90	0.62	3.12	1	3.12
12	0.83	0.75	5	11.84	3.82	0.00	3.82	CURB	0.60	1.20	0.44	3.83	1	3.83
13	0.10	0.83	5	12.36	0.78	0.00	0.78	YARD	0.60	1.10	0.10	1.87	1	1.87
14	0.12	0.75	11	10.37	0.93	0.00	0.93	YARD	0.60	1.10	0.10	1.87	1	1.87
15	0.15	0.81	5	11.89	1.36	0.00	1.36	YARD	0.60	1.10	0.10	1.87	1	1.87
16	0.09	0.85	4	11.84	0.89	0.00	0.89	YARD	0.60	1.10	0.10	1.87	1	1.87
17	0.22	0.88	5	12.36	2.34	0.00	2.34	CURB	0.60	1.20	0.17	2.36	1	2.36



# Storm Sewer Profile

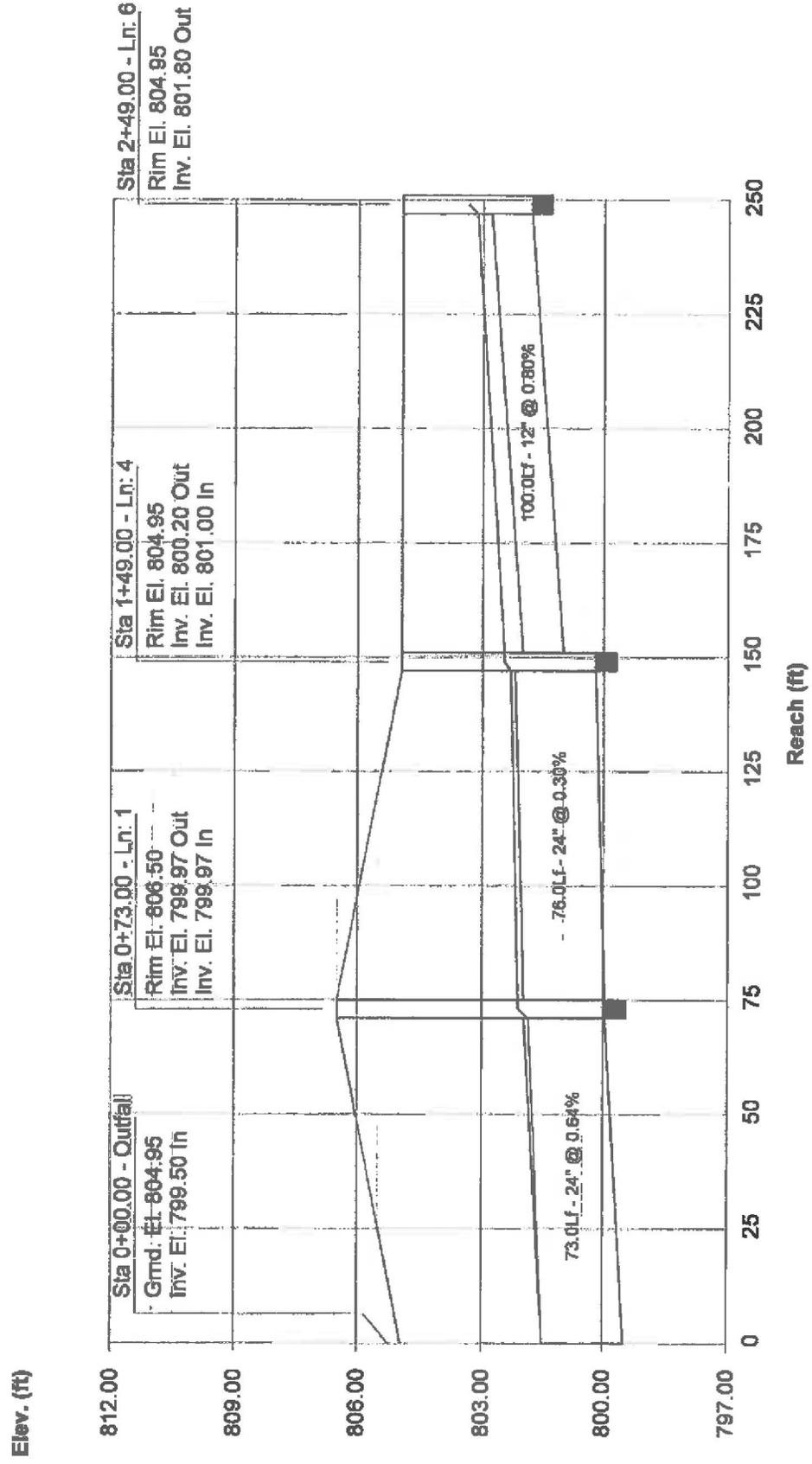


# Storm Sewer Profile



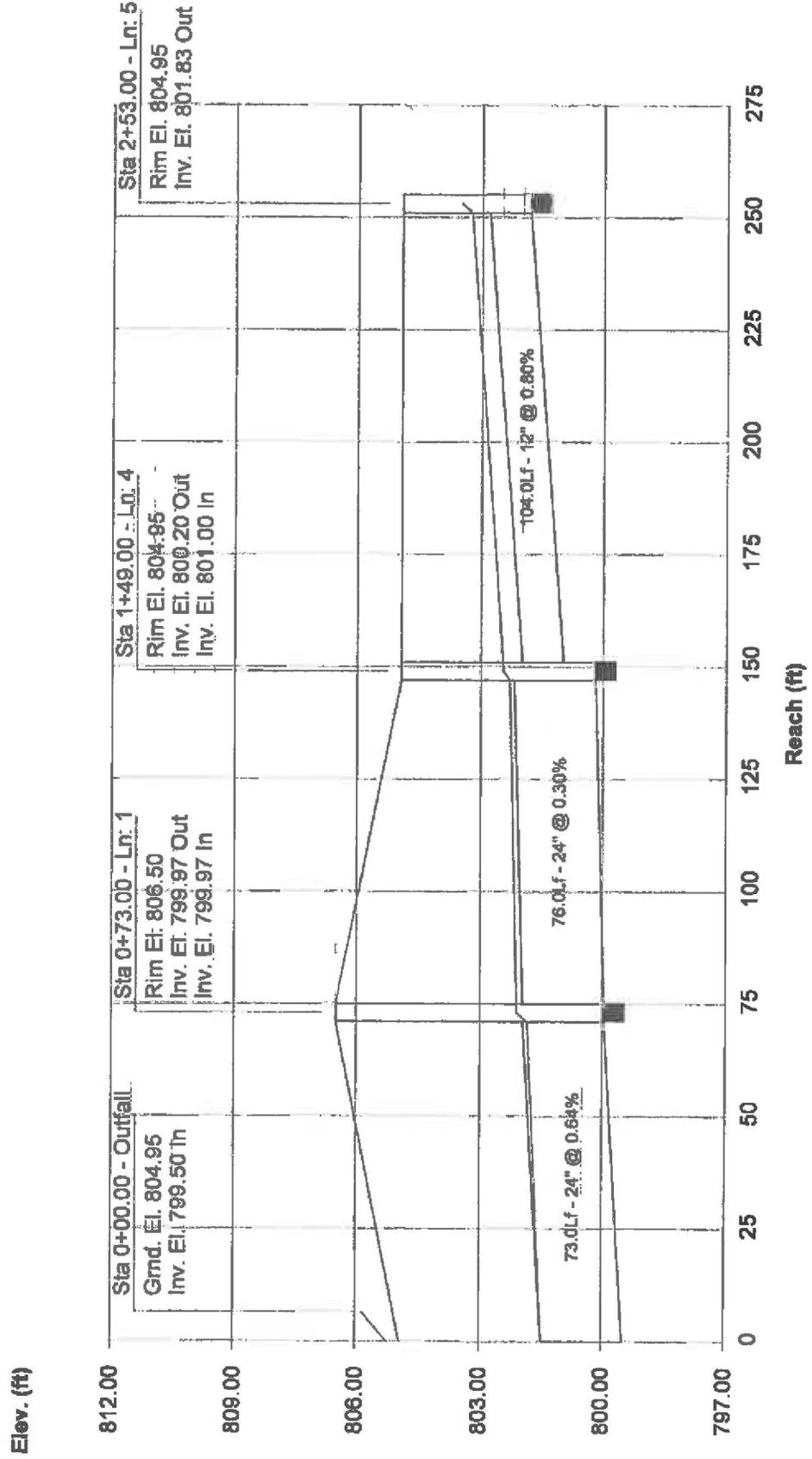
# Storm Sewer Profile

Proj. file: barr1.stm



# Storm Sewer Profile

Proj. file: barn1.stm



# Hydraflow Plan View



barn

No. Lines: 6

10-24-2022

# Storm Sewer Tabulation

Station Line	Len (ft)	Drng Area (ac)		Rnoff coeff (C)	Area x C		Tc (min)		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev (ft)		HGL Elev (ft)		Grnd / Rim Elev (ft)		Line ID
		Incr	Total		Inlet	Syst	Incr	Total					Size (in)	Slope (%)	Up	Dn	Up	Dn	Up	Dn	
1	End	73.0	0.00	0.00	0.00	0.00	0.0	0.8	0.0	16.78	18.15	5.41	24	0.64	799.97	799.50	801.85	801.50	806.50	804.95	5-4
2	1	110.0	0.00	0.00	0.00	0.00	0.0	0.2	0.0	5.43	5.78	4.43	15	0.80	801.45	800.57	802.90	802.12	804.95	806.50	6-5
3	2	36.0	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.05	2.52	2.61	12	0.50	801.83	801.65	803.49	803.37	804.95	804.95	7-6
4	1	76.0	0.00	0.00	0.00	0.00	0.0	0.4	0.0	11.34	12.44	3.61	24	0.30	800.20	799.97	802.31	802.12	804.95	806.50	8-5
5	4	104.0	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.12	3.18	3.97	12	0.80	801.83	801.00	803.26	802.46	804.95	804.95	10-8
6	4	100.0	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.94	3.19	3.74	12	0.80	801.80	801.00	803.15	802.46	804.95	804.95	9-8

barrr

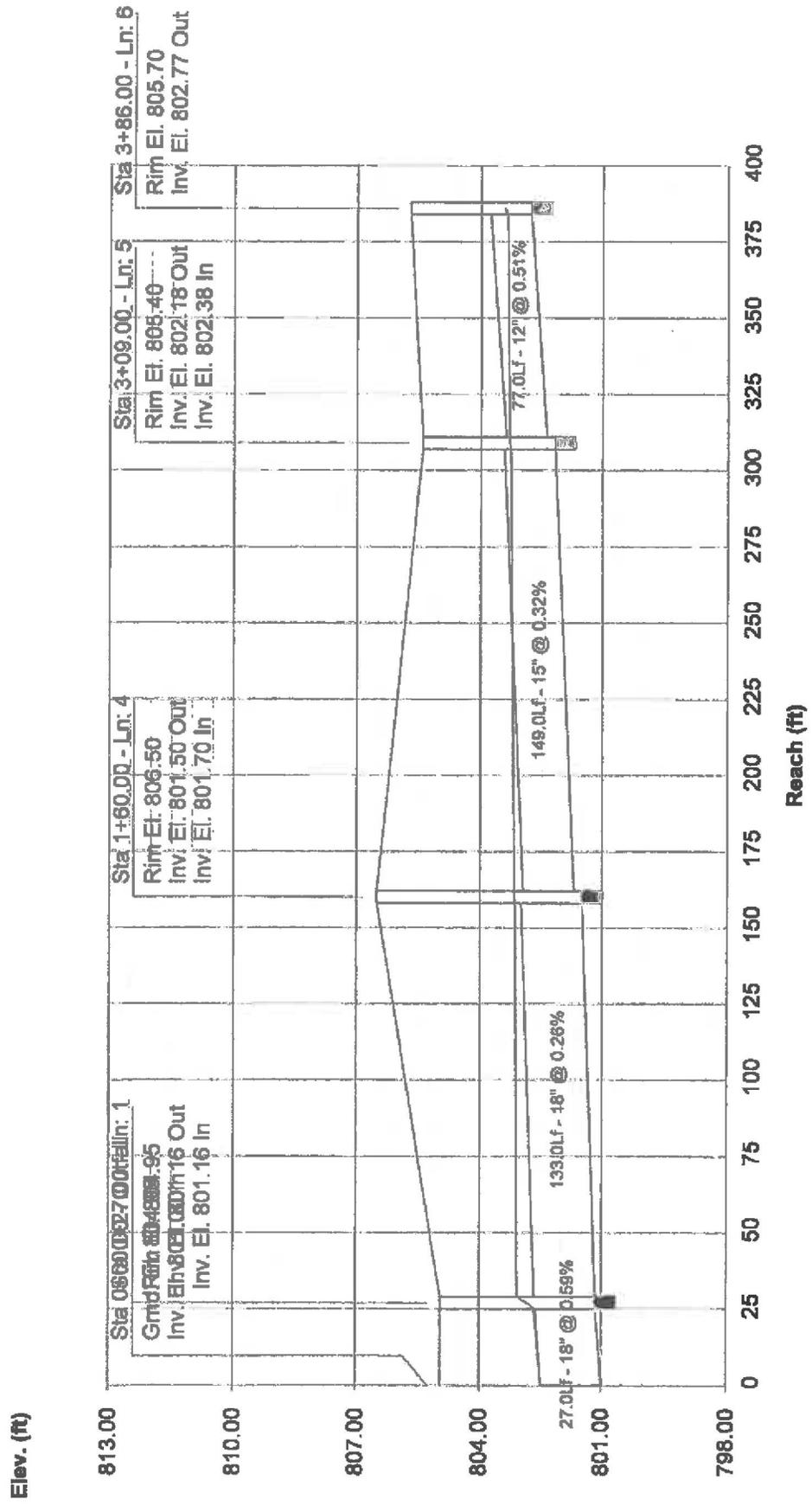
Number of lines: 6

Run Date: 10-24-2022

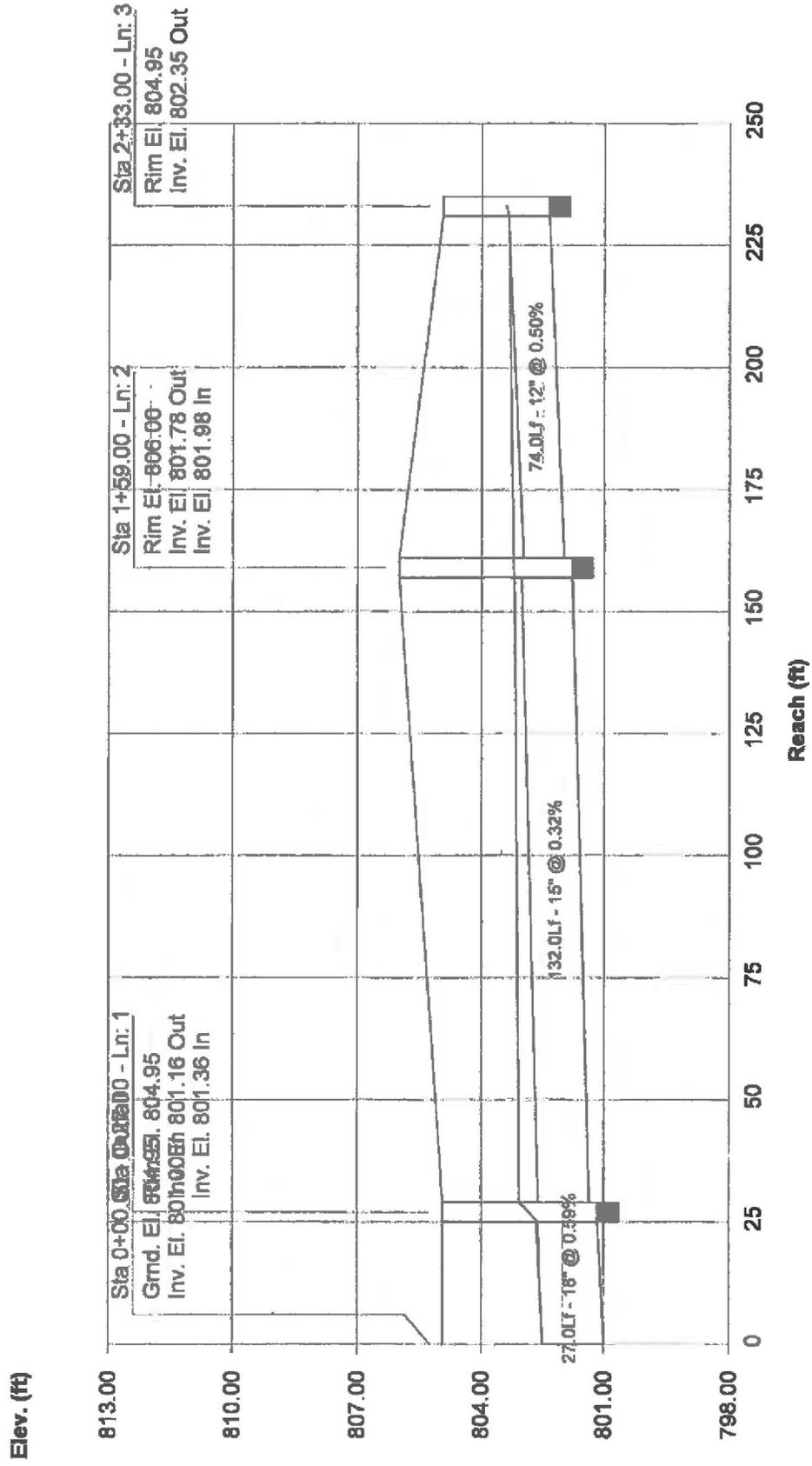
NOTES: Intensity = 69.67 / (Inlet time + 13.10) ^ 0.87; Return period = 2 Yrs.

# Storm Sewer Profile

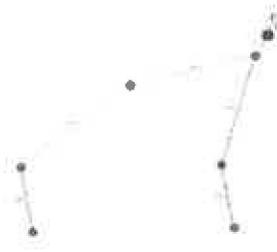
Proj. file: barn2.stm



# Storm Sewer Profile



# Hydraflow Plan View



barn2

No. Lines: 6

10-24-2022

# Storm Sewer Tabulation

Station Line	To Line	Len (ft)	Dmg Area (ac)		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr	Total		Inlet (min)	Syst (min)	Size (in)	Slope (%)					Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	27.0	0.00	0.00	0.00	0.00	0.00	0.00	3.7	0.0	7.45	8.08	4.23	18	0.59	801.16	801.00	802.63	802.50	804.95	804.95	12-11
2	1	132.0	0.00	0.00	0.00	0.00	0.00	0.6	0.0	0.0	2.03	3.64	1.65	15	0.32	801.78	801.36	803.20	803.07	806.00	804.95	16-12
3	2	74.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.50	2.52	1.91	12	0.50	802.35	801.98	803.35	803.22	804.95	806.00	17-16
4	1	133.0	0.00	0.00	0.00	0.00	0.00	2.2	0.0	0.0	2.50	5.31	1.41	18	0.26	801.50	801.16	803.16	803.08	806.50	804.95	13-12
5	4	149.0	0.00	0.00	0.00	0.00	0.00	0.4	0.0	0.0	1.74	3.67	1.47	15	0.32	802.18	801.70	803.27	803.17	805.40	806.50	14-13
6	5	77.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.97	2.53	1.65	12	0.51	802.77	802.38	803.36	803.30	805.70	805.40	15-14
barn2														Number of lines: 6				Run Date: 10-24-2022				

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs.

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## **APPENDIX 8**

### **STORMWATER MANAGEMENT SYSTEM MAINTENANCE PLAN**

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# **STORMWATER MANAGEMENT SYSTEM MAINTENANCE PLAN FOR THE BARN AT HAWTHORN WOODS, HAWTHORN WOODS, IL**

## **PURPOSE AND OBJECTIVE**

The stormwater management facilities have been designed to prevent damage to property and to minimize the impact on the environment. The only way to keep the system operating as designed is with proper maintenance. Maintenance items can typically be broken down into short-term and long-term maintenance tasks but all tasks should be conducted on an as-needed basis if necessary.

**Short Term Maintenance Program – Significant Elements and Aspects** provided as an attachment hereto. Please note that the attachment is not intended to cover all possible maintenance issues, only those most common.

**Long Term Maintenance Program – Significant elements and aspects** are provided as an attachment hereto. The maintenance is supplemented by repair as required or replacement as the case may be, depending on the wear and tear of the components of the drainage system. Please note that the attachment is not intended to cover all possible maintenance issues, only those most common.

The Final Engineering for the project shall illustrate all stormwater management areas including detention ponds, storm sewer system, and deed restricted areas.

## **RESPONSIBILITIES**

Adequate provisions for Short Term and Long Term Maintenance are an essential aspect for continued proper operation of the stormwater management system.

Responsibility for the short and long term overall maintenance of the stormwater management system is put on the property owner or Home Owners Assosiation (HOA) as applicable. Responsibility for the maintenance of the stormwater management system shall include the pipes, outlet control structure and other structures within the stormwater management outlot areas. Responsibility for both the short and long-range maintenance of the grassy surface areas (including native vegetation) within the outlots designated for stormwater management shall be the specific responsibility of the property owner or HOA as applicable.

## **MAINTENANCE OF DRAINAGE SYSTEM**

Cleaning and repairing culverts, outflow pipes, inlets, catch basins and manholes are particularly important because these elements are not visually obvious, as are the surface area elements. If these subsurface elements become clogged, then water may flood the pavement surface and may cause extensive erosion damage or water flow blockage. Cleaning of culverts, outflow pipes, inlets, catch basins and manholes must be made a routine maintenance activity scheduled for several times a year and on an as needed basis. Cleaning and repairing of overland flow routes and swales is important to preserve surface drainage and protect the subdivision from flooding. Experience will show the required cleaning frequencies for specific drainage items.

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**Cost Considerations:** Maintenance and replacement needs and costs should be part of the economic analysis. All maintenance costs will be covered by a maintenance budget sustained by the property owner. Keep records of all maintenance costs in order to determine typical annual costs that would be the basis for the annual maintenance fund. Frequent maintenance program work execution will lead to less frequent and less costly long term maintenance and repair, possibly requiring replacement. The attached short term and long term maintenance provisions may need to be adjusted based on experience recorded over the initial period of occupancy.

**Surface/Subsurface Drainage:** As previously mentioned, cleaning and repairing overland flow routes, swales, culverts, outflow pipes, inlets, catch basins, drain tile connection structures, and manholes is particularly important because flooding is likely if they are obstructed. Frequent walk-through inspections should be conducted to see if any obstructions are present including garbage, wood, branches, cut grass, dirt, leaves, etc. Remember that these drainage structures were placed there for a reason and they can only operate as designed if they are properly maintained.

**Detention Basin Earth Embankment:** Berms shall be repaired if signs of settlement, erosion, piping (leakage, seepage, or wet spots appear. A Registered Professional Engineer shall be hired for design resolution of any breaks in the berm. Walk the top of berm, side slopes, downstream toe and upstream toe or at the waterline of the embankment concentrating on surface erosion, seepage, cracks, settlements, slumps, slides and animal burrow.

**Surface Erosion:** Removal or loss of vegetative cover can cause the formation of deep ruts or gullies in the embankment. These areas should be filled, compacted, and reseeded. Erosion control measures should be implemented while vegetation is being reestablished.

**Seepage:** The passage of water through and/or underneath the earth embankment abutment and natural groundline or at the contact between the embankment and outlet works can be indicated by cattails or other wet environmental vegetation, erosion channelization, or slumping on the embankment face.

**Cracks:** Deep cracks usually indicate the movement of the dam and/or the foundation and can be either the longitudinal (along the length of the embankment) or transverse (across the embankment) directions. Cracking can be an indicator of slumps. Shallow cracks may develop during the summer when the surface soils of the embankment become severely dried and are typically of no concern in regard to the safety of the embankment.

**Settlement:** Settlement is indicated by depressions or low spots and can be signs of consolidation of the embankment or foundation or the loss of material beneath the settlement area.

**Slumps/Slides:** Slow or sudden movements of the earth embankment slope on either face toward the toe of the embankment. If seepage indicates the presence of soil particles, or if deep cracks, settlement, slumps, or slides are noticed, a qualified engineer should be contacted immediately for consultation.

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**Animal Burrows:** Animal burrows result in a loss of earth embankment material and can provide seepage paths for water through the embankment. Burrows should be promptly repaired and vegetation reestablished.

**Vegetation:** The design plans call for the embankment to be covered with native vegetation. The native vegetation cover should be a thick and vigorous growth to stabilize embankment soils and prevent erosion from occurring. There should be no trees on the earth embankment and none within a minimum of 20-feet of the embankment toes or concrete structures. There should be no trees in the emergency spillway. Any woody vegetation (trees, brush) found should be promptly removed.

**Outlet Structure:** The pond outlet control structure shall be checked for any debris or other obstructions which may block or restrict the free flow of water. Check for the development of any rusty areas on the concrete, and seepage, cracking, breaking, or spalling of the concrete.

The detention basin shall be re-graded if any reduction in volume shall occur. In the case of a wet bottom pond the sediment bottom shall be dredged out every 5 years or when 50 percent of the volume has been lost.

**Vegetative Growth:** One of the most common maintenance problems is that of dying vegetation. The responsible party shall determine the cause of problem and correct it either by modifying the environment so the selected vegetation can grow or changing the type of vegetation planted to meet environmental requirements. For example, turf grass often dies in the bottoms of swales and ditches because the environment is too wet. These areas can be planted with wet-tolerant native vegetation that grow well in that type of environment and require little, if any, care.

Portions of the site have been planted with native vegetation. Native vegetation is an important part of the stormwater management system. Many native species have deep roots that help prevent erosion and also remove nutrients and other impurities from the stormwater runoff helping to minimize impacts to surface waters including streams, rivers and lakes. Native vegetation is not like turf grass and should be maintained as follows:

- Do not mow frequently. Mowing should be conducted either in early spring to control invasive vegetation before the desired native species are growing, or in the fall after native vegetation has flowered and gone to seed. **DO NOT MOW NATIVE VEGETATION WHILE IT IS FLOWERING.**
- Consider use of periodic controlled burns to help maintain the health of the native vegetation. It is recommended not to attempt controlled burns without professional assistance.
- Fertilizer and pesticide usage is normally NOT required.
- Always re-seed or re-plant using the same mix as originally permitted. A copy of the native seed or plant mix should be attached to this maintenance plan.

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### **RECORD KEEPING**

Separate and distinct records shall be maintained by the owner or HOA, to record the specific activities and costs thereof for the Short Term and Long Term Maintenance Plan implementation. The records shall include the dates of maintenance inspections and the specific work performed. The records can be used to document maintenance history and as a basis for annual budgeting.

### **CONCLUSION**

The stormwater management plan for this development was designed to convey stormwater runoff without damage to structures or the environment. The only way the stormwater management system can operate as designed is if it is maintained properly over time. Failure to properly maintain the system can result in flooding, poor aesthetics, increased pest populations and poor water quality leaving the site.

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### Long Term Maintenance Program – Significant Elements and Aspects<sup>1</sup>

<b>Stormwater Conveyance Elements</b>	<b>Periodic Inspections</b>	<b>Significant Aspects</b>	<b>Repair Work</b>
Grassy areas – Swales, Other Erosion Prone Areas	Annually	Erosion	Seed or Sod, Ditch Checks to reduce flow velocities or plant native vegetation
Grassy areas – Periphery	Annually, 5 year intervals	Erosion	Groom Seed
Tree Trimming	5 year intervals	Prescribed Management	Cut back
Native Vegetation Areas	2 to 3 year intervals	Prescribed Management	Controlled Burn
At Culvert and Swales Outfalls, Detention Ponds	5 year intervals	Flooding, Erosion	Remove Siltation, Re-seed, Restore Riprap
Outlet Control Structure Pipes	5 year intervals	Flooding, Erosion	Restore/Replace Inflow & Outflow Openings
Storm Structures, and Pond Outlet Control Structure	As needed basis	Decrease storm sewer capacity	Remove blockage, Repair as needed
Detention Basin Berms	Annually	Surface Erosion Seepage Cracks Settlement Slumps/Slides Animal Burrows Piping (Leakage) Vegetation	See prescribed maintenance for “Detention Basin Earth Embankments” listed above on pages 2-3.
Detention Basins	5 year intervals 5 year intervals	Detention Volume Sediment Volume	Re-grade Basin as required Dredge Basin Bottom
Drain Tile Connection Structures	Annually	Check for blockage	Clean out accordingly, Repair as needed

<sup>1</sup> Long range maintenance activities are those required that are typically conducted every several years. The maintenance intervals stated are typical but all are on an as-needed basis as well. This list is to be used as an example only and is not intended to be all inclusive.

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**Short Term Maintenance Program – Significant Elements and Aspects<sup>2</sup>**

<b>Stormwater Conveyance Elements</b>	<b>Periodic Inspection</b>	<b>Significant Aspects</b>	<b>Repair Work</b>
General – All Areas	March through November	Disturbed surface areas	Seed Area with grass or native vegetation Mulch to Protect
Residential Lot Areas	Weekly	Floatable Items that could wash into stormwater system	Dispose of Refuse Store Useable Items
Swales on site	March & June & October	Branches & Leaves/Trash	Collect & Dispose
Culverts under Roads	March through November	Branches & Leaves/Trash Pipe Condition	Collect & Dispose Repair/Replace
Emergency Outflow Structure/Weir	March through November	Branches & Leaves/Trash Pipe or Weir Condition	Collect & Dispose Repair/Replace
Manholes	March & June & October	Branches & Leaves/Trash Manhole Condition	Collect & Dispose Repair/Replace
Stormwater Storage Area	March, June, July, Aug., Sept., Oct., & Nov.	Mow non-native vegetation	Remove/Dispose Refuse/Grass clippings
Roadway Drainage System	Public Works Department	Standard procedure	Prescribed Process

Source: Modified Sample Maintenance Plan from Lake County Stormwater Management Commission.

<sup>2</sup> Maintenance of Grassy Areas shall require application of fertilizer and related treatment to assure substantial grass growth and avoidance of soil erosion of barren or sparsely grassed soil surface areas. The prescribed periodic inspections for the short term maintenance program are to be supplemented by additional inspections and maintenance work on an as-need basis such as at times following periods of substantial rainfall or storm activities, such as high winds.

September 15, 2022



**CHRISTOPHER B. BURKE ENGINEERING, LTD.**

9575 West Higgins Road Suite 600 Rosemont, Illinois 60018 TEL (847) 823-0500 FAX (847) 823-0520

November 9, 2022

Village of Hawthorn Woods  
2 Lagoon Drive  
Hawthorn Woods, IL 60047

Attention: Chris Heinen, Community Development Director

Subject: The Barn at Hawthorn Woods  
27951 N. Gilmer Road  
(CBBEL Project No. 02-65H276)

Dear Chris:

Christopher B. Burke Engineering, Ltd. (CBBEL) has completed its review of the following submitted material:

- Engineering Plans entitled "Final Engineering for the Barn at Hawthorn Woods" prepared by Pearson, Brown & Associates, Inc. dated September 16, 2022 and last revised October 25, 2022.
- Stormwater & Floodplain Management Design Report prepared by Pearson, Brown & Associates, Inc. dated September 16, 2022, revised October 25, 2022.
- Jurisdictional Determination (JD) issued by the U.S. Army Corps of Engineers (USACE) dated October 11, 2022.
- Wetland Assessment and Farmed Wetland Determination Report prepared by Bollinger Environmental, Inc. dated May 2022.
- Existing Agricultural Drain Tile Investigation Plan prepared by Huddleston McBride dated August 9, 2022.
- Plat of Easement prepared by R.E. Allen and Associates, Ltd. dated September 23, 2022, revised October 21, 2022.
- Temporary Traffic Signal Plans prepared by KLOA dated October 19, 2022.
- Comment Response Letter prepared by Pearson, Brown & Associates, Inc. dated October 25, 2022.

**Stormwater and Floodplain Review**

Based on our knowledge of the Lake County Watershed Development Ordinance (WDO) we offer the following preliminary comments:

1. The following comments are regarding the Lake County Watershed Development Permit Application form.
  - a) The detention volume required on the WDP application form and model output show 2.39 acre-ft. This is different from the report text of 2.21 acre-ft. The final report should be revised for consistency.
  - b) The WDP form should be signed by the property owner under Item 13A; and by a professional engineer and certified wetland specialist under Item 13B.
2. CBBEL will wait for the IDNR-OWR delegation determination. The Village can issue the floodway construction permit as part of the WDO once delegation is provided by IDNR-OWR. Prior to issuance of the permit, more detail (including likely hydraulic modeling) will be required from the applicant's engineer to demonstrate compliance with IDNR-OWR Part 3708 Floodway Construction Rules. It is recommended that a detailed description of how each section of the rule is met be provided, including verifying that the roadway through the floodway is an appropriate use. CBBEL has located the regulatory FIS hydraulic model for Davis Lake Drain and can provide that to the applicant if requested.
3. The following comments are regarding the storm sewer calculations:
  - a) The storm sewer calculations should be verified for Structures 17, 16, etc. The C values and flowrates from the storm sewer calculations do not match the inlet capacity calculations. The storm sewer calculations should be revised accordingly.
  - b) The drain tile survey notes for the 6-inch drain tiles should be clarified. One note indicates that the tiles are not functional while the other indicates they serve the upstream watershed as a mutual drain. They are proposed to be removed on site, so it should be verified that they no longer serve upstream lands.
  - c) If Gilmer Road is being widened as part of the LCDOT requirements for the project, it is recommended that the drain tile under the road be replaced and an observation structure located upstream of the roadway.
  - d) The applicant should investigate the possibility of extending storm sewer to the outdoor ceremony area to capture runoff from this area, which currently is not being directed to the stormwater detention basin.
4. A Federal Emergency Management Agency (FEMA) Letter of Map Change will be required for the proposed buildings. Depending on the exact location and existing ground elevation, this may be a Letter of Map Amendment (LOMA) or a Letter of Map Revision based on Fill (LOMR-F). Consideration should be given to the buildings in future phases and the Letters of Map Change required for those.
5. The comment regarding the detention basin configuration remains partially outstanding. As currently drawn, the southern pipe discharge into the detention basin will likely have erosion as the water drains north over the bottom of the detention basin to the outlet. It is recommended that the southern sediment basin be connected to the northern one via a small channel below the NWL of the pond that will reduce the likelihood for erosion and promote water quality treatment. See RVR comment below.

Note the detention basin must function like a wetland basin to qualify for water quality, RVR and hydrocarbon removal benefits.

6. The RVR calculations remain outstanding. The applicant should fill out Appendix O of the WDO to verify compliance with the RVR requirements.
7. The project will require permits for the proposed work within right-of-way (ROW) from the applicable roadway jurisdictions, which may include additional stormwater detention. As currently proposed, there is approximately 0.7 acre-ft of excess detention volume that may be required for the roadway improvements. Note the roadway improvement plans were not provided for review.
8. The comment regarding seeding remains outstanding. The permanent seed mixes must be provided for review prior to approval to verify native plantings in the compensatory storage and detention basin areas.

#### **Wetland Review**

1. USACE issued a JD on October 11, 2022. The JD determined WL B and WL C as identified on Exhibit 8 of Bollinger Environmental's report are jurisdictional wetlands regulated by USACE. However, WL A, Farmed Wetland 1 and Farmed Wetland 2 are Isolated Waters of Lake County (IWLC). The applicant's Certified Wetland Specialist shall schedule an IWLC boundary verification to confirm the limits of WL A.
2. Per Section 1000.02(F) of the Watershed Development Ordinance (WDO) the approximate offsite wetland limits should be added to the Aerial Photograph Exhibit 8 in the Bollinger report. The parcel may contain buffer areas that originate from offsite wetlands.
3. Although the wetland limits have been added to Sheet 3 of the Engineering Plans the proposed area of wetland and buffer impacts shall be added to Sheet 5-Grading Plan. We recommend including a table on the Grading Plan summarizing the impacts.
4. The Grading Plan indicates IWLC WL A and Farmed Wetland 1 will be impacted by the development. The requirements of Article 5 Section 500 and Article 10 Sections 1004-1009 shall be addressed.

#### **Water and Sewer Review**

1. Water service will be provided by a private well permitted through the Lake County Health Department. Please provide the basis of sizing calculations (number of PE or GPM requirement) after approval from Lake County. Also provide As-Built information for the well (well log, pumping test data, and any water quality data) after approval by the County.
2. We suggest that the well be metered and monthly volume readings taken, recorded and submitted to the Village for use as a database should a community water supply become available in the future.
3. It is our understanding that fire protection is not being provided.

4. Sewage treatment will be provided by an on-site septic system permitted by the Lake County Health Department. Please provide the basis of sizing calculations and design after approval by the County. Also provide As-Built information for the septic facilities upon completion of construction and approval by the County.

#### Plat of Easement Review

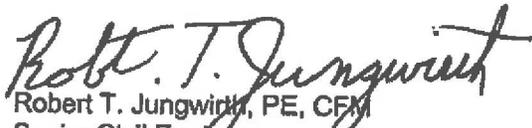
1. Correct the Village Board of Trustees certificate to the Village of Hawthorn Woods.
2. Also correct the Blanket Easement Provisions to the Village of Hawthorn Woods.

#### Traffic Study Review

1. Plans will need to be submitted to LCDOT for detailed traffic signal plan review.
2. Suggest lane assignment and associated pavement marking letters and symbols for the northbound approach be revised for an exclusive left turn lane and combination through/right turn lane as is common practice (instead of a combination left/through lane and exclusive right turn lane as shown).
3. LCDOT approved traffic signal and roadway plans will be required once approved by the County.

If you have questions or comments, please do not hesitate to contact me.

Sincerely,

  
Robert T. Jungwirth, PE, CFM  
Senior Civil Engineer

cc: Pam Newton, Village of Hawthorn Woods  
Erika Frable, Village of Hawthorn Woods  
Lee Fell, CBBEL  
Darren Olson, CBBEL  
Mark Emory, CBBEL  
Tom Szabo, CBBEL  
Julie Gangloff, CBBEL

**TRAFFIC SIGNAL SPECIFICATIONS  
AND  
HIGHWAY STANDARDS**

**FOR**

**Gilmer Road and Fremont Center Road  
Hawthorn Woods, IL**

Prepared By



10/19/2022

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## **RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM**

Effective: May 22, 2002

Revised: July 1, 2015

800.03TS

### Description.

This work shall consist of re-optimizing a closed loop traffic signal system according to the following Levels of work.

LEVEL I applies when improvements are made to an existing signalized intersection within an existing closed loop traffic signal system. The purpose of this work is to integrate the improvements to the subject intersection into the signal system while minimizing the impacts to the existing system operation. This type of work would be commonly associated with the addition of signal phases, pedestrian phases, or improvements that do not affect the capacity at an intersection.

LEVEL II applies when improvements are made to an existing signalized intersection within an existing closed loop traffic signal system and detailed analysis of the intersection operation is desired by the engineer, or when a new signalized or existing signalized intersection is being added to an existing system, but optimization of the entire system is not required. The purpose of this work is to optimize the subject intersection, while integrating it into the existing signal system with limited impact to the system operations. This item also includes an evaluation of the overall system operation, including the traffic responsive program.

For the purposes of re-optimization work, an intersection shall include all traffic movements operated by the subject controller and cabinet.

After the signal improvements are completed, the signal shall be re-optimized as specified by an approved Consultant who has previous experience in optimizing Closed Loop Traffic Signal Systems for District One of the Illinois Department of Transportation. The Contractor shall contact the Traffic Signal Engineer at (847) 705-4424 for a listing of approved Consultants. Traffic signal system optimization work, including fine-tuning adjustments of the optimized system, shall follow the requirements stated in the most recent IDOT District 1 SCAT Guidelines, except as note herein.

A listing of existing signal equipment, interconnect information, phasing data, and timing patterns may be obtained from the Department, if available and as appropriate. The existing SCAT Report is available for review at the District One office and if the Consultant provides blank computer discs, copies of computer simulation files for the existing optimized system and a timing database will be made for the Consultant. The Consultant shall confer with the Traffic Signal Engineer prior to optimizing the system to determine if any extraordinary conditions exist that would affect traffic flows in the vicinity of the system, in which case, the Consultant may be instructed to wait until the conditions return to normal or to follow specific instructions regarding the optimization.

### **(a) LEVEL I Re-Optimization**

1. The following tasks are associated with LEVEL I Re-Optimization.
  - a. Appropriate signal timings shall be developed for the subject intersection and existing timings shall be utilized for the rest of the intersections in the system.
  - b. Proposed signal timing plan for the modified intersection(s) shall be forwarded to IDOT for review prior to implementation.



Basis of Payment.

This work shall be paid for at the contract unit price each for RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM – LEVEL I or RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM – LEVEL II, which price shall be payment in full for performing all work described herein per intersection. Following completion of the timings and submittal of specified deliverables, 100 percent of the bid price will be paid. Each intersection will be paid for separately.

## **GROUNDING OF TRAFFIC SIGNAL SYSTEMS**

Effective: May 22, 2002

Revised: July 1, 2015

806.01TS

Revise Section 806 of the Standard Specifications to read:

### General.

All traffic signal systems, equipment and appurtenances shall be properly grounded in strict conformance with the NEC. This work shall be in accordance with IDOT's District One Traffic Signal Design Details.

The grounding electrode system shall include a ground rod installed with each traffic signal controller concrete foundation and all mast arm and post concrete foundations. An additional ground rod will be required at locations where measured resistance exceeds 25 ohms. Ground rods are included in the applicable concrete foundation or service installation pay item and will not be paid for separately.

Testing shall be according to Article 801.13 (a) (4) and (5).

- (a) The grounded conductor (neutral conductor) shall be white color coded. This conductor shall be bonded to the equipment grounding conductor only at the Electric Service Installation. All power cables shall include one neutral conductor of the same size.
- (b) The equipment grounding conductor shall be green color coded. The following is in addition to Article 801.04 of the Standard Specifications.
  - 1. Equipment grounding conductors shall be bonded to the grounded conductor (neutral conductor) only at the Electric Service Installation. The equipment grounding conductor is paid for separately and shall be continuous. The Earth shall not be used as the equipment grounding conductor.
  - 2. Equipment grounding conductors shall be bonded, using a UL Listed grounding connector, to all traffic signal mast arm poles, traffic signal posts, pedestrian posts, pull boxes, handhole frames and covers, conduits, and other metallic enclosures throughout the traffic signal wiring system, except where noted herein. Bonding shall be made with a splice and pigtail connection, using a sized compression type copper sleeve, sealant tape, and heat-shrinkable cap. A UL listed electrical joint compound shall be applied to all conductors' terminations, connector threads and contact points. Conduit grounding bushings shall be installed at all conduit terminations including spare or empty conduits.
  - 3. All metallic and non-metallic raceways shall have a continuous equipment grounding conductor, except raceways containing only detector loop lead-in circuits, circuits under 50 volts and/or fiber optic cable will not be required to include an equipment grounding conductor.
  - 4. Individual conductor splices in handholes shall be soldered and sealed with heat shrink. When necessary to maintain effective equipment grounding, a full cable heat shrink shall be provided over individual conductor heat shrinks.

- (c) The grounding electrode conductor shall be similar to the equipment grounding conductor in color coding (green) and size. The grounding electrode conductor is used to connect the ground rod to the equipment grounding conductor and is bonded to ground rods via exothermic welding, UL listed pressure connectors, and UL listed clamps .

**UNDERGROUND RACEWAYS**

Effective: May 22, 2002

Revised: July 1, 2015

810.02TS

Revise Article 810.04 of the Standard Specifications to read:

"Installation. All underground conduits shall have a minimum depth of 30-inches (700 mm) below the finished grade."

Add the following to Article 810.04 of the Standard Specifications:

"All metal conduit installed underground shall be Rigid Steel Conduit unless otherwise indicated on the plans."

Add the following to Article 810.04 of the Standard Specifications:

"All raceways which extend outside of a structure or duct bank but are not terminated in a cabinet, junction box, pull box, handhole, post, pole, or pedestal shall extend a minimum of 300 mm (12") or the length shown on the plans beyond the structure or duct bank. The end of this extension shall be capped and sealed with a cap designed for the conduit to be capped.

The ends of rigid metal conduit to be capped shall be threaded, the threads protected with full galvanizing, and capped with a threaded galvanized steel cap.

The ends of rigid nonmetallic conduit and coilable nonmetallic conduit shall be capped with a rigid PVC cap of not less than 3 mm (0.125") thick. The cap shall be sealed to the conduit using a room-temperature-vulcanizing (RTV) sealant compatible with the material of both the cap and the conduit. A washer or similar metal ring shall be glued to the inside center of the cap with epoxy, and the pull cord shall be tied to this ring."

**LIGHT EMITTING DIODE (LED) SIGNAL HEAD AND OPTICALLY PROGRAMMED LED SIGNAL HEAD**

Effective: May 22, 2002

Revised: July 1, 2015

880.01TS

Materials.

Add the following to Section 1078 of the Standard Specifications:

1. LED modules proposed for use and not previously approved by IDOT District One will require independent testing for compliance to current VTCSH-ITE standards for the product and be Intertek ETL Verified. This would include modules from new vendors and new models from IDOT District One approved vendors.
2. The proposed independent testing facility shall be approved by IDOT District One. Independent testing must include a minimum of two (2) randomly selected modules of each type of module (i.e. ball, arrow, pedestrian, etc.) used in the District and include as a minimum Luminous Intensity and Chromaticity tests. However, complete module performance verification testing may be required by the Engineer to assure the accuracy of the vendor's published data and previous test results. An IDOT representative will select sample modules from the local warehouse and mark the modules for testing. Independent test results shall meet current ITE standards and vendor's published data. Any module failures shall require retesting of the module type. All costs associated with the selection of sample modules, testing, reporting, and retesting, if applicable, shall be the responsibility of the LED module vendor and not be a cost to this contract.
3. All signal heads shall provide 12" (300 mm) displays with glossy yellow or black polycarbonate housings. All head housings shall be the same color (yellow or black) at the intersection. For new signalized intersections and existing signalized intersections where all signals heads are being replaced, the proposed head housings shall be black. Where only selected heads are being replaced, the proposed head housing color (yellow or black) shall match existing head housings. Connecting hardware and mounting brackets shall be polycarbonate (black). A corrosion resistant anti-seize lubricant shall be applied to all metallic mounting bracket joints, and shall be visible to the inspector at the signal turn-on. Post top mounting collars are required on all posts, and shall be constructed of the same material as the brackets.
4. The LED signal modules shall be replaced or repaired if an LED signal module fails to function as intended due to workmanship or material defects within the first 7 years from the date of traffic signal TURN-ON. LED signal modules which exhibit luminous intensities less than the minimum values specified in Table 1 of the ITE Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement (June 27, 2005) [VTSCH], or applicable successor ITE specifications, or show signs of entrance of moisture or contaminants within the first 7 years of the date of traffic signal TURN-ON shall be replaced or repaired. The vendor's written warranty for the LED signal modules shall be dated, signed by a vendor's representative and included in the product submittal to the State.

(a) Physical and Mechanical Requirements

1. Modules can be manufactured under this specification for the following faces:

- a. 12 inch (300 mm) circular, multi-section
  - b. 12 inch (300 mm) arrow, multi-section
2. The maximum weight of a module shall be 4 lbs. (1.8 kg).
  3. Each module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.), and shall be weather proof after installation and connection.
  5. The lens of the module shall be tinted with a wavelength-matched color to reduce sun phantom effect and enhance on/off contrast. The tinting shall be uniform across the lens face. Polymeric lens shall provide a surface coating or chemical surface treatment applied to provide abrasion resistance. The lens of the module shall be integral to the unit, convex with a smooth outer surface and made of plastic. The lens shall have a textured surface to reduce glare.
  6. The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens.
  7. Each module shall have a symbol of the type of module (i.e. circle, arrow, etc.) in the color of the module. The symbol shall be 1 inch (25.4 mm) in diameter. Additionally, the color shall be written out in 1/2 inch (12.7mm) letters next to the symbol.

**(b) Photometric Requirements**

4. The LEDs utilized in the modules shall be AlInGaP technology for red and InGaN for green and amber indications, and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40 °C to +74 °C.

**(c) Electrical**

1. Maximum power consumption for LED modules is per Table 2.
2. Operating voltage of the modules shall be 120 VAC. All parameters shall be measured at this voltage.
3. The modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors).
4. When a current of 20 mA AC (or less) is applied to the unit, the voltage read across the two leads shall be 15 VAC or less.
5. The LED modules shall provide constant light output under power. Modules with dimming capabilities shall have the option disabled or set on a non-dimming operation.
6. LED arrows shall be wired such that a catastrophic loss or the failure of one or more LED will not result in the loss of the entire module.

**(d) Retrofit Traffic Signal Module**

1. The following specification requirements apply to the Retrofit module only. All general specifications apply unless specifically superseded in this section.
  2. Retrofit modules can be manufactured under this specification for the following faces:
    - a. 12 inch (300 mm) circular, multi-section
    - b. 12 inch (300 mm) arrow, multi-section
  3. Each Retrofit module shall be designed to be installed in the doorframe of a standard traffic signal housing. The Retrofit module shall be sealed in the doorframe with a one-piece EPDM (ethylene propylene rubber) gasket.
  4. The maximum weight of a Retrofit module shall be 4 lbs. (1.8 kg).
  5. Each Retrofit module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.), and shall be weather proof after installation and connection.
  6. Electrical conductors for modules, including Retrofit modules, shall be 39.4 inches (1m) in length, with quick disconnect terminals attached.
  7. The lens of the Retrofit module shall be integral to the unit, shall be convex with a smooth outer surface and made of plastic or of glass.
- (e) The following specification requirements apply to the 12 inch (300 mm) arrow module only. All general specifications apply unless specifically superseded in this section.
1. The arrow module shall meet specifications stated in Section 9.01 of the Equipment and Material Standards of the Institute of Transportation Engineers (November 1998) [ITE Standards], Chapter 2 (Vehicle Traffic Control Signal Heads) or applicable successor ITE specifications for arrow indications.
  2. The LEDs arrow indication shall be a solid display with a minimum of three (3) outlining rows of LEDs and at least one (1) fill row of LEDs.
- (f) The following specification requirement applies to the 12 inch (300 mm) programmed visibility (PV) module only. All general specifications apply unless specifically superseded in this section.
1. The LED module shall be a module designed and constructed to be installed in a programmed visibility (PV) signal housing without modification to the housing.

Basis of Payment.

Add the following to the first paragraph of Article 880.04 of the Standard Specifications:

The price shall include furnishing the equipment described above, all mounting hardware and installing them in satisfactory operating condition.

Revise the second paragraph of Article 880.04 of the Standard Specifications to read:

If the work consists of retrofitting an existing polycarbonate traffic signal head with light emitting diodes (LEDs), it will be paid for as a SIGNAL HEAD, LED, RETROFIT, of the type specified, and of the particular kind of material, when specified. Price shall be payment in full for removal of the existing module, furnishing the equipment described above including LED modules, all mounting hardware, and installing them in satisfactory operating condition. The type specified will indicate the number of signal faces, the number of signal sections in each signal face and the method of mounting.

**TRAFFIC SIGNAL BACKPLATE**

Effective: May 22, 2002

Revised: July 1, 2021

882.01TS

Delete 1<sup>st</sup> sentence of Article 1078.03 of the Standard Specifications and add "All backplates shall be louvered, formed ABS plastic or composite aluminum".

Delete first sentence of the second paragraph of Article 1078.03 of the Standard Specifications and add "The backplate shall be composed of one or two piece.

Delete second sentence of the fourth paragraph of Article 1078.03 the Standard Specifications.

Add the following to the fourth paragraph of Article 1078.03 of the Standard Specifications:

When retro reflective sheeting is specified, it shall be Type ZZ sheeting according to Article 1091.03 and applied in preferred orientation for the maximum angularity according to the vendor's recommendations. The retroreflective sheeting shall be installed under a controlled environment at the vendor/equipment supplier before shipment to the contractor. The formed plastic backplate shall be prepared and cleaned, following recommendations of the retroreflective sheeting manufacturer.

## TEMPORARY TRAFFIC SIGNAL INSTALLATION

Effective: May 22, 2002

Revised: January 1, 2017

890.01TS

Revise Section 890 of the Standard Specifications to read:

### Description.

This work shall consist of furnishing, installing, maintaining, and removing a temporary traffic signal installation as shown on the plans, including but not limited to temporary signal heads, emergency vehicle priority systems, interconnect, vehicle detectors, uninterruptable power supply, and signing. Temporary traffic signal controllers and cabinets interconnected to railroad traffic control devices shall be new. When temporary traffic signals will be operating within a county or local agency Traffic Management System, the equipment must be NTCIP compliant and compatible with the current operating requirements of the Traffic Management System.

### General.

Only an approved controller equipment supplier will be allowed to assemble temporary traffic signal and railroad traffic signal cabinet. Traffic signal inspection and TURN-ON shall be according to 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS special provision.

### Construction Requirements.

#### (a) Controllers.

1. Only controllers supplied by one of the District approved closed loop equipment supplier will be approved for use at temporary signal locations. All controllers used for temporary traffic signals shall be fully actuated NEMA microprocessor based with RS232 data entry ports compatible with existing monitoring software approved by IDOT District 1, installed in NEMA TS2 cabinets with 8 phase back panels, capable of supplying 255 seconds of cycle length and individual phase length settings up to 99 seconds. On projects with one lane open and two way traffic flow, such as bridge deck repairs, the temporary signal controller shall be capable of providing an adjustable all red clearance setting of up to 30 seconds in length. All controllers used for temporary traffic signals shall meet or exceed the requirements of Section 857 of the Standard Specifications with regards to internal time base coordination and preemption. All railroad interconnected temporary controllers and cabinets shall be new and shall satisfy the requirements of Article 857.02 of the Standard Specifications and as modified herein.
2. Only control equipment, including controller cabinet and peripheral equipment, supplied by one of the District approved closed loop equipment suppliers will be approved for use at temporary traffic signal locations. All control equipment for the temporary traffic signal(s) shall be furnished by the Contractor unless otherwise stated in the plans. On projects with multiple temporary traffic signal installations, all controllers shall be the same manufacturer brand and model number with the latest version software installed at the time of the signal TURN-ON.

- (b) Cabinets. All temporary traffic signal cabinets shall have a closed bottom made of aluminum alloy. The bottom shall be sealed along the entire perimeter of the cabinet base to ensure a water, dust and insect-proof seal. The bottom shall provide a minimum of two (2) 4 inch (100 mm) diameter holes to run the electric cables through.

The 4 inch (100 mm) diameter holes shall have a bushing installed to protect the electric cables and shall be sealed after the electric cables are installed.

- (c) Grounding. Grounding shall be provided for the temporary traffic signal cabinet meeting or exceeding the applicable portions of the National Electrical Code, Section 806 of the Standard Specifications and shall meet the requirements of the 806.01TS GROUNDING OF TRAFFIC SIGNAL SYSTEMS special provision.
- (d) Traffic Signal Heads. All traffic signal sections shall be 12 inches (300 mm). Pedestrian signal sections shall be 16 inch (406mm) x 18 inch (457mm). Traffic signal sections shall be LED with expandable view, unless otherwise approved by the Engineer. Pedestrian signal heads shall be Light Emitting Diode (LED) Pedestrian Countdown Signal Heads except when a temporary traffic signal is installed at an intersection interconnected with a railroad grade crossing. When a temporary traffic signal is installed at an intersection interconnected with a railroad grade crossing, Light Emitting Diode (LED) Pedestrian Signal Heads shall be furnished. The temporary traffic signal heads shall be placed as indicated on the temporary traffic signal plan or as directed by the Engineer. If no traffic staging is in place or will not be staged on the day of the turn on, the temporary traffic signal shall have the signal head displays, signal head placements and controller phasing match the existing traffic signal or shall be as directed by the engineer. The Contractor shall furnish enough extra cable length to relocate heads to any position on the span wire or at locations illustrated on the plans for construction staging. The temporary traffic signal shall remain in operation during all signal head relocations. Each temporary traffic signal head shall have its own cable from the controller cabinet to the signal head.
- (e) Interconnect.
  - 1. Temporary traffic signal interconnect shall be provided using fiber optic cable or wireless interconnect technology as specified in the plans. The Contractor may request, in writing, to substitute the fiber optic temporary interconnect indicated in the contract documents with a wireless interconnect. The Contractor must provide assurances that the radio device will operate properly at all times and during all construction staging. If approved for use by the Engineer, the Contractor shall submit marked-up traffic signal plans indicating locations of radios and antennas and installation details. If wireless interconnect is used, and in the opinion of the engineer, it is not viable, or if it fails during testing or operations, the Contractor shall be responsible for installing all necessary poles, fiber optic cable, and other infrastructure for providing temporary fiber optic interconnect at no cost to the contract.
  - 2. The existing system interconnect and phone lines are to be maintained as part of the Temporary Traffic Signal Installation specified for on the plan. The interconnect, including any required fiber splices and terminations, shall be installed into the temporary controller cabinet as per the notes or details on the plans. All labor and equipment required to install and maintain the existing interconnect as part of the Temporary Traffic Signal Installation shall be included in the cost of TEMPORARY TRAFFIC SIGNAL INSTALLATION. When shown in the plans, temporary traffic signal interconnect equipment shall be furnished and installed. The temporary traffic signal interconnect shall maintain interconnect communications throughout the entire signal system for the duration of the project.

Any temporary signal within an existing closed loop traffic signal system shall be interconnected to that system using similar brand control equipment at no additional cost to the contract.

3. Temporary wireless interconnect. The radio interconnect system shall be compatible with Eagle or Econolite controller closed loop systems. This work shall include all temporary wireless interconnect components, at the adjacent existing traffic signal(s) to provide a completely operational closed loop system. This work shall include all materials, labor and testing to provide the completely operational closed loop system as shown on the plans. The radio interconnect system shall include the following components:

- a. Rack or Shelf Mounted RS-232 Frequency Hopping Spread Spectrum (FHSS) Radio
- b. Software for Radio Configuration (Configure Frequency and Hopping Patterns)
- c. Antennas (Omni Directional or Yagi Directional)
- d. Antenna Cables, LMR400, Low Loss. Max. 100-ft from controller cabinet to antenna
- e. Brackets, Mounting Hardware, and Accessories Required for Installation
- f. RS232 Data Cable for Connection from the radio to the local or master controller
- g. All other components required for a fully functional radio interconnect system

All controller cabinet modifications and other modifications to existing equipment that are required for the installation of the radio interconnect system components shall be included in the cost of TEMPORARY TRAFFIC SIGNAL INSTALLATION.

The radio interconnect system may operate at 900Mhz (902-928) or 2.4 Ghz depending on the results of a site survey. The telemetry shall have an acceptable rate of transmission errors, time outs, etc. comparable to that of a hardwire system.

The proposed or existing master controller and telemetry module shall be configured for use with the radio interconnect at a minimum rate of 9600 baud.

The radio interconnect system shall include all other components required for a complete and fully functional telemetry system and shall be installed in accordance to the vendors recommendations.

- (f) Emergency Vehicle Pre-Emption. All emergency vehicle preemption equipment (light detectors, light detector amplifiers, confirmation beacons, etc.) as shown on the temporary traffic signal plans shall be provided by the Contractor. It shall be the Contractor's responsibility to contact the municipality or fire district to verify the brand of emergency vehicle preemption equipment to be installed prior to the contract bidding. The equipment must be completely compatible with all components of the equipment currently in use by the Agency. All light operated systems shall operate at a uniform rate of 14.035 hz  $\pm$ 0.002, or as otherwise required by the Engineer, and provide compatible operation with other light systems currently being operated in the

District. All labor and material required to install and maintain the Emergency Vehicle Preemption installation shall be included in the item Temporary Traffic Signal Installation.

- (g) **Vehicle Detection.** All temporary traffic signal installations shall have vehicular detection installed at all approaches of the intersection and as directed by the Engineer. Pedestrian push buttons shall be provided for all pedestrian signal heads/phases as directed by the Engineer. Microwave vehicle sensors or video vehicle detection system shall be approved by IDOT prior to Contractor furnishing and installing. The Contractor shall install, wire, and adjust the alignment of the microwave vehicle sensor or video vehicle detection system in accordance to the manufacturer's recommendations and requirements. The Contractor shall be responsible for adjusting the alignment of the microwave vehicle sensor or video vehicle detection system for all construction staging changes and for maintaining proper alignment throughout the project. An equipment supplier shall be present and assist the contractor in setting up and maintaining the microwave vehicle sensor or video vehicle detection system. An in-cabinet video monitor shall be provided with all video vehicle detection systems and shall be included in the item Temporary Traffic Signal Installation.
- (h) **Uninterruptable Power Supply.** All temporary traffic signal installations shall have Uninterruptable Power Supply (UPS). The UPS cabinet shall be mounted to the temporary traffic signal cabinet and shall be according to the applicable portions of Section 862 of the Standard Specifications and as modified in 862.01TS UNINTERRUPTABLE POWER SUPPLY, SPECIAL Special Provision.
- (i) **Signs.** All existing street name and intersection regulatory signs shall be removed from existing poles and relocated to the temporary signal span wire. If new mast arm assembly and pole(s) and posts are specified for the permanent signals, the signs shall be relocated to the new equipment at no extra cost. Any intersection regulatory signs that are required for the temporary traffic signal shall be provided as shown on the plans or as directed by the Engineer. Relocation, removing, bagging and installing the regulatory signs for the various construction stages shall be provided as shown on the plans or as directed by the Engineer. If Illuminated Street Name Signs exist they shall be taken down and stored by the contractor and reflecting street name signs shall be installed on the temporary traffic signal installation.
- (j) **Energy Charges.** The electrical utility energy charges for the operation of the temporary traffic signal installation shall be paid for by others if the installation replaces an existing signal. Otherwise charges shall be paid for under 109.05 of the Standard Specifications.
- (k) **Maintenance.** Maintenance shall meet the requirements of the Standard Specifications and 850.01TS MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION Special Provisions. Maintenance of temporary signals and of the existing signals shall be included in the cost of the TEMPORARY TRAFFIC SIGNAL INSTALLATION pay item. When temporary traffic signals are to be installed at locations where existing signals are presently operating, the Contractor shall be fully responsible for the maintenance of the existing signal installation as soon as he begins any physical work on the Contract or any portion thereof. In addition, a minimum of seven (7) days prior to assuming maintenance of the existing traffic signal installation(s) under this

Contract, the Contractor shall request that the Resident Engineer contact the Bureau of Traffic Operations (847) 705-4424 for an inspection of the installation(s).

(l) Temporary Traffic Signals for Bridge Projects. Temporary Traffic Signals for bridge projects shall follow the State Standards, Standard Specifications, Special Provisions and any plans for Bridge Temporary Traffic Signals included in the plans. The installation shall meet the Standard Specifications and all other requirements in this TEMPORARY TRAFFIC SIGNAL INSTALLATION specification. In addition all electric cable shall be aurally suspended, at a minimum height of 18 feet (5.5m) on temporary wood poles (Class 5 or better) of 45 feet (13.7 m) minimum height. The signal heads shall be span wire mounted or bracket mounted to the wood pole or as directed by the Engineer. The Controller cabinet shall be mounted to the wood pole as shown in the plans, or as directed by the Engineer. Microwave vehicle sensors or video vehicle detection system may be used in place of detector loops as approved by the Engineer.

(m) Temporary Portable Traffic Signal for Bridge Projects.

1. The controller and cabinet shall be NEMA type designed for NEMA TS2 Type 1 operation. Controller and LED signal displays shall meet the applicable Standard Specifications and all other requirements in this TEMPORARY TRAFFIC SIGNAL INSTALLATION special provision.
2. Work shall be according to Article 701.18(b) of the Standard Specifications except as noted herein.
3. General.
  - a. The temporary portable bridge traffic signals shall be trailer-mounted units. The trailer-mounted units shall be set up securely and level. Each unit shall be self-contained and consist of two signal heads. The left signal head shall be mounted on a mast arm capable of extending over the travel lane. Each unit shall contain a solar cell system to facilitate battery charging. There shall be a minimum of 12 days backup reserve battery supply and the units shall be capable of operating with a 120 V power supply from a generator or electrical service.
  - b. All signal heads located over the travel lane shall be mounted at a minimum height of 17 feet (5m) from the bottom of the signal back plate to the top of the road surface. All far right signal heads located outside the travel lane shall be mounted at a minimum height of 8 feet (2.5m) from the bottom of the signal back plate to the top of the adjacent travel lane surface.
  - c. The long all red intervals for the traffic signal controller shall be adjustable up to 250 seconds in one-second increments.
  - d. As an alternative to detector loops, temporary portable bridge traffic signals may be equipped with microwave sensors or other approved methods of vehicle detection and traffic actuation.
  - e. All portable traffic signal units shall be interconnected using hardwire communication cable. Radio communication equipment may be used only

with the approval of the Engineer. If radio communication is used, a site analysis shall be completed to ensure that there is no interference present that would affect the traffic signal operation. The radio equipment shall meet all applicable FCC requirements.

- f. The temporary portable bridge traffic signal system shall meet the physical display and operational requirements of conventional traffic signals as specified in Part IV and other applicable portions of the currently adopted version of the Manual on Uniform Traffic Control Devices (MUTCD) and the Illinois MUTCD. The signal system shall be designed to continuously operate over an ambient temperature range between -30 °F (-34 °C) and 120 °F (48 °C). When not being utilized to inform and direct traffic, portable signals shall be treated as non-operating equipment according to Article 701.11.

**Basis of Payment.**

This work shall be paid for at the contract unit price each for TEMPORARY TRAFFIC SIGNAL INSTALLATION, TEMPORARY BRIDGE TRAFFIC SIGNAL INSTALLATION, or TEMPORARY PORTABLE BRIDGE TRAFFIC SIGNAL INSTALLATION, the price of which shall include all costs for the modifications required for traffic staging, changes in signal phasing as required in the Contract plans, microwave vehicle sensors, video vehicle detection system, any maintenance or adjustment to the microwave vehicle sensors/video vehicle detection system, the temporary wireless interconnect system, temporary fiber optic interconnect system, all material required, the installation and complete removal of the temporary traffic signal, and any changes required by the Engineer. Each intersection will be paid for separately.

**TEMPORARY TRAFFIC SIGNAL TIMING**

Effective: May 22, 2002

Revised: July 1, 2015

890.02TS

Description.

This work shall consist of developing and maintaining appropriate traffic signal timings for the specified intersection for the duration of the temporary signalized condition, as well as impact to existing traffic signal timings caused by detours or other temporary conditions.

All timings and adjustments necessary for this work shall be performed by an approved Consultant who has previous experience in optimizing Closed Loop Traffic signal Systems for District One of the Illinois Department of Transportation. The Contractor shall contact the Traffic Signal Engineer at (847) 705-4424 for a listing of approved Consultants.

The following tasks are associated with TEMPORARY TRAFFIC SIGNAL TIMING.

- (a) Consultant shall attend temporary traffic signal inspection (turn-on) and/or detour meeting and conduct on-site implementation of the traffic signal timings.
- (b) Consultant shall be responsible for making fine-tuning adjustments to the timings in the field to alleviate observed adverse operating conditions and to enhance operations.
- (c) Consultant shall provide monthly observation of traffic signal operations in the field.
- (d) Consultant shall provide on-site consultation and adjust timings as necessary for construction stage changes, temporary traffic signal phase changes, and any other conditions affecting timing and phasing, including lane closures, detours, and other construction activities.
- (e) Consultant shall make timing adjustments and prepare comment responses as directed by the Area Traffic Signal Operations Engineer.
- (f) Return original timing plan once construction is complete.

Basis of Payment.

The work shall be paid for at the contract unit price each for TEMPORARY TRAFFIC SIGNAL TIMING, which price shall be payment in full for performing all work described herein per intersection. When the temporary traffic signal installation is turned on and/or detour implemented, 50 percent of the bid price will be paid. The remaining 50 percent of the bid price will be paid following the removal of the temporary traffic signal installation and/or detour.

**LAKE COUNTY DOT TRAFFIC SIGNAL GENERAL REQUIREMENTS**

Effective: October 15, 2016

Revised: March 1, 2019

LC800.01

All work and equipment performed and installed under this Contract shall be governed by and shall comply with:

SPECIFICATION	ADOPTED/DATED
<b>The State of Illinois</b> <b>"Standard Specifications for Road and Bridge Construction"</b> referred to as <b>"Standard Specifications"</b>	<b>April 1, 2016</b>
<b>The State of Illinois</b> <b>"Manual on Uniform Traffic Control Devices for Streets and Highways,"</b> referred to as <b>"MUTCD"</b>	<b>June 2014</b>
<b>The National Electrical Code</b> referred to as <b>"NEC"</b>	<b>2011 Edition</b>
<b>The National Electrical Manufacturers Association</b> <b>(All publications for traffic control items)</b> referred to as <b>"NEMA"</b>	All applicable current documents published prior to Contract Letting Date
<b>The International Municipal Signal Association</b> <b>("Official Wire &amp; Cable Specifications Manual,")</b> referred to as <b>"IMSA"</b>	All applicable current documents published prior to Contract Letting Date
<b>The Institute of Transportation Engineers</b> <b>ATC Version 6 Standard</b>	<b>January 12, 2018</b>
<b>AASHTO "Standard Specifications"</b> <b>LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals</b>	<b>2015 Edition &amp; 2017 Interim Revisions</b>
<b>Supplemental Specifications and Recurring Special Provisions</b>	<b>January 1, 2018</b>

The project Special Provisions supplement the above specifications, manuals, and codes. In case of conflict with any part or parts of said documents, the project Special Provisions shall take precedence and shall govern.

The following terms and acronyms are used:

IDOT	Illinois Department of Transportation
District 1	IDOT District 1
LCDOT	The Lake County Division of Transportation
Traffic Engineer	The LCDOT Traffic Engineer or designee
PASSAGE	Lake County's ITS System
PASSAGE Consultant	Parsons Transportation Group

The intent of these Special Provisions is to prescribe the materials and construction methods commonly used in traffic signal installations. All material furnished shall be new. The locations and the details of all installations shall be indicated on the plans or as directed by the Engineer.

All traffic signal work related to the traffic signal cabinet shall be performed with at least one electrician holding a current IMSA Traffic Signal Technician Level 2 certification present on site and actively overseeing and directing the work, unless approved in advance by the Traffic Engineer.

The work performed under this Contract shall consist of furnishing and installing all traffic signal work as shown on the plans and as specified herein in a manner acceptable and approved by the Resident Engineer.

Definitions of Terms.

Add the following to Section 101 of the Standard Specifications:

101.56 Vendor. Company that sells a particular type of product directly to the Contractor or the Equipment Supplier.

101.57 Equipment Supplier. Company that supplies, represents, and provides technical support for District 1 approved traffic signal controllers and other related equipment. The Equipment Supplier shall be located within District 1 and shall:

- a. Be full service with on-site facilities to assemble, test and trouble-shoot traffic signal controllers and cabinet assemblies.
- b. Maintain an inventory of District 1 approved controllers and cabinets.
- c. Be staffed with permanent sales and technical personnel able to provide traffic signal controller and cabinet expertise and support.
- d. Technical staff shall attend traffic signal "turn-on" and inspection with a minimum 14 calendar day notice.

## **SUBMITTALS**

Revise Article 801.05 of the Standard Specifications to read:

All material approval requests shall be submitted electronically. The submittal shall be by email, and shall include a cover letter and one PDF file with all pay items for the project.

General requirements include:

- a. All material approval requests shall be submitted within 7 calendar days after the preconstruction meeting. Traffic signal materials and equipment shall bear the U.L. label whenever such labeling is available.
- b. Product data and shop drawings shall be arranged by pay item. Pages of the submittal should be numbered.
- c. When hard copy submittals are necessary for another agency, four complete copies of the manufacturer's descriptive literatures and technical data for the traffic signal materials will be submitted, in addition to the electronic copy required above. If the literature contains more than one item, the Contractor shall indicate which item or items will be furnished.
- d. When hard copy submittals are necessary for structural elements, four complete copies of the shop drawings for the mast arm assemblies and poles, and the combination mast arm assemblies and poles showing, in detail, the fabrication thereof and the certified mill analyses of the materials used in the fabrication, anchor rods, and reinforcing materials, shall be submitted, in addition to the electronic copy required above.
- e. Partial or incomplete submittals will be returned without review.
- f. Certain non-standard mast arm poles and structures will require additional review from IDOT's Bureau of Bridges and Structures. Examples include special mast arms and non-standard length mast arm pole assemblies. The Contractor shall account for the additional review time in their schedule.
- g. The County Section Number, permit number, or IDOT contract number, project location/limits and corresponding pay code number shall be on each sheet of correspondence, catalog cuts and mast arm poles and assemblies drawings.
- h. Where certifications and/or warranties are specified, the information submitted for approval shall include certifications and warranties. Certifications involving inspections, and/or tests of material shall include all test data, dates, and times.
- i. The Contractor shall secure approved materials in a timely manner to assure construction schedules are not delayed.

- j. After the Traffic Engineer reviews the submittals for conformance with the design concept of the project, the drawings will be stamped indicating their status as 'APPROVED', 'APPROVED AS CORRECTED', 'NOT APPROVED', or 'RESUBMIT'. Review schedule will be according to Article 801.05(b). Since the Traffic Engineer's review is for conformance with the design concept only, it is the Contractor's responsibility to coordinate the various items into a working system as specified. The Contractor shall not be relieved from responsibility for errors or omissions in the shop, working, layout drawings, or other documents by the Traffic Engineer's approval thereof.
- k. For contracts let through the Illinois Department of Transportation, the Contractor shall forward all stamped submittals to IDOT's Bureau of Local Roads and Streets upon completion of the review and approval process by LCDOT.
- l. All submitted items reviewed and marked 'APPROVED AS CORRECTED', 'NOT APPROVED', or 'RESUBMIT' shall be resubmitted in their entirety, unless otherwise indicated within the submittal comments, with a disposition of previous comments to verify Contract compliance at no additional cost to the contract.
- m. It is the Contractor's responsibility to note any deviations from Contract requirements at the time of submittal and to make any requests for deviations in writing to the Resident Engineer. In general, substitutions will not be acceptable. Requests for substitutions shall demonstrate that the proposed substitution is superior to the material or equipment required by the Contract Documents. No exceptions, deviations or substitutions will be permitted without the approval of the Resident Engineer.
- n. The Contractor shall not order major equipment (i.e., mast arm assemblies) prior to Resident Engineer approval of the Contractor marked proposed traffic signal equipment locations to assure proper placement of Contract required traffic signal displays, push buttons and other facilities. Field adjustments may require changes in proposed mast arm length and other coordination.

#### **MARKING PROPOSED LOCATIONS**

Revise "Marking Proposed Locations for Highway Lighting System" of Article 801.09 to read "Marking Proposed Locations for Highway Lighting System and Traffic Signals."

Add the following to Article 801.09 of the Standard Specifications:

It shall be the Contractor's responsibility to verify all dimensions and conditions existing in the field prior to ordering materials and beginning construction. This shall include locating the mast arm foundations and verifying the mast arms lengths.

**INSPECTION OF ELECTRICAL SYSTEMS**

Add the following to Article 801.10 of the "Standard Specifications":

- (c) All cabinets, including temporary traffic signal cabinets, shall be assembled by an approved Equipment Supplier in District 1. LCDOT reserves the right to request that any controller and cabinet be tested at a District 1 approved Equipment Supplier's facility prior to field installation. Such testing will be at no extra cost to the contract. All permanent or temporary "railroad interconnected" controllers and cabinets, shall be new, built, tested and approved by the controller Equipment Supplier, in the Equipment Supplier's District 1 approved facility, prior to field installation. The Equipment Supplier shall provide the technical equipment and assistance as required by the Traffic Engineer to fully test this equipment.

**LIQUIDATED DAMAGES FOR UNTIMELY WORK**

A primary concern of LCDOT is to maintain a safe and efficient roadway for the public. Therefore, the Contractor shall proceed with the traffic signal work as soon as conditions and project staging permit. If in the opinion of the Traffic Engineer construction conditions are suitable for traffic signal work, and the Contractor has not yet begun the traffic signal work, the Resident Engineer shall notify the Contractor to proceed. The Contractor shall begin the traffic signal work within seven calendar days after notification to proceed. The Contractor shall continue to prosecute the traffic signal work until completion, or until he can no longer proceed due to conditions beyond their control. The Contractor shall notify the Resident Engineer of any conditions impeding and/or delaying their prosecution of the work. Failure by the Contractor to proceed with the traffic signal work as specified herein shall result in liquidated damages of **\$500.00** per calendar day per occurrence.

For projects involving detector loop installations or replacement, the following additional conditions apply. If in the opinion of the Traffic Engineer, construction conditions are suitable for loop installation(s), the Resident Engineer shall notify the Contractor to proceed. The detector loops shall be installed and fully operational within 14 calendar days following notification to proceed by the Resident Engineer. This 14-day period shall be in effect throughout the entire year, including the off season, regardless of the Contractor's working day status. Failure by the Contractor to complete the loop installation(s) within the specified timeframe shall result in liquidated damages in the amount of **\$500.00** per calendar day, per intersection.

**MAINTENANCE AND RESPONSIBILITY**

Revise Article 801.11 of the "Standard Specifications" to read:

- a. Existing traffic signal installations and/or any electrical facilities at locations included in this Contract may be altered or reconstructed totally or partially as part of the work on this contract. The Contractor is hereby advised that all traffic control equipment presently installed at these locations may be the property of the County of Lake, State of Illinois, Department of Transportation, Division of Highways, County, Transit Agency, Private Developer, or the Municipality in which it is located. Once the Contractor has begun any work on any portion of the project, all traffic signals within the limits of this Contract that have the pay item MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION, TEMPORARY TRAFFIC SIGNAL INSTALLATION, and/or MAINTENANCE OF EXISTING FLASHING BEACON INSTALLATION, shall become the full responsibility of the Contractor. The Contractor shall supply the Resident Engineer and the County's Traffic Signal Maintenance Contractor one 24-hour emergency contact name and telephone number. The Contractor shall provide sufficient qualified personnel to respond to all notifications of malfunctions on a round-the-clock basis (24 hours a day, 7 days a week). The Contractor is required to keep a time and date log of all maintenance items, including the time of the initial report, the response time, and the time of final permanent repair. The Contractor shall provide this information to the Resident Engineer, upon request.
- b. When the project has a pay item for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION, TEMPORARY TRAFFIC SIGNAL INSTALLATION, and/or MAINTENANCE OF EXISTING FLASHING BEACON INSTALLATION, the Contractor shall notify the Traffic Engineer at (847) 377-7000 of their intent to begin any physical construction work on the project. This notification shall be a minimum of ten calendar days prior to the start of construction to allow sufficient time for an inspection of the existing traffic signal installation(s) and the transfer of maintenance to the Contractor. If work is started prior to the inspection, maintenance of the traffic signal installation(s) will be immediately transferred to the Contractor without an inspection. The Contractor shall then become responsible for repairing or replacing all equipment that is not operating properly or is damaged at no cost to the owner of the traffic signal. Final repairs to or the replacement of damaged equipment shall meet the approval of the Traffic Engineer at the time of final inspection or the traffic signal installation will not be accepted.
- c. Automatic Traffic Enforcement equipment including red lighting running and railroad crossing camera systems are owned and operated by others. The Contractor shall not be responsible for maintaining this equipment. This equipment shall be de-activated while the traffic signal is on Contractor maintenance. The Contractor shall notify the municipality of the equipment de-activation.

- d. LCDOT, regional transit, IDOT, and other agencies may also have equipment connected to existing traffic signal or peripheral equipment including PTZ cameras, switches, transit signal priority (TSP and BRT) servers and other devices that shall be included with traffic signal maintenance at no additional cost to the contract.
- e. For contracts that include pay items for milling or pavement patching that may result in destruction of loop detectors, but do not include installation or modification of the traffic signals, maintenance transfers are not required. These contracts do require a notification of intent to work and an inspection. A minimum of ten calendar days prior to the loop removal, the Contractor shall notify the Traffic Engineer at (847) 377-7000, at which time arrangements will be made to adjust the traffic controller timing to compensate for the absence of detection.
- f. The Contractor is advised that the existing and/or temporary traffic signal installation shall remain in operation during all construction stages, except for the most unavoidable down time. Any plan to shut down the traffic signal installation for a period exceeding 15 minutes shall receive prior approval from the Traffic Engineer. Approval to shut down the traffic signal installation will only be granted during the hours of 9:00 A.M. to 3:00 P.M. on weekdays. Shutdowns will not be allowed during inclement weather, weekends or holiday periods.
- g. The Contractor shall be fully responsible for the safe and efficient operation of the traffic signals. Any inquiry, complaint or request by LCDOT, the County's Traffic Signal Maintenance Contractor or the public, shall be investigated and repairs started. The Contractor shall restore service and complete permanent repairs according to the following Repair Timetable. Failure to provide this service will result in liquidated damages of **\$500** per calendar day per occurrence. The Traffic Engineer reserves the right to assign any work not completed within this timeframe to the County's Traffic Signal Maintenance Contractor. All costs associated with the completion of the uncompleted repair shall be the responsibility of the Contractor. Failure to pay these costs to the Traffic Signal Maintenance Contractor within one month after the incident will result in additional liquidated damages of \$500 per month per occurrence. Unpaid bills will be deducted from the cost of the Contract. County personnel, the County's Traffic Signal Maintenance Contractor, and the County's PASSAGE Consultant may inspect any signaling device on LCDOT's highway system at any time without notification.
- h. Any proposed activity in the vicinity of a highway-rail grade crossing shall adhere to the guidelines set forth in the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) regarding work in temporary traffic control zones in the vicinity of highway-rail grade crossings which states that lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the railroad tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be

provided at the crossing to prevent vehicles from stopping on the tracks, even if automatic warning devices are in place.

- i. At signals where the Contractor is responsible for maintenance, including temporary traffic signals and newly constructed traffic signals that are not yet accepted by the County, the Contractor shall be responsible for clearing snow, ice, dirt, debris or other condition that obstructs visibility of any traffic signal display or access to traffic signal equipment in compliance with the REPAIR TIMETABLE. Two clearly visible signal indications of all colors and arrows are required to be maintained at all time.
- j. In the event of power loss at locations where the Contractor is responsible for maintenance, including temporary traffic signals and newly constructed traffic signals that are not yet accepted by the County, the Contractor shall be responsible for working with Lake County personnel to make connections of portable County-supplied generators at the maintained location, as directed by the Traffic or Resident Engineer.

Immediately after performing any work related to a signal maintenance item (troubleshooting, temporary repair, permanent repair, etc.) the Contractor shall contact the Lake County PASSAGE Transportation Management Center (TMC) at **(847) 377-7000**.

All items shall be repaired within the time frame described in the Repair Timetable. The times listed are noncumulative. Any repairs not specifically covered in the Repair Timetable, or described elsewhere, shall be completed within a time frame matching the most similar line item in the Repair Timetable.

**REPAIR TIMETABLE  
(non cumulative)**

<b>ITEM</b>	<b>RESPONSE TIME</b>	<b>SERVICE RESTORATION</b>	<b>PERMANENT REPAIRS</b>
<b>KNOCKDOWNS/FAILURE/DAMAGE:</b>			
Cabinet	1 hr	24 hrs	2 wks
Controller (Local or Master)	1 hr	24 hrs	2 wks
Adaptive Control Hardware	1 hr	24 hrs	3 wks
Detector Loop/Magnetometer	1 hr	n.a.	2 wks
Loop Detector/Amplifier	1 hr	4 hrs	2 wks
Video Detection Camera	1 hr	4 hrs	2 wks
PTZ Camera	2 hrs	48 hrs	2 wks
Detector Interface Card/Mini Hub	1 hr	4 hrs	2 wks
Modem	2 hrs	NWD	2 wks
Load Switch	1 hr	2 hrs	2 hrs
Signal Head/Lenses	1 hr	2 hrs	NWD
Pole/Mast Arm	1 hr	2 hrs	ENG
Cabling/Conduit	1 hr	4 hrs	ENG
Interconnect/Communication	1 hr	NWD	ENG
Graffiti/Advertising	NWD	NWD	NWD
Telemetry, Electrical	1 hr	2 hrs	NWD
Ethernet Switches/Video Encoders	1 hr	48 hrs	2 wks
Highway Advisory Radio (HAR)	1 hr	48 hrs	2 wks
Indicators/switches/LEDs/displays	NWD	n.a.	2 wks
Snow/Ice/Debris/Other Obstructions	1 hr	2 hrs	NWD
Outages not covered elsewhere	1 hr	2 hrs	NWD
Filter/Cleanliness/fans/thermostat	NWD	NWD	n.a.
Misalignment (conflicting)	1 hr	2 hrs	NWD
Misalignment (non-conflicting)	2 hrs	4 hrs	NWD
<b>COMPLAINTS/CALLS/ALARMS:</b>			
Timing/Phasing/Programming	1 hr	2 hrs	ENG
Coordination Alarm/Cycle Fail	NWD	ENG	ENG
Controller Alarm/Status Change	1 hr	NWD	1 wk
Detector Alarm/Status change	NWD	NWD	ENG
UPS	1 hr	2 hrs	2 wks
CMU Flash/Local Flash	1 hr	2 hrs	1 wk
Door Open/Maint. Req.	1 hr	4 hrs	NWD

**LEGEND:** hr=hour, hrs=hours, NWD=next week day, days=calendar days,  
ENG=acceptable to Traffic Engineer, wk=week, wks=weeks, n.a.=not applicable

**MODIFICATION OF IDOT SPECIAL PROVISION REQUIREMENTS**

When IDOT Special Provisions for traffic signal items are included in an LCDOT Contract or Permit project, the following modifications shall apply to the noted Special Provisions.

**Contact Information:** The Contractor shall utilize the LCDOT contact information for LCDOT projects in place of the personnel, phone numbers, and directives provided in the following District 1 Special Provisions when they are included in the Contract:

800.02TS Optimize Signal System  
800.03TS Re-Optimize Signal System  
805.01TS Electric Service Installation  
886.01TS Detector Loop  
890.01TS Temporary Traffic Signal Installation  
890.02TS Temporary Traffic Signal Timing

All references in the above special provisions to Traffic Signal Engineer, Area Traffic Signal Engineer, Area Traffic Signal Maintenance and Operations Engineer, Bureau of Traffic Operations, Traffic Operations Engineer, State, State's Traffic Signal Maintenance Contractor, and State's Electrical Maintenance Contractor shall be replaced with the LCDOT Traffic Engineer and the phone number shall be **847-377-7000**. Submittals, requests for reviews, scheduling of appointments, and requests for materials and information shall be directed to the LCDOT Traffic Engineer instead of IDOT, District 1, or the State's Maintenance Contractor.

**Traffic Signal Timing Consultant Requirements:** Add the following paragraph to the following District 1 Special Provisions:

800.02TS Optimize Signal System  
800.03TS Re-Optimize Signal System  
890.02TS Temporary Traffic Signal Timing

All work shall be based upon the LCDOT Countywide Synchro model. The Consultant shall contact the Traffic Engineer at **847-377-7000** to acquire the required portion of the countywide model to be updated for the particular project. Upon completion of the project, the Consultant shall provide LCDOT with the revised and updated files for inclusion into the Countywide Synchro Model. Graphics displays for LCDOT's traffic signal systems do not need to be furnished to LCDOT.

**Pedestrian Pushbutton Station Requirements:** Add the following paragraph to the following District 1 Special Provision:

**888.01 TS Pedestrian Push Button**

The pedestrian push button signs shall be retroreflective R10-3, 9"x12" signs displaying the "Push Button For" legend with the Walking Man symbol and arrow, unless shown otherwise in the plans. The pedestrian push button station shall be natural, unfinished aluminum with rounded corners sized to accommodate the 9"x12" sign.

**DAMAGE TO TRAFFIC SIGNAL SYSTEM**

Revise Article 801.12(b) of the "Standard Specifications" to read:

Any traffic control equipment damaged or not operating properly from any cause whatsoever shall be repaired and/or replaced. All inoperable components shall be replaced with new equipment meeting the special provisions or the current LCDOT requirements. The Contractor shall provide replacement components at no additional cost to the Contract and/or owner of the traffic signal system. Final repairs or replacement of damaged equipment shall meet the approval of the Traffic Engineer prior to or at the time of final inspection; otherwise the traffic signal installation will not be accepted. Cable splices outside the controller cabinet shall not be allowed, unless approved by the Traffic Engineer.

Temporary replacement of damaged or knocked down mast arm pole assembly shall require construction of a full or partial span wire signal installation or other method approved by the Traffic Engineer.

Automatic Traffic Enforcement equipment, including Red Light Enforcement cameras, detectors, and peripheral equipment, damaged or not operating properly from any cause whatsoever, shall be the responsibility of the municipality or the Automatic Traffic Enforcement company per Permit agreement.

**VIDEO AND NETWORK SYSTEM REQUIREMENTS**

For all projects including installation or relocation of video and/or network equipment, the Contractor shall contact the TMC at **847-377-7000** after installation to confirm proper operation of the equipment within the PASSAGE system. This includes confirming that the camera horizon is properly adjusted, camera lens is clear, network settings are correct and all devices are communicating correctly with the TMC. For equipment requiring an IP address or other LCDOT assigned parameters, the Contractor should request the information from the TMC a minimum of one week in advance of the traffic signal "turn-on." The Contractor shall be responsible for making any changes necessary to the camera mounting, aiming, and/or equipment programming to meet the PASSAGE requirements and/or to operate the equipment to the satisfaction of the Traffic Engineer. Contacting the TMC for confirmation of equipment operation does not constitute an installation review and does not relieve the

Contractor of the responsibility to correct deficiencies identified at the "turn-on." The cost of meeting these requirements shall be included in the associated pay item and no additional compensation shall be made. Calls to the TMC shall be made according to the PASSAGE System Support section of this special provision.

**TRAFFIC SIGNAL INSPECTION ("TURN-ON")**

Revise Article 801.15(b) of the "Standard Specifications" to read:

It is LCDOT's intent to have all electric work completed and the equipment field-tested by the Equipment Supplier, prior to LCDOT's "turn-on" field inspection. The Contractor shall have all traffic signal work completed and the electrical service installation connected by the utility company prior to requesting an inspection and "turn-on" of the traffic signal installation. In the event the Traffic Engineer determines that the work is not complete and that the inspection will require more than two hours to complete, the inspection may be cancelled and the Contractor will be required to reschedule at another date.

The Contractor may request a "turn-on" and inspection of the completed traffic signal installation at each separate location. This request shall be made to the Traffic Engineer at **(847) 377-7000** a minimum of ten calendar days prior to the time of the requested inspection. When the Contract includes the pay item RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM, OPTIMIZE TRAFFIC SIGNAL SYSTEM, or TEMPORARY TRAFFIC SIGNAL TIMINGS, the Contractor shall notify the Signal Coordination and Timing (SCAT) Consultant of the "turn-on"/detour implementation schedule, as well as stage changes and signal phase changes during construction. The SCAT Consultant shall be in attendance at each temporary and permanent traffic signal "turn-on."

The Contractor shall provide a representative from the Equipment Supplier's office to attend the traffic signal inspection for both permanent and temporary traffic signal "turn-ons." Signal indications being tested shall match the lane configurations and markings at the intersection. If any conflicting signal indications are visible to motorist or pedestrians while testing, the Contractor shall be responsible to provide police officer(s) to direct traffic.

Upon demonstration that the signals are operating properly according to the Contract and to the satisfaction of the Traffic Engineer, the Traffic Engineer will allow the signals to be placed in continuous operation. The Traffic Engineer will inspect the traffic signal installation, with the assistance of the Contractor, and provide a written "punch-list" of deficient items requiring completion. The Contractor shall complete all "punch-list" work within 30 calendar days of notification. If this work is not completed within 30 days, LCDOT reserves the right to have the work completed by others at the Contractor's expense. This cost will be in addition to Liquidated Damages for Untimely Work.

The Contractor shall furnish all equipment and/or parts to keep the traffic signal installation operating. The Contractor shall be responsible for all traffic signal equipment and associated maintenance thereof until LCDOT acceptance is granted.

When the Contractor has completed the "punch-list" work, he/she shall contact the Traffic Engineer to schedule a follow-up inspection of the traffic signal installation. If the Traffic Engineer determines that any "punch-list" items have not been completed, he may cancel the inspection, and the Contractor will need to reschedule.

It is possible that during any follow-up inspections of the traffic signal installation, deficient items may be identified that were not identified at the "turn-on" inspection, or included in the initial "punch-list". The Traffic Engineer shall advise the Contractor of any such items, and it shall be the Contractor's responsibility to complete these items prior to acceptance of the traffic signal.

Acceptance of the traffic signal by LCDOT shall be based on the inspection results and successful operation during a minimum 72-hour "burn-in" period following activation of the traffic signal and related equipment. Therefore, due to the required "burn-in" period, acceptance of the traffic signal shall not occur at the time of the "turn-on." Upon notification by the Contractor that all noted deficiencies have been corrected, and after the "burn-in" period, the Traffic Engineer shall perform an acceptance inspection of the traffic signal installation. If approved, the traffic signal acceptance shall be given verbally at the inspection, followed by written correspondence from the Traffic Engineer. The Agency that is responsible for the maintenance of each traffic signal installation will assume the traffic signal maintenance upon acceptance by the Traffic Engineer.

LCDOT requires the following Final Project Documentation from the Contractor prior to acceptance of the traffic signal. The documentation shall be provided in hard copy and electronic format as indicated below.

1. One copy (11"x17") and one electronic PDF file of as-built signal plans with field revisions marked in red.
2. One copy of the operation and service manuals for the signal controller and the associated control equipment.
3. Five copies (11"x17") and one electronic PDF file of the cabinet wiring diagrams.
4. Five copies and one electronic PDF file of the traffic signal installation cable log.
5. All manufacturer and Contractor warranties and guarantees required by Article 801.14 of the Standard Specifications.

All cost of work and materials required to comply with the above requirements shall be included in the pay item bid prices, under which the subject materials and signal equipment are paid, and no additional compensation will be allowed. Materials and signal equipment not complying with the above requirements will be subject to removal and disposal at the Contractor's expense.

**LOCATING UNDERGROUND FACILITIES**

Revise Section 803 of the "Standard Specifications" to read:

Once the Contractor has taken maintenance of an existing County facility or has constructed underground facilities, they are responsible for locating the facilities according the J.U.L.I.E. requirements at no additional cost to the Contract.

Contractor requests for equipment locates will be granted only once prior to the start of construction. Additional requests shall be at the expense of the Contractor. The location of underground traffic facilities does not relieve the Contractor of their responsibility to repair any item(s) damaged during the construction, at his/her own expense.

Locate requests shall be directed to LCDOT's Traffic Signal Maintenance Contractor or to the LCDOT Traffic Engineering Department at (847) 377-7000.

The exact location of all utilities shall be field verified by the Contractor before the installation of any components of the traffic signal system. For locations of utilities call J.U.L.I.E. at 1-800-892-0123. The location of some utilities may require contacting other Agencies or Municipalities.

The Contractor should note that IDOT does not participate in J.U.L.I.E. Underground work that is proposed to take place within IDOT right-of-way requires the Contractor to contact IDOT for the procedures involved in locating their facilities.

**RESTORATION OF WORK AREA**

Add to Section 801 of the "Standard Specifications":

Restoration of the traffic signal work area shall be included in the related pay item including foundation, conduit, handhole, trench and backfill, etc. and no extra compensation shall be allowed. All roadway surfaces including shoulders, medians, sidewalks, pavement, etc. shall be restored to match the previously existing conditions. All damage to mowed lawns shall be replaced with an approved sod, and all damage to unmowed fields shall be seeded, according to Section 250 and Section 252 of the Standard Specifications respectively, except that Phosphorus fertilizer nutrient shall not be used on Lake County Highways or within Lake County right-of-way, and a knitted straw mat shall be applied to seeded areas, according to Article 1081.10 (b) of the Standard Specifications. Areas in front of residences are to restored within two weeks of the completion of work causing the disturbance regardless of the duration of the project remaining. The traffic signal work area includes any area where the Contractor or their subcontractors perform work to install, repair, or maintain County owned traffic, lighting, or PASSAGE equipment, regardless of the presence of an actual traffic signal.

**CABINET NEATNESS AND WIRING**

The Contractor shall ensure that all wiring and peripheral equipment in any new traffic signal cabinet is in a neat and orderly fashion that is acceptable to the Traffic Engineer. This applies to controller cabinets, master cabinets, railroad cabinets, communication

cabinets, electrical service cabinets, or any other new cabinet called for in the project plans.

All conduit entrances into the cabinet shall be sealed with a pliable waterproof material. Electrical cables inside the cabinet shall be neatly trained along the base and back of the cabinet. Each conductor shall be connected individually to the proper terminal. The spare conductors shall be bound into a neat bundle. All cables, including those for signals, vehicle detection, pushbuttons, emergency vehicle preemption, video transmission, and communication shall be neatly arranged and bundled within the cabinet to the satisfaction of the Traffic Engineer. Each cable shall be marked with an identification number which corresponds to the number and description on the cabinet cable log.

When modernizing or modifying an existing cabinet, the new cables being installed shall be trained, bundled, and labeled to the satisfaction of the Traffic Engineer. When working inside an existing cabinet, the Contractor shall minimize disturbance to existing cables and cabinet wiring. Any existing cables and cabinet wiring disturbed by the Contractor shall be re-trained, bundled, and/or labeled to the satisfaction of the Traffic Engineer.

Unless indicated elsewhere in the plans and specs, all equipment in the cabinet shall be wired through the UPS except lighted street name signs and luminaires.

Components with Ethernet capabilities shall be connected to the Switch or other communications equipment in the cabinet as directed by the Traffic Engineer. All equipment, materials, labor and hardware, including Ethernet patch cables, required to provide cabinet neatness and wiring to the satisfaction of the Traffic Engineer shall be included in the applicable pay item for FULL ACTUATED CONTROLLER AND TYPE IV CABINET SPECIAL, FULL-ACTUATED CONTROLLER IN EXISTING CABINET, and/or MODIFY EXISTING CONTROLLER.

The County shall not accept maintenance of the traffic signal installations until the requirements of this specification are satisfied.

#### **EQUIPMENT SUPPLIER AND VENDOR REPRESENTATION**

The Traffic Engineer reserves the right to request a representative of the Equipment Supplier and/or Vendor be present at the activation of new traffic equipment. The traffic equipment may include signal heads, cabinets, controllers, amplifiers, preemption, detection, monitoring, communication/transmission, fiber-optic/telemetry, radio, microwave, infrared, illuminated signs, streetlights, push buttons, lighted crosswalks, uninterruptable power supplies, adaptive, counters, and any other new equipment being installed and activated. The representative shall be a qualified technician trained in the proper installation and operation of the equipment being installed under the Contract or permit.

The Traffic Engineer reserves the right to cancel the "turn-on," transfer, or other scheduled activity if, in their opinion, knowledgeable personnel from the Equipment Supplier or Vendor are not present. Rescheduling, and any associated costs, shall be the responsibility of the Contractor, and shall be subject to availability of LCDOT Traffic staff.

This provision is in addition to the requirement contained herein that the Contractor provide a representative from the Equipment Supplier to attend the traffic signal inspection for both permanent and temporary traffic signal "turn-on".

Any costs associated with Equipment Supplier and/or Vendor representation shall be included in the unit price of the associated traffic equipment being activated. Any unforeseen costs incurred by the Contractor to provide this representation shall not be the responsibility of the County.

#### **INTERRUPTION OF COMMUNICATION**

The interruption of communication with County equipment shall be kept to an absolute minimum. Communication includes controller telemetry, video transmission, camera control signals, Highway Advisory Radio, wireless interconnect, telephone (POTS/ISDN/DSL), high speed Internet, cellular modem, or any other County communication equipment. This provision applies to cable types including copper, multimode fiber optic, singlemode fiber optic, telephone cables, Ethernet cables, or any other cable used by the County to monitor and maintain its various signal and ITS equipment.

The Contractor shall plan ahead, and shall stage their construction work accordingly, so that he/she can interrupt communication, and then restore communication, with as little down time as possible. For example, when a section of existing interconnect is being relocated, the new handholes and conduits should be installed prior to disconnecting the interconnect cable. The interconnect cable can then be disconnected, pulled out of the existing conduit, pulled through the new conduit, and re-connected. In addition, when an existing fiber optic cable is to be re-used, the Contractor shall be prepared to immediately replace any fiber splices and/or terminations that become damaged.

Prior to disconnecting any LCDOT communication link, the Contractor shall contact the Traffic Engineer for approval of their planned construction method.

#### **PASSAGE SYSTEM SUPPORT**

The LCDOT PASSAGE TMC staff are available to provide a limited amount of technical support to the Contractor between the hours of 8:00 AM and 4:30 PM. The Contractor may request the TMC staff provide configuration information, settings, and testing support, and other items approved by the Traffic Engineer. Due to the primary responsibility of PASSAGE staff to maintain traffic flow in Lake County during peak hours, requests that require LCDOT support after 4:30 PM may not be honored until the next business day. Extensions to the Contract working days or completion date will not be authorized solely due to requests for support that do not meet these requirements.

**85000200 MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION (LCDOT)**

Effective: October 1, 2016

Revised:  
LC850.01

**Description:** This work shall consist of maintaining an existing traffic signal installation that has been designated to remain in operation during construction.

**General:** This work will be performed according to Section 850 of the "Standard Specifications" and the following:

Full maintenance responsibility shall start as soon as the Contractor begins any physical work on the contract or any portion thereof.

The Contractor shall have electricians on staff with IMSA Level II certification to provide signal maintenance.

This item shall include maintenance of all traffic signal equipment at the intersection, including cameras, emergency vehicle pre-emption equipment, traffic counters, detection equipment, traffic signal control equipment, terminal servers, media converters, transit signal priority equipment, flashing beacons, uninterruptable power supply (UPS) and batteries, handholes, lighted signs, radios, modems, master controllers, telephone service installations, communication equipment, communication cables, conduits to adjacent intersections, and other traffic signal equipment.

Video encoders, layer II and layer III switches will be maintained by the County's PASSAGE Consultant. The Contractor shall provide cabinet access to the PASSAGE Consultant as necessary to maintain communications on the PASSAGE network. Power supplies for encoders and switches shall be furnished by LCDOT. Any electrical work necessary to troubleshoot or replace power supplies shall be performed by the Contractor.

The Contractor will not be required to pay the energy charges for the operation of the existing traffic signal installation.

Maintenance will not include Automatic Traffic Enforcement equipment, e.g. red light enforcement cameras, detectors, or peripheral equipment. This equipment is operated and maintained by the local municipality and should be de-activated while the traffic signal is on Contractor maintenance.

The Contractor shall check all controllers every month, which will include opening the cabinet door and visually inspecting all timing intervals, relays, detectors, and pre-emption equipment to ensure that they are functioning properly. This item includes all portions of the emergency vehicle pre-emption system. The Contractor shall not clear equipment log buffers. The Contractor shall at all times maintain in stock a sufficient amount of materials and equipment to provide effective temporary and permanent repairs.

The Contractor shall provide immediate corrective action when any part of the system fails to function properly. Two far side heads facing each approach shall be considered the minimum acceptable signal operation pending permanent repairs. When repairs at a signalized

intersection require that the controller be disconnected, and power is available, the Contractor shall place the traffic signal installation on flashing operation. The signals shall flash **RED** for all directions unless a different indication has been specified by the Traffic Engineer. When the signal is flashing **RED** or when the power is out, the Contractor shall be required to place at least 1 STOP sign (R1-1-36) meeting MUTCD requirements at each approach of the intersection as a temporary means of regulating traffic according to the Repair Timetable in the project special provisions. At approaches where a yellow flashing indication is directed by the Traffic Engineer, STOP signs will not be required. The Contractor shall maintain a sufficient number of STOP signs for all the signals under the Contractor's maintenance and have enough spare STOP signs in stock at all times to replace those which may be damaged or stolen.

The Contractor shall provide the Engineer with a 24-hour telephone number for traffic signal maintenance. The Contractor, or his representative, shall be available on a 24-hour basis to respond to emergency calls by the Engineer, Traffic Engineer or other parties.

Traffic signal equipment which is lost or not returned to the County for any reason shall be replaced with new equipment meeting the requirements of the project special provisions and "Standard Specifications", or in the absence of applicable specifications, meeting the requirements of the Traffic Engineer.

The Contractor shall respond to all emergency calls from the County or others according to the Repair Timetable and provide immediate corrective action. When equipment has been damaged or becomes faulty beyond repair, the Contractor shall replace it with new and identical equipment. The cost of furnishing and installing the replaced equipment shall be borne by the Contractor at no additional charge to the County. The Contractor may initiate action to recover damages from a responsible third party. If at any time the Contractor fails to perform all work as specified herein to keep the traffic signal installation in proper operating condition or if the Engineer or Traffic Engineer cannot contact the Contractor's designated personnel, the Traffic Engineer shall have the County's Traffic Signal Maintenance Contractor perform the required maintenance work. The County's Traffic Signal Maintenance Contractor shall bill the Contractor for the total cost of the work. The Contractor shall pay this bill within 30 days of the date of receipt of the invoice or the cost of such work will be deducted from the amount due the Contractor. The Contractor shall allow the County's Traffic Signal Maintenance Contractor to open the cabinet and review the operation of the existing traffic signal installation that has been transferred to the Contractor for maintenance.

The Traffic Engineer may require the Contractor to transfer maintenance of a signal back to the County's Traffic Signal Maintenance Contractor (or other electrical contractor) for a short time. This may become necessary due to other signal projects in the area, or if the County needs to perform work at the signal. Any costs incurred by the Contractor for maintenance transfer inspections of this type shall be included in cost of pay item MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION.

Any proposed activity in the vicinity of a highway-rail grade crossing shall adhere to the guidelines set forth in the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) regarding work in temporary traffic control zones in the vicinity of highway-rail grade crossings which states that lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the railroad tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the crossing to prevent vehicles from stopping on the tracks, even if automatic warning devices are in place.

Temporary replacement of damaged or knockdown of a mast arm pole assembly shall require construction of a full or partial span wire signal installation or other method approved by the Traffic Engineer.

**Basis of Payment:** This work shall be paid for at the Contract unit price each for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION. Each intersection will be paid for separately.

## **ELECTRIC CABLE (LCDOT)**

Effective: October 1, 2016

Revised:

LC873.01

**Description:** This work shall consist of furnishing and installing an electric cable of the type, size and number of conductors specified.

**Materials:** The electric cable shall meet the requirements of Article 1070.04 of the "Standard Specifications" and the following:

- **Signal Cable:** The conductors for signal cable shall be limited to No. 14 AWG solid copper.
- **Service Cable:** The service cable may be either single or multiple conductor cable.
- The electric service cable shall have an XLP jacket.
- All other cable jackets shall be polyvinyl chloride, meeting the requirements of IMSA 19-1 or IMSA 20-1.
- The jacket color for signal cable shall be black.\
- The jacket color for lead-in and communications cable shall be gray.
- All cabling between the signal cabinet and the signal heads shall signal cable
- Heat shrink splices shall be used according to the District 1 "Standard Traffic Signal Design Details" as shown on the plans.

**General:** This work shall be performed according to Section 873 of the "Standard Specifications".

**Method of Measurement:** Electric Cable will be measured for payment in feet according to Article 873.05 of the "Standard Specifications".

**Basis of Payment:** This work will be paid for at the contract unit price per foot for ELECTRIC CABLE, of the method of installation (IN TRENCH, IN CONDUIT, or AERIAL SUSPENDED), of the type, size and number of conductors or pairs specified.

**89502375 REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT (LCDOT)**

Effective: July 15, 2017

Revised:  
LC895.01

Add the following to Article 895.05(a) of the Standard Specifications:

The traffic signal equipment which is to be removed and is to become the property of the Contractor shall be disposed of outside the right-of-way at the Contractor's expense.

All equipment to be returned to the Lake County Division of Transportation (LCDOT) shall be delivered by the Contractor to the LCDOT. The Contractor shall contact the LCDOT Traffic Signal Engineer at 847-377-7000 to schedule an appointment to deliver the equipment. No equipment will be accepted without a prior appointment. All equipment shall be delivered within 30 days of removing it from the traffic signal installation. The Contractor shall provide one hard copy and one electronic file of a list of equipment that is to remain the property of the LCDOT, including model and serial numbers, where applicable. The Contractor shall also provide a copy of the Contract plan or special provision showing the quantities and type of equipment. Controllers and peripheral equipment from the same location shall be boxed together (equipment from different locations may not be mixed) and all boxes and controller cabinets shall be clearly marked or labeled with the location from which they were removed. If equipment is not returned according to these requirements, it will be rejected by the LCDOT. The Contractor shall be responsible for the condition of the traffic signal equipment from the time Contractor takes maintenance of the signal installation until the acceptance of a receipt drawn by the LCDOT Traffic Signal Engineer indicating the items have been returned in good condition.

The Contractor shall safely store and arrange for pick up or delivery of all equipment to be returned to agencies other than the LCDOT. The Contractor shall package the equipment and provide all necessary documentation as stated above.

Traffic signal equipment which is lost or not returned to the LCDOT for any reason shall be replaced with new equipment meeting the requirements of these Specifications at no cost to the contract.

For all traffic signal posts or mast arms to remain, all vacated holes remaining in existing posts or mast arms shall be plugged with a kneadable, two-part epoxy putty. The putty shall cure in two hours or less and, when dried, the putty shall be sandable and paintable. It shall be capable of withstanding up to 500 degree Fahrenheit temperatures, with minimum tensile strength of 6000 psi and compressive strength of 18 psi. Products that include asbestos are prohibited.

The epoxy putty shall be applied to each vacated hole according to manufacturer's recommendations. The putty shall be shaped and smoothed, and excess putty shall be removed before it hardens. After the putty is fully hardened, it shall be sanded, cleaned, and painted to match the traffic signal post or mast arm.

**XX005723 VIDEO DETECTION SYSTEM COMPLETE INTERSECTION (LCDOT)**

Effective: October 1, 2016  
Revised: July 15, 2017  
LC801.03

**Description:** This work shall consist of furnishing and installing a system that monitors vehicles on a roadway via the processing of video images and that provides detector outputs to a traffic signal controller. This work shall consist of furnishing and installing video cameras, cables, video processors, a controller interface unit, and a remote communication module to operate the video vehicle detection system at one signalized intersection.

**Materials:** The Video Detection System Complete Intersection shall be one of the following systems:

- Autoscope Encore, Terra TIP, Terra TAP
- Iteris RZ-4 WDR, Vantage Edge 2, Vantage TS2-IM, Edge Connect
- Autoscope AIS-IV, Terra RackVision,

All the cables from the detection cameras to the traffic signal cabinet and within the traffic signal cabinet itself shall be included in the cost of this item.

The Video Detection System Complete Intersection shall also include a LCD monitor in the traffic signal cabinet with BNC connector for video input. Surge protection and grounding shall be provided to protect the video detection cameras and components located in the traffic signal cabinet.

The system shall have anonymous FTP capabilities disabled by the vendor/equipment supplier or provide a feature for the user to disable the functionality through the standard internal menu.

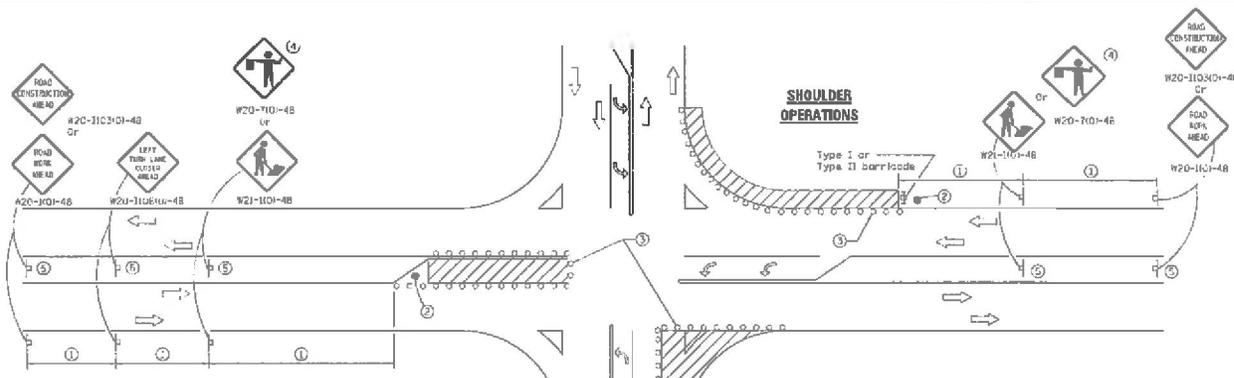
**Installation:** The video detection camera shall be installed on top of the luminaire arm. Occasionally overhead utility wires may obstruct the camera's field of view and prevent proper detector placement. In the event of an obstructed view, the camera shall be installed on a J-hook below the luminaire arm, instead of the normal mounting bracket.

All holes drilled into signal poles, mast arms, or posts shall require rubber grommets to prevent the chafing of wires.

If the Video Detection System Complete Intersection will be connected to the Gigabit Ethernet network, it shall communicate over 10/100 Base T Ethernet to a Layer II (Datalink) Switch and/or a Layer III (Network) Switch. Layer II and Layer III switches shall be installed as shown on the plans.

**Basis of Payment:** This item will be paid for at the contract unit price per each for VIDEO DETECTION SYSTEM COMPLETE INTERSECTION. *The unit price shall include all associated equipment, hardware, cables, materials and labor required to install the system at one signalized intersection and in operation to the satisfaction of the Traffic Engineer.*

If required, the cost of the J-hook shall be included in the cost of VIDEO DETECTION SYSTEM COMPLETE INTERSECTION. If required, the LAYER II (DATALINK) SWITCH and/or the LAYER III (NETWORK) SWITCH will be paid for separately.



**LEFT TURN LANE OR CENTER MEDIAN OPERATIONS**

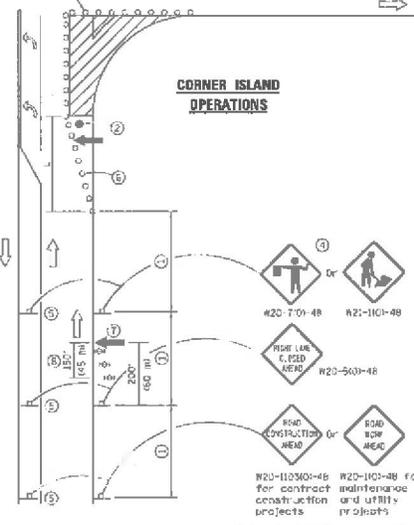
- ① Refer to SIGN SPACING TABLE for distance.
- ② Required for speed > 40 mph.
- ③ Cones at 25' (8 m) centers for 250' (75 m). Additional cones may be placed at 50' (15 m) centers. When drums or Type I or Type II barricades are used, the interval between devices may be doubled.
- ④ Use flagger sign only when flagger is present.
- ⑤ Omit this sign when median is less than 10' (3 m) or for bi-directional turn lanes.
- ⑥ Cones, drums or barricades at 20' (6 m) centers in taper.
- ⑦ Advanced arrow board required for speeds > 45 mph.
- ⑧ Three Type II barricades, drums or vertical barricades at 50' (15 m) centers.

**SYMBOLS**

- Work area
- Cone, drum or barricade
- Sign on portable or permanent support
- Arrow board
- Barricade or drum with flashing light
- Flagger with traffic control sign

SIGN SPACING	
Posted Speed	Sign Spacing
35	500' (150 m)
50-55	300' (90 m)
65	200' (60 m)

**CORNER ISLAND OPERATIONS**



DATE	REVISIONS
4-1-16	Corrected sign number for LEFT TURN LANE CLOSED AHEAD.
1-1-14	Added device at arrow board upstream from taper. Rev. workers sign number.

**GENERAL NOTES**

This standard is used where at any time, day or night, any vehicle, equipment, workers or their activities encroach on the pavement during shoulder operations or where construction requires lane closures in an urban area.

Calculate L as follows:

<b>SPEED LIMIT</b>	<b>FORMULAS</b>
40 mph (70 km/h) or less:	English: $L = \frac{WS^2}{65}$ Metric: $L = \frac{WS^2}{150}$
45 mph (80 km/h) or greater:	English: $L = WS^2$ Metric: $L = 0.65W^2S$

W = Width of offset in feet/meters.  
S = Normal posted speed mph/km/h.

All dimensions are in inches/millimeters unless otherwise shown.

Illinois Department of Transportation

APPROVED: *[Signature]* DATE: 2/16/2016

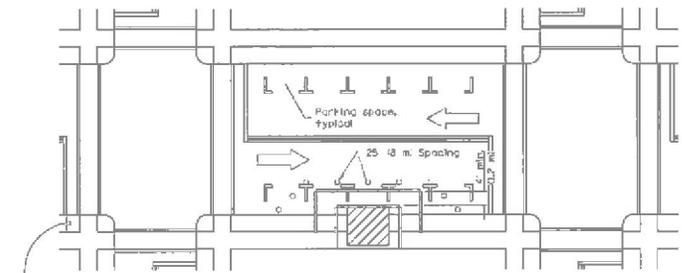
DESIGNER OF SAFETY: *[Signature]*

APPROVED: *[Signature]* DATE: 2/16/2016

REGISTERED PROFESSIONAL ENGINEER

**URBAN LANE CLOSURE, MULTILANE INTERSECTION**

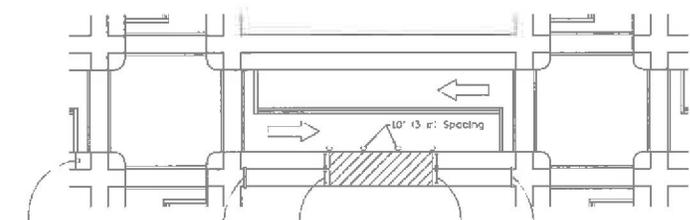
STANDARD 701701-30



① ROAD CONSTRUCTION AHEAD  
 #20-110301-48 for contract construction projects

Or  
 ① ROAD AHEAD  
 #20-2001-48 for maintenance and utility projects

**SIDEWALK DIVERSION**



① ROAD CONSTRUCTION AHEAD  
 #20-110301-48 for contract construction projects

Or  
 ① ROAD AHEAD  
 #20-2001-48 for maintenance and utility projects

SIDEWALK CLOSED  
 R11-1101-241B  
 R11-1102-2430

**SIDEWALK CLOSURE**

- SYMBOLS**
- Work area
  - Sign on portable or permanent support
  - Barricade or drum
  - Cone, drum or barricade
  - Type III barricade
  - Detectable pedestrian channelizing barricade

① Call whenever duplicated by road work traffic control.

**GENERAL NOTES**

This Standard is used where, at any time, pedestrian traffic must be rerouted due to work being performed.

This Standard must be used in conjunction with other Traffic Control & Protection Standards when roadway traffic is affected.

Temporary facilities shall be detectable and accessible.

The temporary pedestrian facilities shall be provided on the same date of the closed facilities whenever possible.

The SIGNALS TO GO/STOP USE OTHER SIDE sign shall be placed at the nearest crosswalk or intersection to each end of the closure. Where the closure occurs at a corner, the signs shall be erected at the corners across the street from the closure. The SIDEWALK CLOSED signs shall be used at the ends of the actual closure.

Type III barricades and R11-2-4830 signs shall be positioned as shown in ROAD CLOSED TO ALL TRAFFIC detail on Standard 701501.

All dimensions are in inches (millimeter) unless otherwise shown.

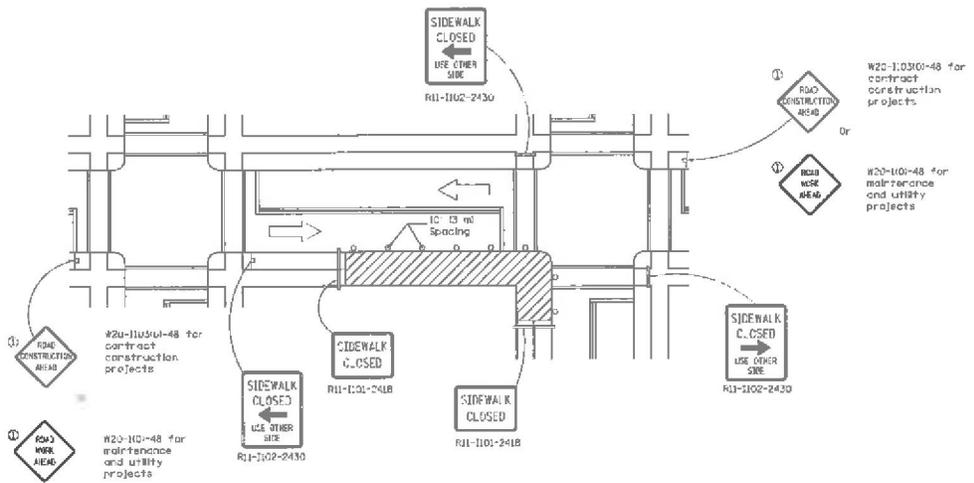
Illinois Department of Transportation  
 Approved: [Signature] April 1, 2015  
 ENGINEER OF SAFETY ENGINEERING  
 APPROVED: [Signature] April 1, 2015  
 PROJECT NO. 01502 AND 0150301-01

DATE	REVISIONS
4-1-16	Omitted orange safety fence from standard as this is covered in the std. spec.
1-1-12	Added SIDEWALK DIVERSION.
	Modified appearance of plan views, Revised Std.

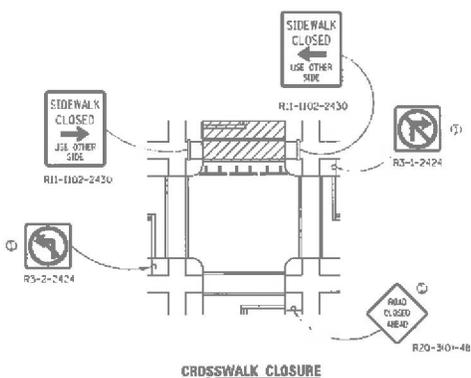
**SIDEWALK, CORNER OR CROSSWALK CLOSURE**

(Sheet 1 of 2)

STANDARD 701801-06



**CORNER CLOSURE**



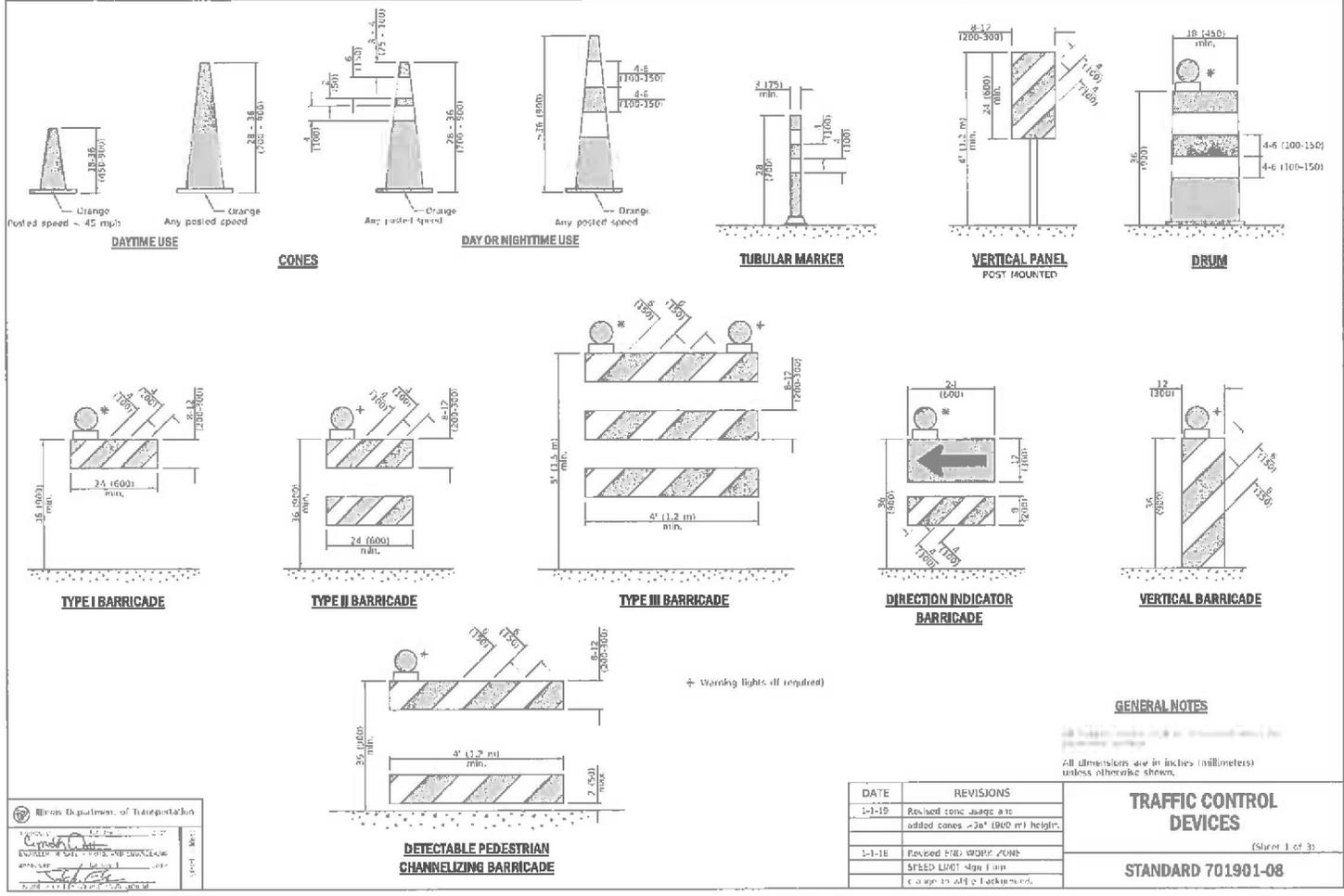
**CROSSWALK CLOSURE**

**SIDEWALK, CORNER OR CROSSWALK CLOSURE**

(Sheet 2 of 2)

STANDARD 701801-06

Illinois Department of Transportation	
APPROVED	April 1, 2006
ENGINEER OF SAFETY ENGINEERING	
REVIEWED	April 1, 2006
ENGINEER OF DESIGN AND ENVIRONMENT	



**GENERAL NOTES**

All heights, widths, and diameters are in inches (millimeters) unless otherwise shown.

DATE	REVISIONS
1-1-15	Revised cone usage as added cones - 36" (914 mm) height.
1-1-16	Revised 5' (1.524 m) HIGH, 2' (600 mm) SPEED LIMIT sign from 18" to 24" (457 mm to 609 mm).

**TRAFFIC CONTROL DEVICES**

(Sheet 1 of 3)

**STANDARD 701901-08**

Illinois Department of Transportation

Project: *12-10*

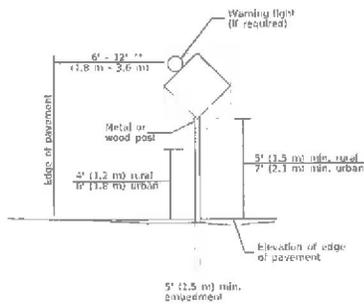
Contract: *12-10*

Drawn: *[Signature]*

Checked: *[Signature]*

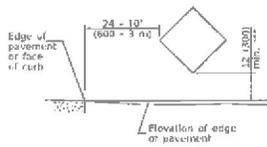
Approved: *[Signature]*

Date: *12-10-15*



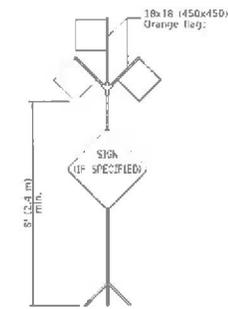
**POST MOUNTED SIGNS**

When curb or paved shoulder are present the dimensions shall be 24 (600) to the face of curb or 6' (1.8 m) to the outside edge of the paved shoulder.



**SIGNS ON TEMPORARY SUPPORTS**

\*\*\* When work operations exceed four days, this dimension shall be 5' (1.5 m) min. If located behind other devices, the height shall be sufficient to be seen completely above the devices.



**HIGH LEVEL WARNING DEVICE**

<b>ROAD CONSTRUCTION NEXT X MILES</b>	<b>END CONSTRUCTION</b>
G20-1104(0)-6036	G20-1105(0)-6024

This signing is required for all projects 2 miles (3200 m) or more in length.  
 ROAD CONSTRUCTION NEXT X MILES sign shall be placed 500' (150 m) in advance of project limits.  
 END CONSTRUCTION sign shall be erected at the end of the job unless another job is within 2 miles (3200 m).  
 Dual sign displays shall be utilized on multi-lane highways.

**WORK LIMIT SIGNING**

<b>WORK ZONE</b>	W2-1105(0)-3610
<b>SPEED LIMIT XX</b>	R2-1-3640
<b>PHOTO ENFORCED</b>	R16-1108(0)-3618 ***
<b>5000 FINE MINIMUM</b>	R7-1106(0)-3618

Sign assembly as shown on standards or as allowed by District Operations.

<b>END WORK ZONE SPEED LIMIT</b>	G20-1103-6036
----------------------------------	---------------

This sign shall be used when the above sign assembly is used.

**HIGHWAY CONSTRUCTION SPEED ZONE SIGNS**

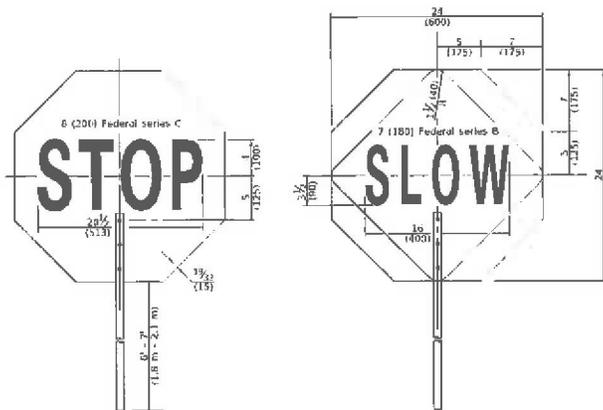
\*\*\* R10-1108p shall only be used along roadways under the jurisdiction of the State.



W12-1103-4048

**WIDTH RESTRICTION SIGN**

XX'-XX\"/>



FRONT SIDE

REVERSE SIDE

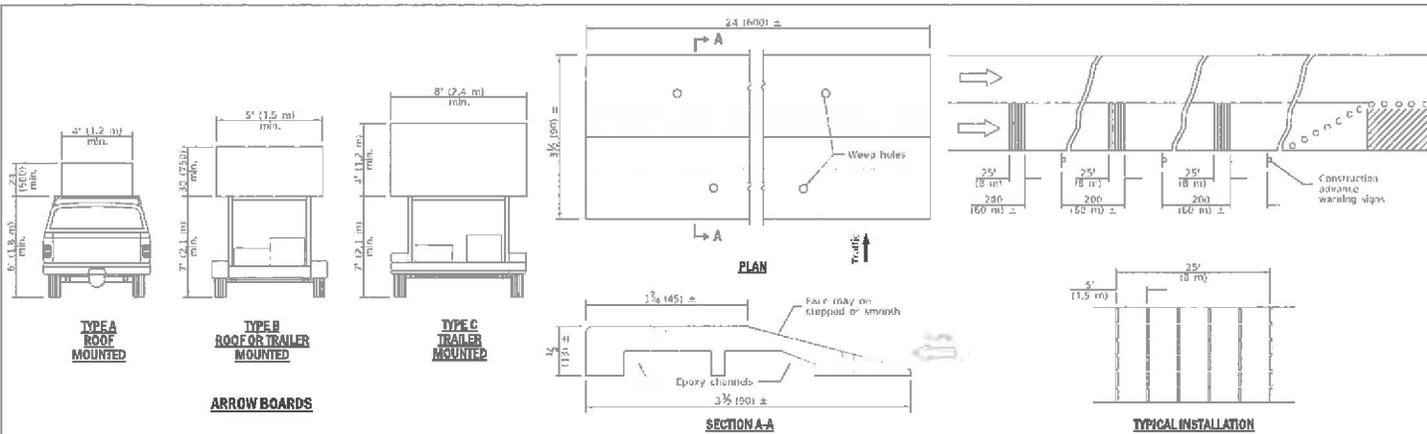
**FLAGGER TRAFFIC CONTROL SIGN**

Illinois Department of Transportation  
 Approved by: [Signature]  
 Date: [Date]  
 Project: [Project Name]

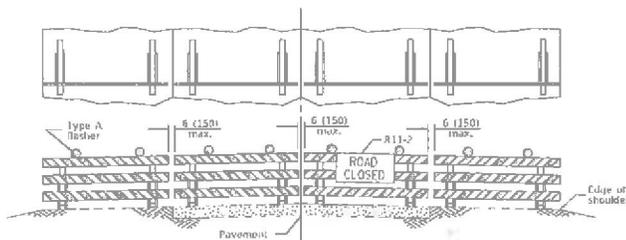
**TRAFFIC CONTROL DEVICES**

(Sheet 2 of 3)

**STANDARD 701901-08**

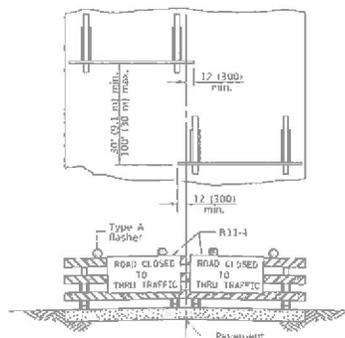


**TEMPORARY RUMBLE STRIPS**



ROAD CLOSED TO ALL TRAFFIC

ReflectORIZED striping may be omitted on the back side of the barricades. If a Type III barricade with an attached sign panel which meets NCHRP 350 is not available, the sign may be mounted on an NCHRP 350 temporary sign supports directly in front of the barricade.



ROAD CLOSED TO THRU TRAFFIC

ReflectORIZED striping shall appear on both sides of the barricades. If a Type III barricade with an attached sign panel which meets NCHRP 350 is not available, the signs may be mounted on NCHRP 350 temporary sign supports directly in front of the barricade.

Illinois Department of Transportation

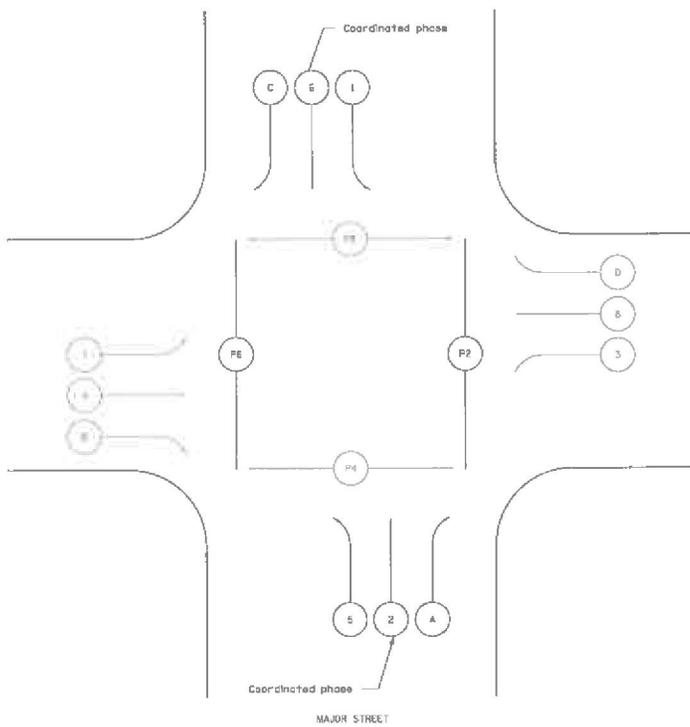
DESIGNER: [Signature]  
 CHECKED: [Signature]  
 DATE: 10/11/11

**TYPICAL APPLICATIONS OF TYPE III BARRICADES CLOSING A ROAD**

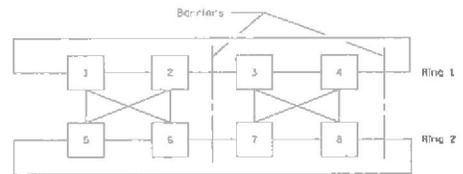
**TRAFFIC CONTROL DEVICES**

STANDARD 701901-08

(Sheet 3 of 3)



**STANDARD PHASE DESIGNATION DIAGRAM (NEMA)**



**NEMA EIGHT PHASE DUAL RING  
ACTUATED CONFIGURATION**

**LEGEND**

- (X), [X] Vehicular phase no. X
- (P) Pedestrian phase no. X
- (A), (B), (C), (D) Right turn overlap where:
  - (A) = 2 + 5
  - (B) = 4 + 5
  - (C) = 6 + 7
  - (D) = 8 + 1

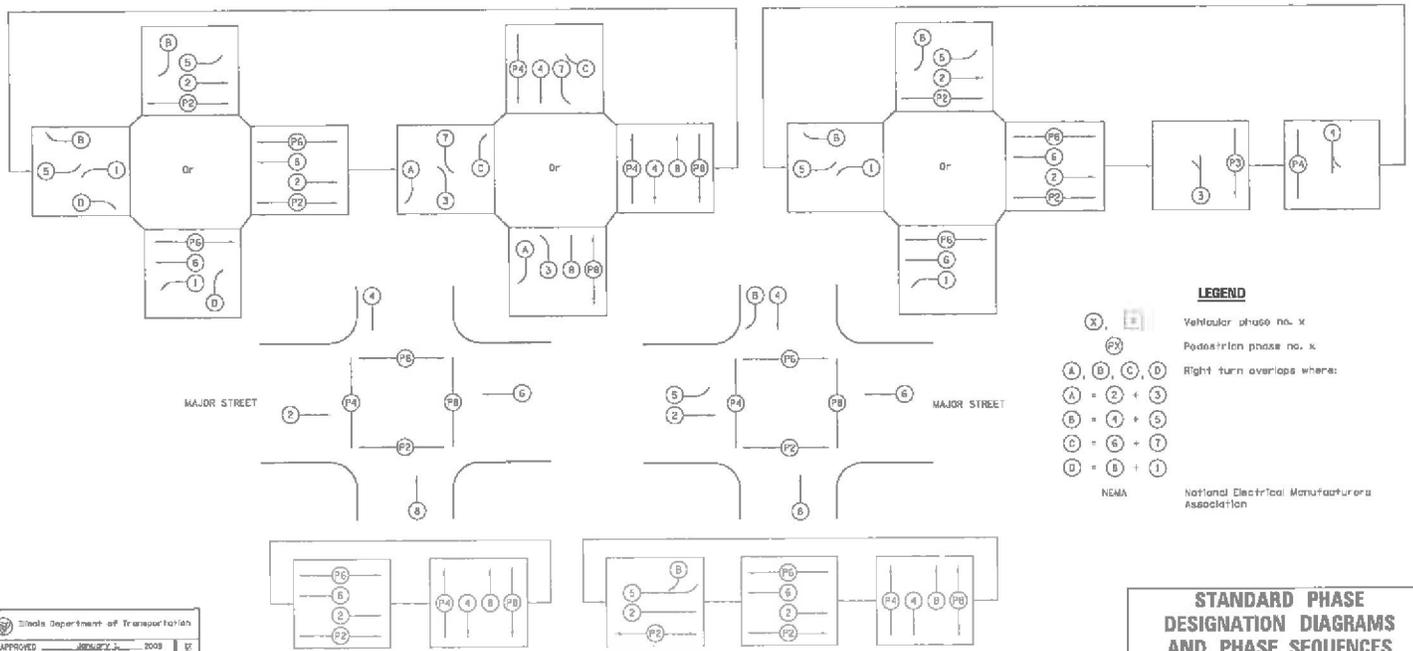
NEMA National Electrical Manufacturers Association

Illinois Department of Transportation  
 APPROVED January 1, 2009  
 ENGINEER OF OPERATIONS  
 APPROVED January 1, 2008  
 ENGINEER OF DESIGN AND ENVIRONMENT

DATE	REVISIONS
1-1-09	Clarified note regarding units of length.
1-1-97	Revised Standard 2393-2.

**STANDARD PHASE  
DESIGNATION DIAGRAMS  
AND PHASE SEQUENCES**  
(Sheet 1 of 2)

STANDARD 857001-01



**LEGEND**

(X) Vehicle phase no. x  
 (PY) Pedestrian phase no. x

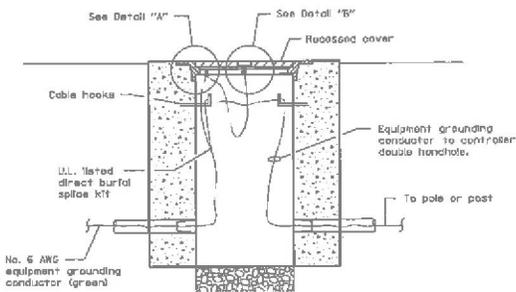
Right turn overlaps where:  
 A = 2 + 3  
 B = 4 + 5  
 C = 6 + 7  
 D = 8 + 1

NEMA National Electrical Manufacturers Association

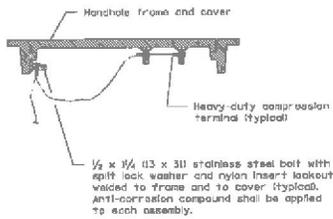
Illinois Department of Transportation  
 APPROVED [Signature] 2003  
 ENGINEER OF OPERATIONS  
 APPROVED [Signature] 2003  
 INSPECTOR OF DESIGN AND CONSTRUCTION

**PHASE DESIGNATION DIAGRAMS AND CORRESPONDING PHASE SEQUENCES**

**STANDARD PHASE DESIGNATION DIAGRAMS AND PHASE SEQUENCES**  
 Sheet 2 of 21  
 STANDARD 857001-01



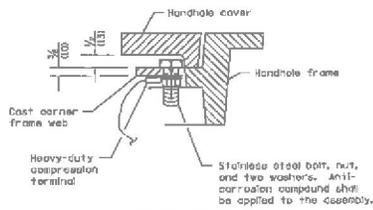
**BONDING A HANDHOLE COVER & FRAME**



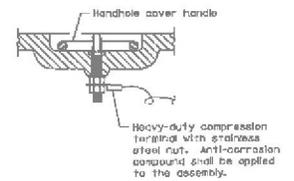
**BONDING AN EXISTING HANDHOLE COVER & FRAME**



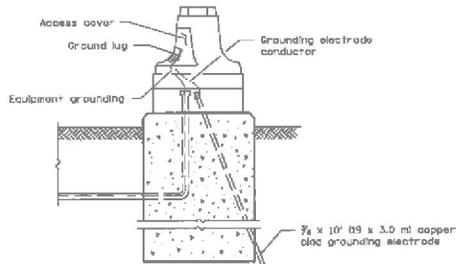
**HEAVY-DUTY COMPRESSION TERMINAL**



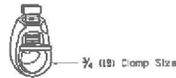
**DETAIL "A"**



**DETAIL "B"**



**GROUNDING A MAST ARM POLEPOST**



**HEAVY-DUTY GROUND ROD CLAMP**

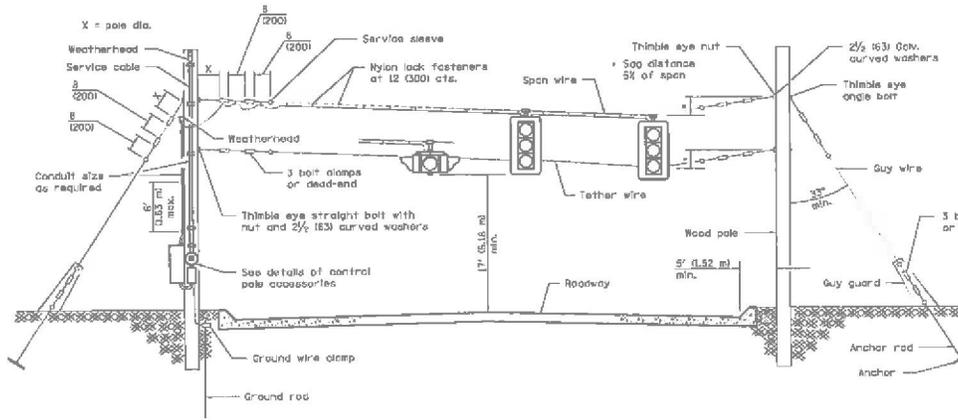
All dimensions are in inches (millimeter) unless otherwise shown.

Illinois Department of Transportation	
APPROVED	January 3, 2003
DIRECTOR OF OPERATIONS	
APPROVED	January 3, 2003
MANAGER OF TRAFFIC AND EQUIPMENT	

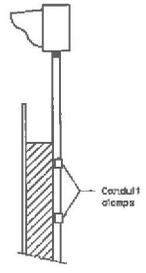
DATE	REVISIONS
1-1-09	Switched units to English metric.
1-1-07	Revised terminology.

**TRAFFIC SIGNAL GROUNDING & BONDING**

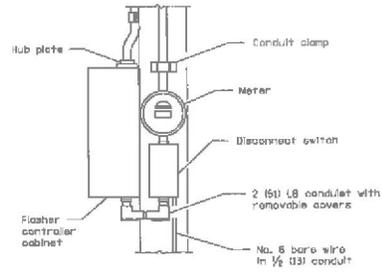
STANDARD 873001-02



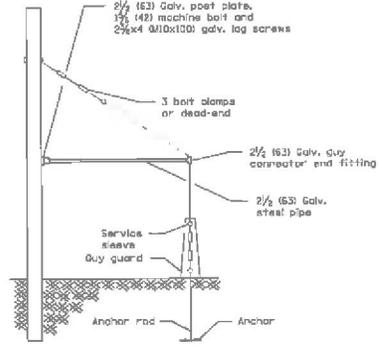
**SPAN WIRE MOUNTED SIGNALS AND FLASHING BEACON**



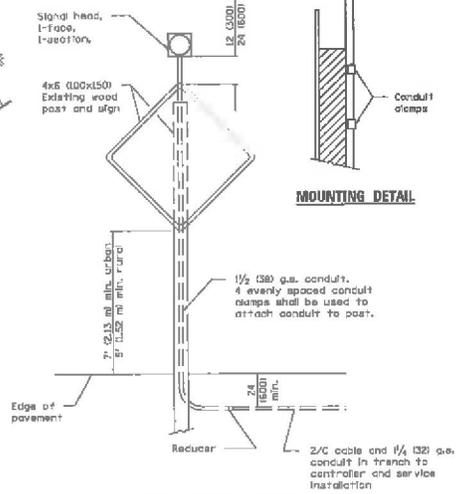
**MOUNTING DETAIL**



**CONTROL POLE DETAIL**



**SIDEWALK GUY DETAIL**



**POST MOUNTED FLASHING BEACON**

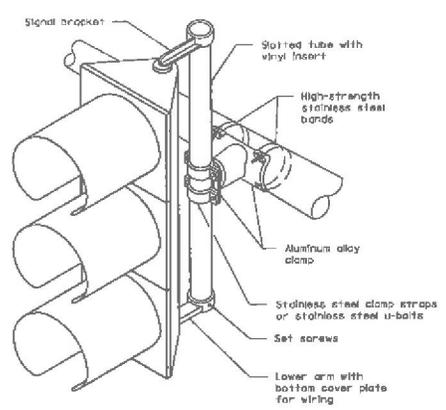
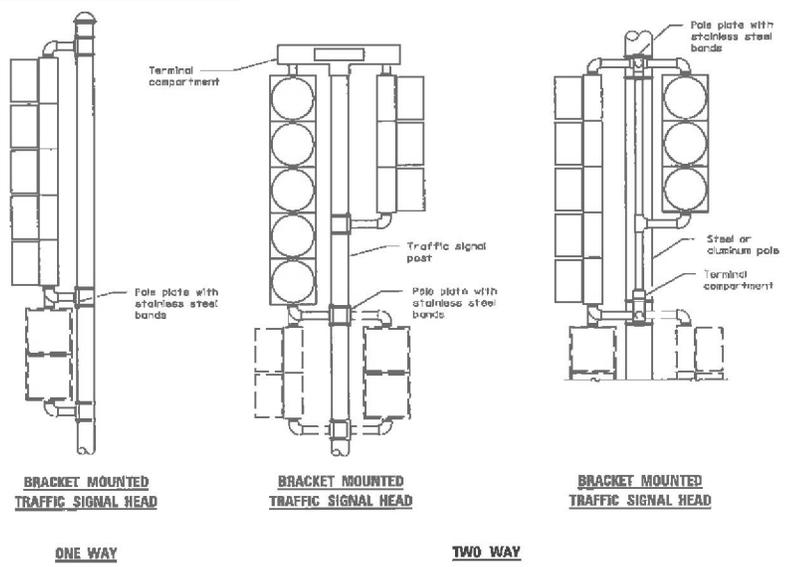
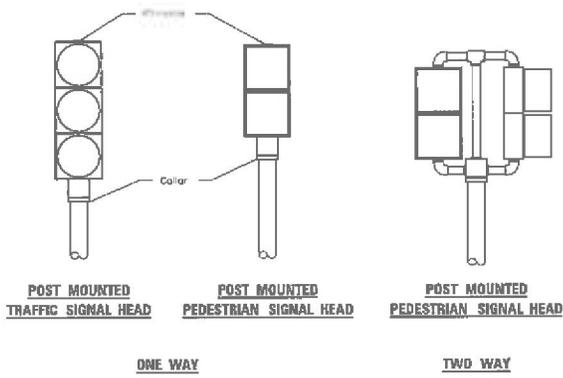
All dimensions are in inches (millimeters) unless otherwise shown.

State Department of Transportation  
 APPROVED: [Signature] 2001  
 ENGINEER OF OPERATIONS  
 APPROVED: [Signature] 2001  
 REGISTERED PROFESSIONAL ENGINEER

DATE	REVISIONS
1-1-05	Switched units to English metric.
1-1-02	Revised Standard #40001.

**SPAN WIRE MOUNTED SIGNALS AND FLASHING BEACON INSTALLATION**

STANDARD 880001-01



Illinois Department of Transportation

APPROVED *[Signature]* January 1, 2009

SECTION OF OPERATIONS

APPROVED *[Signature]* January 1, 2009

OFFICE OF DESIGN AND ENVIRONMENT

ED-11 (REVISED)

DATE	REVISIONS
1-1-09	Omitted note regarding units of length.
1-1-02	Revised Standard 840006.

**TRAFFIC SIGNAL MOUNTING DETAILS**

STANDARD 880006-01

**SUMMARY OF QUANTITIES**

ITEM DESCRIPTION	UNIT	CELMER RD @ FRENCH CENTER RD	TOTAL
TRAFFIC CONTROL AND PROTECTION, STANDARD T0101	L. S&M	1	1
UNDERGROUND CONDUIT, GALVANNEZ STEEL, 2" DIA.	FOOT	20	20
ELECTRIC CABLE IN CONDUIT, SIGNAL NO. 14 SE	FOOT	278	278
ELECTRIC CABLE IN CONDUIT, SIGNAL NO. 14 TE	FOOT	660	660
DRILL EXISTING MANHOLE	EACH	1	1
SIGNAL HEAD, LED, 1-FACE, 3-SECTION, BRACKET MOUNTED	EACH	1	1
SIGNAL HEAD, LED, 1-FACE, 3-SECTION, BRACKET MOUNTED	EACH	2	2
SIGNAL HEAD, LED, 1-FACE, 3-SECTION, MAST-ARM MOUNTED	EACH	2	2
TRAFFIC SIGNAL BACKPLATE, CONVEKSA, TORNED PLASTIC	EACH	2	2
LIGHT OBSCURTA	EACH	1	1
TEMPORARY TRAFFIC SIGNAL INSTALLATION	EACH	1	1
MODIFY EXISTING CONTROLLER	EACH	1	1
MODIFY EXISTING CONTROLLER CABINET	EACH	1	1
REMOVE ELECTRIC CABLE FROM CABINET	FOOT	1599	1599
REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT	EACH	1	1
VIDEO DETECTION SYSTEM COMPLETE INTERSECTION	EACH	1	1
PC-OPTIMIZE TRAFFIC SIGNAL SYSTEM LEVEL 3	EACH	1	1
TEMPORARY TRAFFIC SIGNAL TIMING	EACH	1	1

**JDOT STANDARD DRAWINGS**

DWG. NO.	DESCRIPTION
701701-3D	URBAN LANE CLOSURE, MULTILANE INTERSECTION
701801-06	SIDEWALK, CORNER OR CROSSWALK CLOSURE
701901-06	TRAFFIC CONTROL DEVICES
857001-D1	STANDARD PHASE DESIGNATION DIAGRAMS AND PHASE SEQUENCES
873001-02	TRAFFIC SIGNAL GROUNDING & BONDING
880001-D1	SPAN WIRE MOUNTED SIGNALS AND FLASHING BEACON INSTALLATION
880006-D1	TRAFFIC SIGNAL MOUNTING DETAILS

**GENERAL NOTES**

- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS AND CONDITIONS EXISTING IN THE FIELD PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION. THIS SHALL INCLUDE LOCATING THE MAST ARM FOUNDATIONS AND VERIFYING THE MAST ARMS LENGTHS.
- THE EXACT LOCATION OF ALL UTILITIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR BEFORE ORDERING ANY MATERIALS AND STARTING ANY WORK. FOR LOCATIONS OF UTILITIES, LOCALLY OWNED EQUIPMENT, LEASED ENFORCEMENT CAMERA SYSTEM FACILITIES AND JDOT UNDERGROUND FACILITIES, CONTACT THE COUNTY AND CITY FOR LOCATES. THE CONTRACTOR SHALL CALL "8.8.18" AT (800) 892-0123 OR 811.
- THE CONTRACTOR SHALL CHECK THE PROPOSED TRAFFIC SIGNAL EQUIPMENT LOCATIONS FOR OVERHEAD UTILITY CONFLICTS. THE CONTRACTOR SHALL COORDINATE ANY CONFLICTS WITH THE UTILITY COMPANIES AND THE RESIDENT ENGINEER BEFORE ORDERING MATERIALS.
- THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH UTILITY COMPANIES AND LOCAL GOVERNMENT AGENCIES.



FULL SIZE PLANS HAVE BEEN PREPARED USING STANDARD ENGINEERING SCALES. REDUCED SIZE PLANS WILL NOT CONFORM TO STANDARD SCALES. IN MAKING MEASUREMENTS ON REDUCED PLANS, THE ABOVE SCALES MAY BE USED.



*Dann M. Schwabell*  
 ENGINEER  
 DANN M. SCHWABEL  
 ILLINOIS REGISTRATION NO. 002-054045  
 EXPIRATION DATE 11-30-2023  
 PROFESSIONAL DESIGN FIRM NO. 184-001747  
 APPLIES TO SHEETS TS-1 TO TS-10

**48 - HOURS BEFORE DIGGING**

TS SHT NO. 1

<table border="1"> <tr> <td>DATE</td> <td>REVISION</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	DATE	REVISION							<table border="1"> <tr> <td>DESIGNED BY</td> <td> </td> </tr> <tr> <td>CHECKED BY</td> <td> </td> </tr> <tr> <td>DATE</td> <td>03/28/2022</td> </tr> </table>	DESIGNED BY		CHECKED BY		DATE	03/28/2022		80% West Michigan Blvd., Suite 400 Grand Rapids, MI 49508 PC-8478 24-99999 P1 04/11 010-0000	PROJECT # 24111	SCALE: SHEET 01 OF 02	SUMMARY OF QUANTITIES STA. TO STA.	<table border="1"> <tr> <td>SECTION</td> <td>COUNT</td> <td>SHEET NO.</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	SECTION	COUNT	SHEET NO.			
DATE	REVISION																										
DESIGNED BY																											
CHECKED BY																											
DATE	03/28/2022																										
SECTION	COUNT	SHEET NO.																									

## TRAFFIC SIGNAL LEGEND

(NOT TO SCALE)

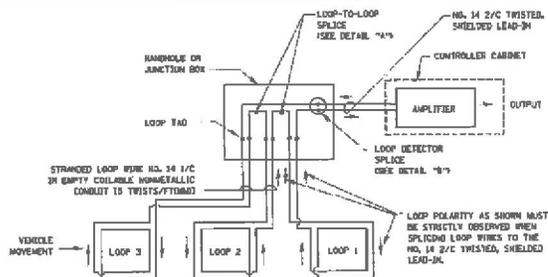
ITEM	EXISTING	PROPOSED	ITEM	EXISTING	PROPOSED	ITEM	EXISTING	PROPOSED
CONTROLLER CABINET			HANDHOLE			SIGNAL HEAD		
COMMUNICATION CABINET			-SQUARE			-PI PROGRAMMABLE SIGNAL HEAD		
MASTER CONTROLLER			-ROUND					
MASTER MASTER CONTROLLER			HEAVY DUTY HANDHOLE			SIGNAL HEAD WITH BACKPLATE		
UNINTERRUPTIBLE POWER SUPPLY			-SQUARE			-PP PROGRAMMABLE SIGNAL HEAD		
SERVICE INSTALLATION			-ROUND			-RB RETROREFLECTIVE BACKPLATE		
-PI POLE MOUNTED			DOUBLE HANDHOLE					
SERVICE INSTALLATION			JUNCTION BOX			SIGNAL HEAD WITH BACKPLATE		
-CG GROUND MOUNTED			RAILROAD CANTILEVER MAST ARM			-PP PROGRAMMABLE SIGNAL HEAD		
-GM GROUND MOUNTED METERED			RAILROAD FLASHING SIGNAL			-RB RETROREFLECTIVE BACKPLATE		
TELEPHONE CONNECTION			RAILROAD CROSSING GATE					
STEEL MAST ARM ASSEMBLY AND POLE			RAILROAD CROSSBUCK			PEDESTRIAN SIGNAL HEAD		
ALUMINUM MAST ARM ASSEMBLY AND POLE			RAILROAD CONTROLLED CABINETS			AT RAILROAD INTERSECTIONS		
STEEL COMBINATION MAST ARM ASSEMBLY AND POLE WITH LUMINAIRE			UNDERGROUND CONDUIT PVC GALVANIZED STEEL			PEDESTRIAN SIGNAL HEAD WITH COUNTDOWN TIMER		
SIGNAL POST			TEMPORARY SPIN WIRE, TETHER WIRE, AND CABLE			ILLUMINATED SIGN "NO LEFT TURN"/"NO RIGHT TURN"		
-DM BARREL MOUNTED - TEMPORARY			SYSTEM ITEM			NUMBER OF CONDUCTORS, ELECTRIC CABLE NO. 14, UNLESS NOTED OTHERWISE, ALL DETECTOR LOOP CABLE TO BE SHIELDED		
WOOD POLE			INTERSECTION ITEM			GROUND CABLE IN CONDUIT, NO. 6 SOLID COPPER STRIPE		
GLTY WIRE			REMOVE ITEM			ELECTRIC CABLE IN CONDUIT, TRACER NO. 14 3/C		
SIGNAL HEAD			RELOCATE ITEM			COAXIAL CABLE		
SIGNAL HEAD WITH BACKPLATE			ABANDON ITEM			VEHICLE CABLE		
SIGNAL HEAD OPTICALLY PROGRAMMED			CONTROLLER CABINET AND FOUNDATION TO BE REMOVED			COPPER INTERCONNECT CABLE, NO. 16, 3 PAIR TWISTED, SHIELDED		
FLASHER INSTALLATION			MAST ARM POLE AND FOUNDATION TO BE REMOVED			FIBER OPTIC CABLE		
-FS SOLAR POWERED			SIGNAL POST AND FOUNDATION TO BE REMOVED			-NO, 800/125, MANDY		
			DETECTOR LOOP, TYPE I			-NO, 820/125, MANDY SHIRT		
PEDESTRIAN SIGNAL HEAD			PERFORMED DETECTOR LOOP			-NO, 820/125, MANDY SHIRT		
PEDESTRIAN PUSH BUTTON			SAMPLING SYSTEM DETECTOR			GROUND ROD		
-APS ACCESSIBLE PEDESTRIAN PUSH BUTTON			INTERSECTION AND SAMPLING SYSTEM DETECTOR			-CI CONTROLLER		
RADAR DETECTION SENSOR			DETECT AND SAMPLING SYSTEM DETECTOR			-NO MAST ARM		
VIDEO DETECTION CAMERA			WIRELESS DETECTOR SENSOR			-PI POST		
RADAR/VIDEO DETECTION ZONE			WIRELESS ACCESS POINT			-SI SERVICE		
PAN, TILT, ZOOM (PTZ) CAMERA								
EMERGENCY VEHICLE LIGHT DETECTOR								
COMPARATION BEACON								
WIRELESS INTERCONNECT								
WIRELESS INTERCONNECT RADIO REPEATER								

TS SMT NO. 2

DATE: 01/15/2018 DRAWN: J.P. CHECKED: J.P. DATE: 01/15/2018	REVISIONS: 01 REVISIONS: 02 REVISIONS: 03	<b>STATE OF ILLINOIS</b> <b>DEPARTMENT OF TRANSPORTATION</b>	<b>DISTRICT ONE</b> <b>STANDARD TRAFFIC SIGNAL DESIGN DETAILS</b>	SHEET NO. 10 OF 21 SHEETS TOTAL	SECTION 10 COUNTY 10 LANE 10-10 CONTRACT NO. 10-10-10
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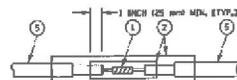
**LOOP DETECTOR NOTES**

- EACH PAIR OF LOOP WIRES SHALL BE PLACED IN A SEPARATE EMPTY COILABLE NONMETALLIC CONDUIT FROM THE EDGE OF PAVEMENT TO THE HANDHOLE. SPACING BETWEEN THE HOLES DRILLED IN THE PAVEMENT SHALL NOT BE LESS THAN 6" (150 mm). EMPTY COILABLE NONMETALLIC CONDUIT SHALL BE INCLUDED IN THE COST OF THE LOOP WIRE.
- THE NUMBER OF LOOP TURNS SHALL BE AS RECOMMENDED BY THE AMPLIFIER MANUFACTURER. ALL ADJACENT SIDES OF THE LOOPS SHALL BE INSTALLED IN SUCH A WAY THAT THE CURRENT FLOW IS IN THE SAME DIRECTION TO REINFORCE ITS MAGNETIC FIELDS FOR SMALL VEHICLE DETECTION.
- EACH LOOP LEAD-IN SHALL BE IDENTIFIED AND PERMANENTLY TAGGED IN THE HANDHOLE. EACH LEAD-IN CABLE TAG SHALL INDICATE THE LOCATION OF THE LOOP, LOOP ROTATION (CLOCKWISE/COUNTERCLOCKWISE), LOOP LEAD-IN DIRECTION (IN OR OUT), LOOP CABLE NUMBER AND LOCATION IN CABINET, AND NUMBER OF TURNS IN THE DETECTOR LOOPS IN WATER PROOF INK AS INDICATED ON THE DISTRICT I STANDARD TRAFFIC SIGNAL DESIGN DETAIL. THE CONTRACTOR SHALL MARK LOOP LOCATIONS ON RECORD DRAWINGS AND PRESENT TO THE ENGINEER AFTER FINAL INSPECTION. LOOPS SHALL BE MARKED BY LANE AND LOOP NUMBER. SEE DETAIL BELOW.
- ALL LOOP CABLE SHALL BE FASTENED WITH PLASTIC TIE WRAP TO THE HANDHOLE HOOKS.
- IN ASPHALT PAVEMENT, LOOPS SHOULD BE PLACED IN THE BINDER AND DIVERTIBLES MARKED AT THE CURB WITH A SAW-CUT. THE SAW-CUT SHALL BE CUT IN ACCORDANCE WITH LOCAL AND E.P.A. DUST CONTROL REQUIREMENTS. DETECTOR LOOPS SHALL NOT BE INSTALLED IN WET CONDITIONS AND THE SAW-CUTS MUST BE FREE OF DEBRIS AND RESIDUE SUCH AS DUST AND WATER WHICH IS TO BE ACHIEVED BY THE USE OF COMPRESSED AIR, WIRE BRUSHING AND HEAT DRYING ACCORDING TO SEALANT MANUFACTURER REQUIREMENTS. THE DETECTOR WIRE SHALL BE HELD IN PLACE BY THE USE OF FORM WEDGES. WEDGES SHALL BE SPACED NO MORE THAN 18" (450 mm) APART.
- LOOP SPLICES SHALL BE SOLDERED USING A SOLDERING IRON, BLOW TORCHES OR OTHER DEVICES WHICH OXIDIZE COPPER CABLE SHALL NOT BE ALLOWED FOR SOLDERING OPERATIONS. SEE DETAIL BELOW RIGHT.
- PREFORMED DETECTOR LOOPS SHALL BE USED, AS SHOWN ON THE PLANS, WHERE NEW CONCRETE PAVEMENT IS PROPOSED. THE INSTALLATION OF PREFORMED LOOPS SHALL BE IN ACCORDANCE WITH THE DISTRICT I SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

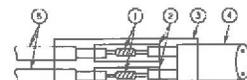


**DETECTOR LOOP WIRING SCHEMATIC**

- LOOPS SHALL BE SPLICED IN SERIES.
- SAW-CUTS SHALL BE A MINIMUM WIDTH OF 5/16" IS MIN.
- SAW-CUT DEPTHS SHALL BE 3" (75 mm) IF IN CONCRETE. THE SAW-CUT DEPTH SHALL BE TO THE TOP OF THE REINFORCEMENT.
- LOOP CORNERS SHALL BE DRILLED WITH A 2" (50 mm) DIAMETER CORE.

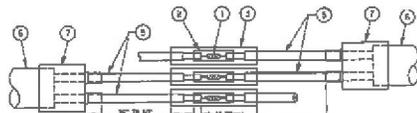


DETAIL "A"  
LOOP-TO-LOOP SPLICE

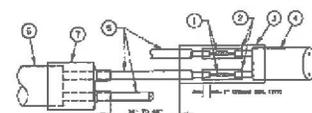


DETAIL "B"  
LOOP-TO-CONTROLLER SPLICE

**TYPE I LOOP**



DETAIL "A"  
LOOP-TO-LOOP SPLICE

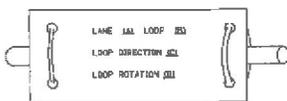


DETAIL "B"  
LOOP-TO-CONTROLLER SPLICE

**LOOP DETECTOR SPLICE**

- WESTERN UNION SPLICE SOLDERED WITH ROSIN CORE FLUX. ALL EXPOSED SURFACES OF THE SOLDER SHALL BE SMOOTH. THE WESTERN UNION SPLICES SHALL BE STAGGERED.
- WESTERN 30/100 HEAT SHRINK TUBE, MINIMUM LENGTH 3" (75 mm), UNDERWATER GRADE.
- WCS 200/250 HEAT SHRINK TUBE, MINIMUM LENGTH 6" (150 mm), UNDERWATER GRADE.
- NO. 14 2/C TWISTED, SHIELDED CABLE.
- LOOP CONDUCTOR WITH FLEXIBLE PLASTIC TUBING.
- PRE-FORMED LOOP.
- 16 POLYURETHAN 2 CONDUCTOR BREAKOUT SEAL, TYCO CORP-2 OR APPROVED EQUAL.

**LOOP LEAD-IN CABLE TAG**

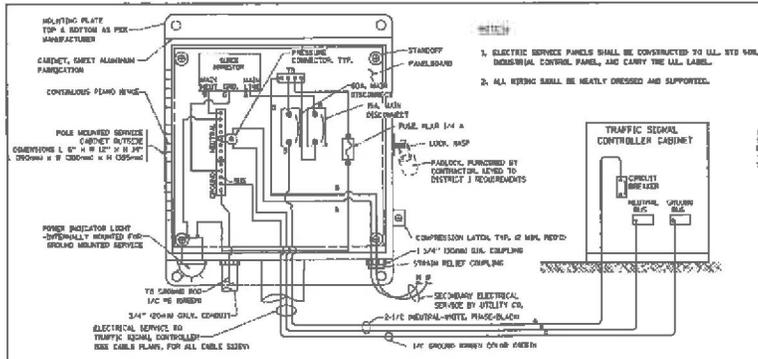


- LANE 1 IS THE LANE CLOSEST TO THE CENTERLINE OF THE ROADWAY
- LOOP 1 IS THE LOOP IN THE LANE CLOSEST TO THE INTERSECTION
- LABEL LOOP CABLE "IN" OR LOOP CABLE "OUT"
- LABEL LOOP CABLE CLOCKWISE OR LOOP CABLE COUNTERCLOCKWISE.

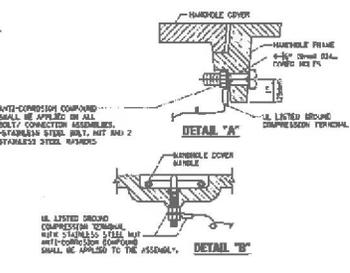
TS SMT NO. 3

PREPARED BY: [Name] CHECKED BY: [Name] DATE: 10-21-08	DESIGNED - DAB DRAWN - BCK CHECKED - DAG DATE - 10-21-08	REVISION - [None] REVISION - [None] REVISION - [None]	DISTRICT 003 STANDARD TRAFFIC SIGNAL DESIGN DETAIL	SHEET NO. 7 OF 7 SHEETS TOTAL	SECTION TS-45	COUNTY LAKE	CONTRACT NO. [Blank]
	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION			SCALE: NONE	COUNTY LAKE	CONTRACT NO. [Blank]	



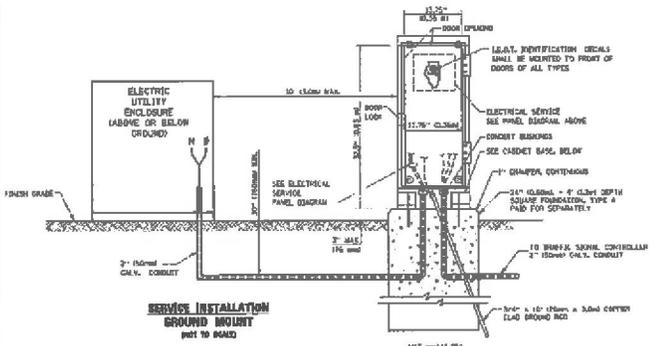


1. ELECTRIC SERVICE PANELS SHALL BE CONSTRUCTED TO ALL STD. SOL. INDUSTRIAL CONTROL PANELS, AND CARRY THE ALL LABELS.
2. ALL WIRING SHALL BE NEATLY DRESSED AND SUPPORTED.



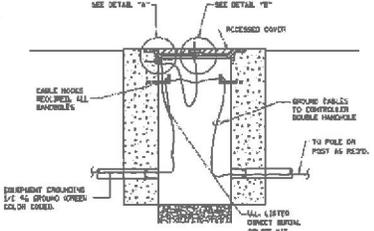
- NOTES**
- GROUNDING SYSTEM**
1. THE GROUNDING SYSTEM SHALL CONSIST OF AN INSULATED CONDUCTOR TYPE 30, NO. 4 A.W.G. STAINLESS STEEL COVER TO BE INSTALLED IN PARALLELS. THE GROUNDING CABLE SHALL BE INSTALLED BY A CONTRACTOR AS SHOWN ON THE CABLE PLAN PROVIDED. ALL GROUNDING CONDUCTORS SHALL BE BUNDLED TO METAL ENCLOSURE BARS/ROCK. POST, MAST ARM, CONTROLLER, ETC. GROUND ROD SHALL BE 3/4" DIA. x 10'-0" LONG x 3/4" DIA. LUMP. POWER DIAG. THE GROUND ROD SHALL BE INSTALLED AT ALL POST FOUNDATIONS. POLE FOUNDATIONS, CONTROLLER CABINET FOUNDATION AND ELECTRICAL SERVICE INSTALLATION AS INDICATED ON THE CABLE PLAN. IF THERE ARE ANY SPECIAL CONDITIONS SUCH AS SUB-SURFACE CONDITIONS OR INSTALLATION PROBLEMS, THE RESPECT ENGINEER SHALL BE NOTIFIED BY CONTACT THE BUREAU OF TRAFFIC, ILLINOIS DEPARTMENT OF TRANSPORTATION DISTRICT ONE AT (618) 262-6346.
  2. THE METAL CONDUCTOR AND THE GROUND CONDUCTOR SHALL BE CONNECTED BY THE SERVICE INSTALLATION. AT AN OTHER POINT BY THE TRAFFIC SIGNAL SYSTEM SHALL THE METAL AND GROUND CONDUCTORS BE CONNECTED.
  3. ALL EQUIPMENT GROUNDING CONDUCTORS SHALL TERMINATE AT THE GROUND BUS IN THE CONTROLLER CABINET.
  4. THE CONTRACTOR SHALL PROVIDE A GROUND CABLE WITH CONNECTIONS BETWEEN THE BARS/ROCK COVER AND BARS/ROCK FRAME.

**ELECTRICAL SERVICE - PANEL DIAGRAM TYPICAL FOR POLE AND GROUND MOUNTED SERVICE INSTALLATION POLE MOUNT (SHOWN)**  
SEE TO SCALE

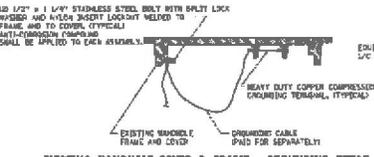


**SERVICE INSTALLATION GROUND MOUNT**  
SEE TO SCALE

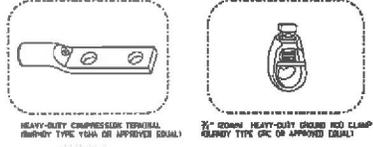
**CABINET - BASE BOLT PATTERN**  
SEE TO SCALE



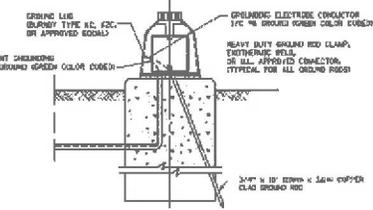
**HANDHOLE COVER & FRAME - GROUNDING DETAIL**  
SEE TO SCALE



**EXISTING HANDHOLE COVER & FRAME - GROUNDING DETAIL**  
SEE TO SCALE

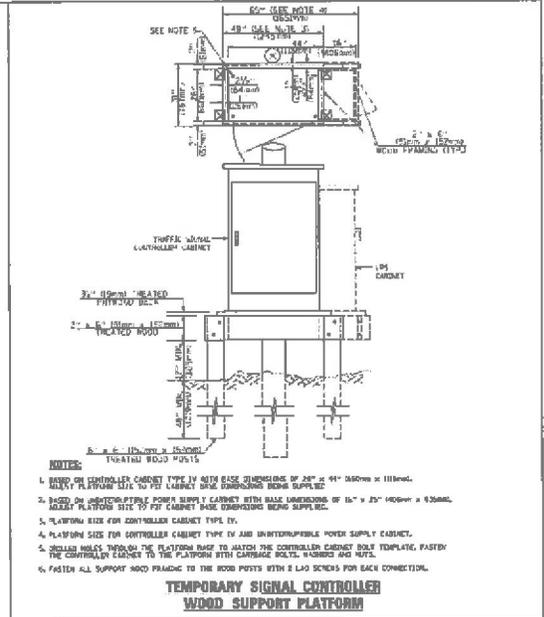
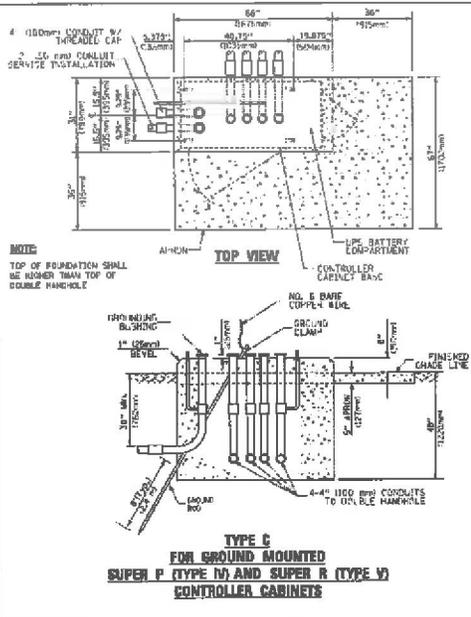
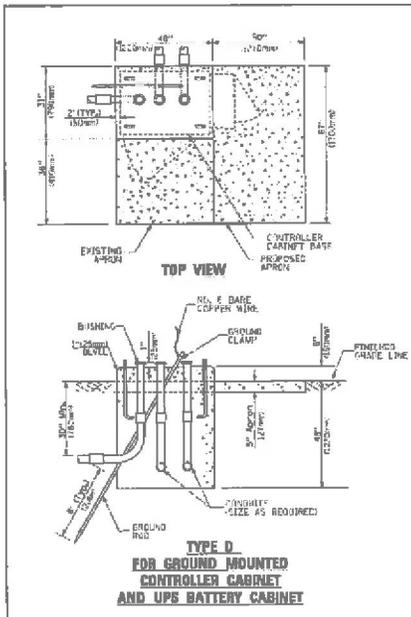


- \* ALL CLAMPS SHALL BE BRONZE OR COPPER OR APPROVED.
- \* GROUND CABLES SHALL BE LOOPED OVER EDGES OF THE HANDHOLES 1/2" CLEAR SPACE SHALL BE PROVIDED IN SINGLE HANDHOLES.
- \* 1/2" CLEAR SPACE SHALL BE PROVIDED IN DOUBLE HANDHOLES.
- \* 1" CLEAR SPACE SHALL BE PROVIDED BETWEEN FRAME AND COVER.



**MAST ARM POLE/POST-GROUNDING DETAIL**  
SEE TO SCALE

TS SHIT NO. 5	DESIGNED - DAB	CHECKED - DAB	DATE - 10-26-89	REVISIONS -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	DISTRICT ONE STANDARD TRAFFIC SIGNAL DESIGN DETAILS	SCALE NONE	SHEET NO. 4 OF 7	TRAFFIC SIGNAL	TO 684	SECTION	COUNT	NO. OF SHEETS	TOTAL SHEETS
	DATE - 10-26-89	REVISIONS -	CONTRACT NO.											
	DATE - 10-26-89	REVISIONS -	CONTRACT NO.											



CABLE SLACK LENGTH	FEET	METER
BRIDGE	6.5	2.0
BRIDGE BENCH	15.0	4.0
CONTROL POST	2.0	0.6
TRAIL	7.0	2.1
CONTROLLER CABINET	1.0	0.3
ELECTRIC SERVICE AT TRAINING OR SERVICE LOCATION	10.0	3.0
GROUND CABLE SIGNAL POST, MAST ARM CABINET	1.0	0.3
GROUND CABLE BETWEEN FRAME AND CORNER	5.0	1.5

**CABLE SLACK**

VERTICAL CABLE LENGTH	FEET	METER
MAST ARM POLE C MAST ARM MOUNTED SIGNAL HEAD (L = MAST ARM LENGTH - DISTANCE TO SIGNAL HEAD FROM END OF ARM)	20.0	6.0
HEIGHT OF MOUNTED POST AND POLE OF SIGNAL POLE	15.0	4.5
PRESTRIKED PUSH BUTTON	5.0	1.5
SERVICE INSTALLATION POLE HEIGHT TO SERVICE DROP	13.0	4.0
SERVICE INSTALLATION POLE HEIGHT TO GRADE	11.0	3.4
SERVICE INSTALLATION GRAUND MOUNT	5.0	1.5
PERMITATION SIGNAL POST, MAST ARM POLE, CONTROLLER CABINET, SERVICE-GROUND MOUNT	5.0	1.5

**VERTICAL CABLE LENGTH**

FOUNDATION	DEPTH
TYPE A - SIGNAL POST	4'-0" (1.2m)
TYPE C - CONTROLLER BY UPS	4'-0" (1.2m)
TYPE D - CONTROLLER	1'-0" (0.3m)
SERVICE INSTALLATION	1'-0" (0.3m)
GROUND MOUNT	1'-0" (0.3m)
TYPE A - SIGNAL	1'-0" (0.3m)

**DEPTH OF FOUNDATION**

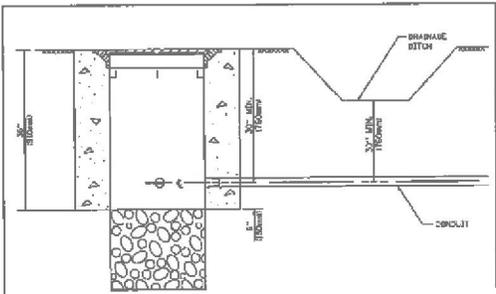
MAST ARM LENGTH	FOUNDATION DEPTH	FOUNDATION DIAMETER	SP. GRA. THICKNESS	QUANTITY OF BARS	SIZE OF BARS
Less than 30' (9.1 m)	30" (7.62 m)	30" (7.62 m)	24"	8	#11
Greater than or equal to 30' (9.1 m) and less than 40' (12.2 m)	30" (7.62 m)	30" (7.62 m)	30"	12	#11
Greater than or equal to 40' (12.2 m) and less than 50' (15.2 m)	30" (7.62 m)	36" (9.14 m)	30"	12	#11
Greater than or equal to 50' (15.2 m) and less than 60' (18.3 m)	30" (7.62 m)	36" (9.14 m)	30"	12	#11
Greater than or equal to 60' (18.3 m) and less than 70' (21.3 m)	30" (7.62 m)	42" (10.67 m)	30"	15	#11
Greater than or equal to 70' (21.3 m) and less than 80' (24.4 m)	30" (7.62 m)	42" (10.67 m)	36"	15	#11

- NOTES:**
- These foundation depths are for steel which were calculated using 80% yield, 40% safety factor, 100% of the weight of the steel, and 100% of the weight of the concrete. Compression strength of concrete shall be 4,000 psi (27.6 MPa).
  - Foundation shall be constructed using 40% of the weight of the steel and 100% of the weight of the concrete.
  - Foundation shall be constructed using 40% of the weight of the steel and 100% of the weight of the concrete.
  - For steel and concrete with other grades refer to state standard 810.02.

**DEPTH OF MAST ARM FOUNDATIONS, TYPE E**

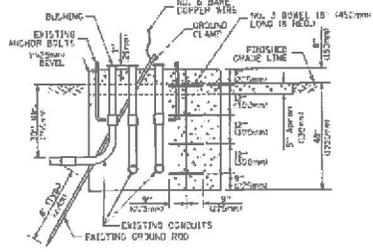
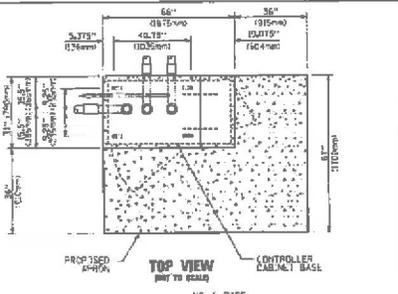
TS SHIT NO. 6

DESIGNED - DR	REVISION - DR	DATE - 11-14	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	DIRECTOR STANDARD TRAFFIC SIGNAL DESIGN DETAIL	COUNTY ILLINOIS	SHEET NO. 5 OF 7 SHEETS TOTAL	DATE 11-10-15	CONTRACT NO.
DRAWN - DR	REVISION - DR							
CHECKED - DR	REVISION - DR							
DATE - 10-20-15	REVISION - DR							

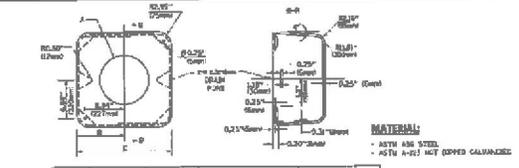


- NOTES:**
- CONDUIT DEPTH SHALL BE A MINIMUM OF 30" (TYPICAL) BELOW THE BOTTOM OF THE DRAINAGE DITCH OR ANY SLARING GRADING.
  - THE MINIMUM CONDUIT DEPTH APPLIES TO ALL CONDUIT PLACED UNDER ROADWAY PAVEMENT, MULTI-USE PATHS, SIDEWALKS AND SOB. SURFACES.
  - THE MINIMUM CONDUIT DEPTH APPLIES TO ALL HANDHOLES, HEAVY BUTT HANDHOLES AND DOUBLE HANDHOLES.

**HANDHOLE WITH MINIMUM CONDUIT DEPTH**  
PART TO SCALE



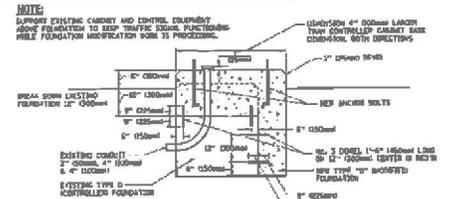
**MODIFY EXISTING TYPE "D" FOUNDATION TO TYPE "C" FOUNDATION**  
PART TO SCALE



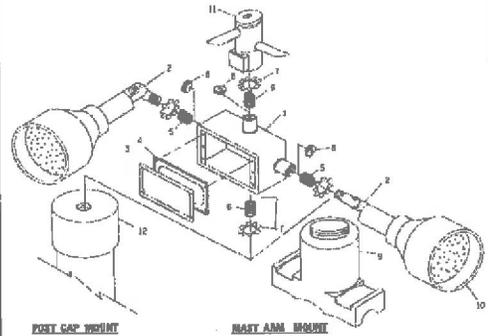
A	B	C	HEIGHT	WEIGHT
VARIABLE	66" (1676mm)	12" (305mm)	12" (305mm)	55 lbs (25kg)
VARIABLE	36" (914mm)	12" (305mm)	12" (305mm)	68 lbs (31kg)
VARIABLE	12" (305mm)	12" (305mm)	12" (305mm)	81 lbs (37kg)
VARIABLE	12" (305mm)	36" (914mm)	12" (305mm)	118 lbs (54kg)

**SHROUD**

- NOTES:**
- DIMENSION "A" IS EQUAL TO THE DIAMETER OF THE MAIN ARM POLE AT THE TOP OF THE SHROUD. THE SHROUD SHALL BE TESTED TO THE MAIN ARM POLE.
  - THE SUPPLIER SHALL VERIFY THE ABOVE DIMENSIONS BASED ON MATT ARM REQUIREMENTS.
  - THE HEIGHT OF THE SHROUD SHALL COMP. THE SHROUD BOLTS, NUTS AND MAIN ARM POLE BASE.



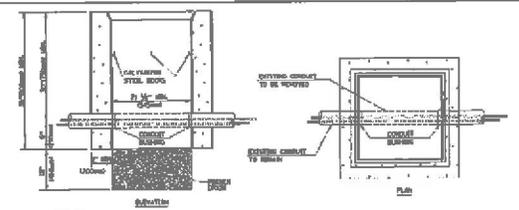
**MODIFY EXISTING TYPE "D" FOUNDATION**  
PART TO SCALE



**EMERGENCY VEHICLE DETECTOR WITH CONFIRMATION BEACON MOUNTING DETAIL**

ITEM NO.	IDENTIFICATION
1	EMERGENCY VEHICLE DETECTOR (EVIDENCE CODE)
2	POST CAP MOUNT
3	MAST ARM MOUNT
4	CONCRETE FOUNDATION
5	REBAR
6	REBAR COUPLER
7	REBAR BUSHING
8	REBAR WELD CLAMP
9	REBAR WELD CLAMP
10	REBAR WELD CLAMP
11	REBAR WELD CLAMP
12	REBAR WELD CLAMP

- NOTES:**
- ALL ELECTRICAL ITEMS, EXCEPT ITEMS #8 AND #9, SHALL BE ALUMINUM OR GALVANIZED.
  - ITEM #8 - GEORGEY FS-4-50 OR EQUIVALENT  
ITEM #9 - ALUMINUM CORN-BRASS LAMP SHIELD OR EQUIVALENT  
ITEM #9 - "HAND-ON" SINGLE BRACKET OR EQUIVALENT
  - WHEN POST MOUNTING IS SPECIFIED, ITEM #9 SHALL NOT BE REQUIRED. THE DETECTOR UNIT SHALL BE MOUNTED DIRECTLY ON TOP OF THE CAP BY BOLLING AND TAPPING A 3/4" DIA. HOLE WITH PIPE THREADS. THE POST CAP SHALL EITHER BE SCREWED TO THE TOP OF THE POST OR A MINIMUM OF 3 TIGHTENING SCREWS SHALL BE REQUIRED ON EACH CAP.



- NOTES:**
- HANDHOLE CONSTRUCTION PER STATE STANDARD B1400.
  - REMOVAL OF THE EXISTING CONDUIT FROM THE HANDHOLE AND THE INSTALLATION OF THE CONDUIT BUSHINGS SHALL BE INCLUDED WITH THE COST OF THE HANDHOLE.

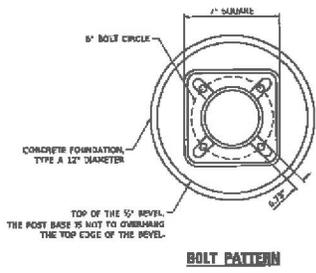
**HANDHOLE TO INTERCEPT EXISTING CONDUIT**

TS SHIT NO. 7

DESIGNED -	DWG -	REVISION -	DWG NO. -	DISTRICT ONE	SECTION	COUNTY	TOTAL SHEET
DRIVEN -	DCR -	REVISION -		STANDARD TRAFFIC SIGNAL BEACON DETAILS		LAKE	15 OF 15
CHECKED -	DWG -	REVISION -				LAKE	
DATE -	DATE -	REVISION -				LAKE	

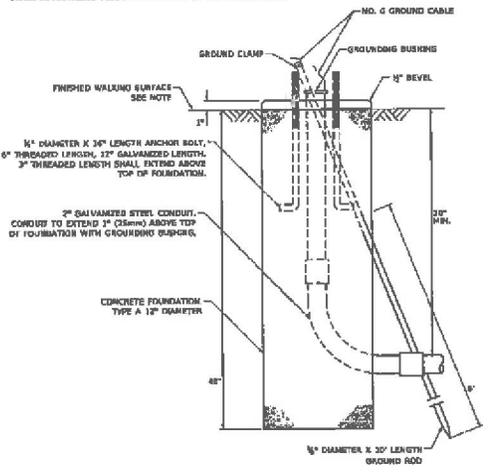
STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

PROJECT NAME	SHEET NO. OF TOTAL SHEETS	DATE	CONTRACT NO.

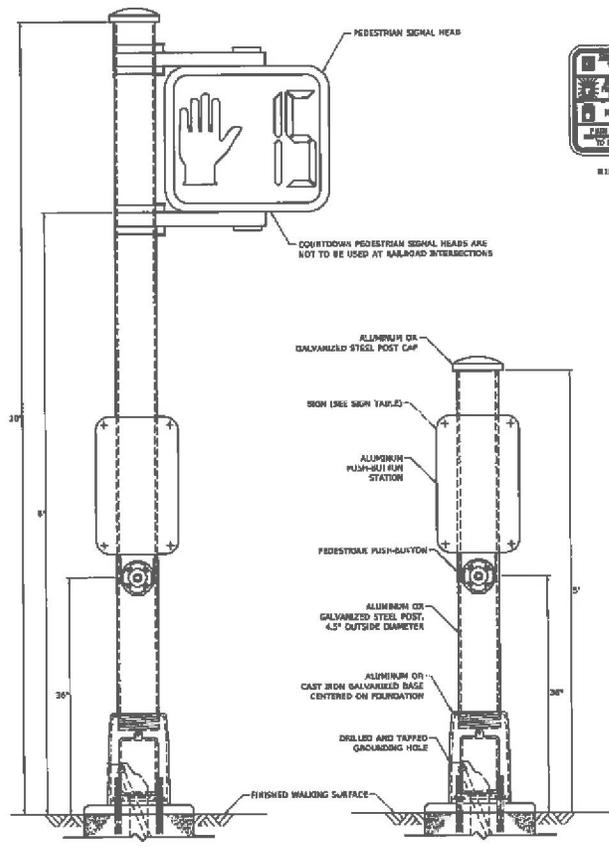


**BOLT PATTERN**

NOTE:  
1. IF THE PEDESTRIAN SIGNAL POST FOUNDATION IS INSTALLED WITHIN OR BEHIND A BARRIER CURB, THE TOP OF THE FOUNDATION SHALL BE INSTALLED FLUSH WITH THE TOP OF THE BARRIER CURB.

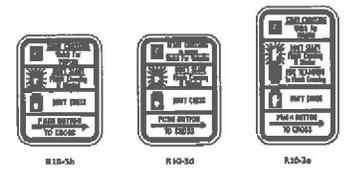


**CONCRETE FOUNDATION, TYPE A 12-INCH DIAMETER**



**PEDESTRIAN SIGNAL POST, 10 FT.**

**PEDESTRIAN SIGNAL POST, 5 FT.**



R10-1b R10-2b R10-3a

**SIGN TABLE**

SIGN	DIMENSIONS
R10-2b (RAILROAD ONLY)	8" X 12"
R10-3b (RAILROAD ONLY)	8" X 12"
R10-3a	8" X 15"

NOTES:  
1. THE SIGN PANELS SHALL BE TYPE AP ELECTRIC.  
2. THE ARROW ON SIGNS FOR PUSH-BUTTONS SERVING TWO DIRECTIONS ON THE SAME PHASE SHALL BE BI-DIRECTIONAL.  
3. THE SIGN FOR DUAL-CALL PUSH-BUTTONS SHALL HAVE NO ARROW.

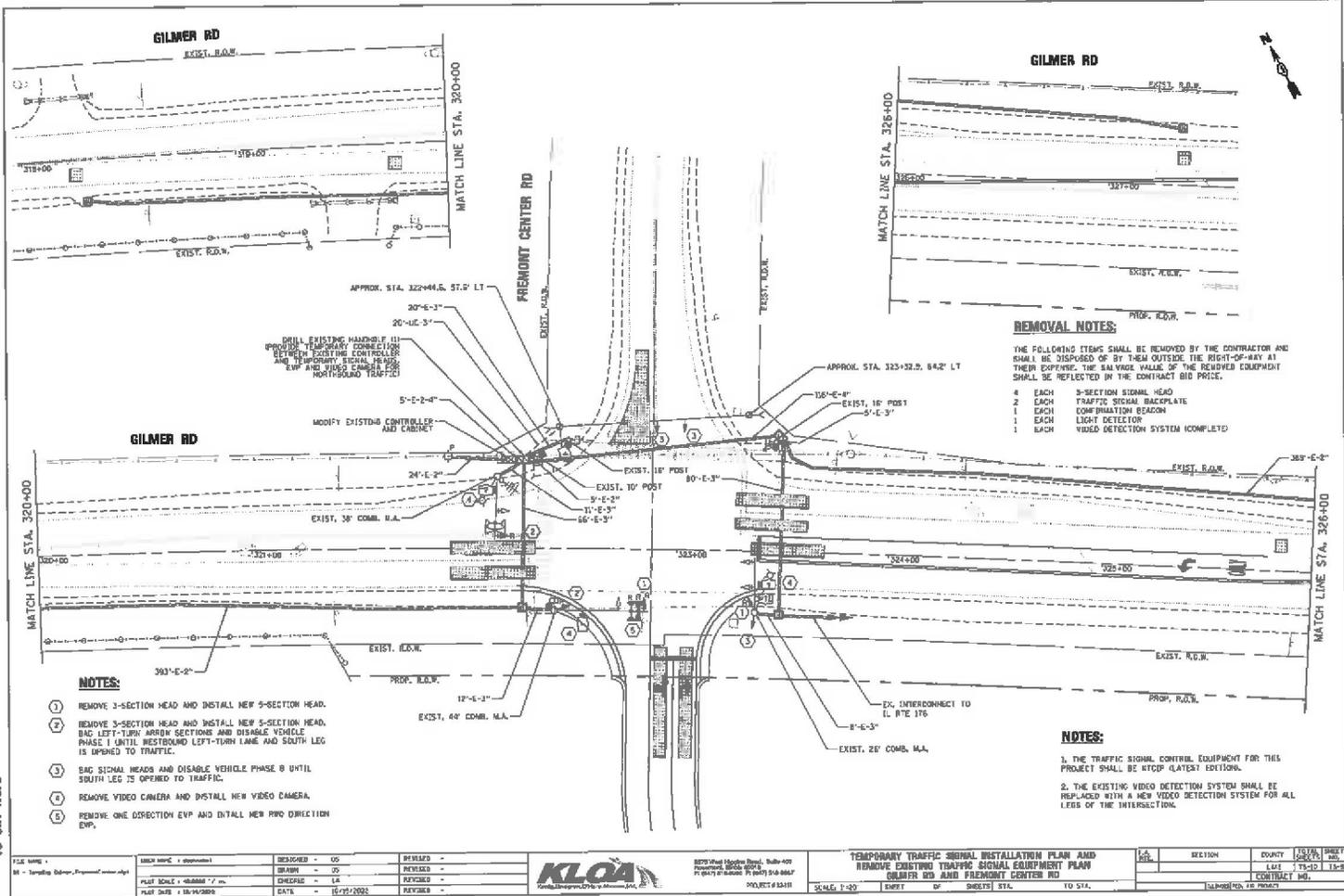
TS SH1 NO. 8

DATE MADE - 10/20/08	DESIGNED - JP	REVISED - 08/15/08
DRAWN - DP	CHECKED - LP	REVISED -
DATE MADE - 11/20/08	DATE - 10/15/08	REVISED -

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

DISTRICT ONE  
STANDARD TRAFFIC SIGNAL DESIGN DETAILS  
SCALE: R15

SECTION	COUNTY	TOTAL SHEETS
TS-45		15-10   15-2
CONTRACT NO.		ILLINOIS DOT PROJECT



**REMOVAL NOTES:**

THE FOLLOWING ITEMS SHALL BE REMOVED BY THE CONTRACTOR AND SHALL BE DISPOSED OF BY THEM OUTSIDE THE RIGHT-OF-WAY AT THEIR EXPENSE. THE SALVAGE VALUE OF THE REMOVED EQUIPMENT SHALL BE REFLECTED IN THE CONTRACT BID PRICE.

- 4 EACH 3-SECTION SIGNAL HEAD
- 2 EACH TRAFFIC SIGNAL BACKPLATE
- 1 EACH CONFIRMATION BEACON
- 1 EACH LIGHT DETECTOR
- 1 EACH VIDEO DETECTION SYSTEM COMPLETED

**NOTES:**

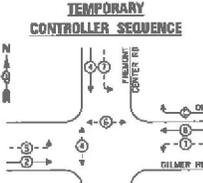
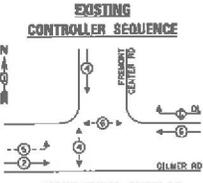
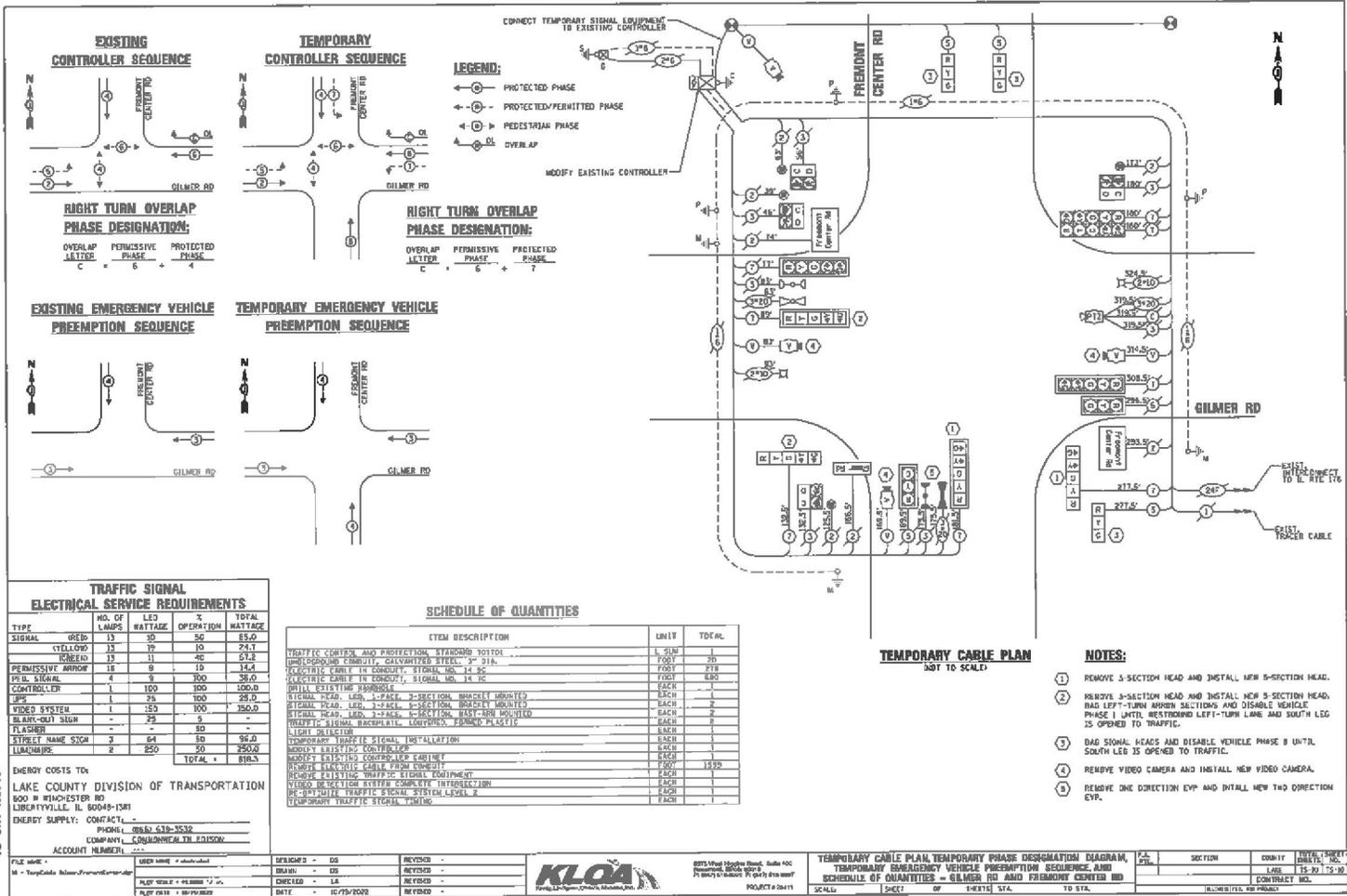
- 1 REMOVE 3-SECTION HEAD AND INSTALL NEW 5-SECTION HEAD.
- 2 REMOVE 3-SECTION HEAD AND INSTALL NEW 5-SECTION HEAD, BAG LEFT-TURN ARROW SECTIONS AND DISABLE VEHICLE PHASE 1 UNTIL WESTBOUND LEFT-TURN LANE AND SOUTH LEG IS OPENED TO TRAFFIC.
- 3 BAG SIGNAL HEADS AND DISABLE VEHICLE PHASE 0 UNTIL SOUTH LEG IS OPENED TO TRAFFIC.
- 4 REMOVE VIDEO CAMERA AND INSTALL NEW VIDEO CAMERA.
- 5 REMOVE ONE DIRECTION ENP AND INSTALL NEW PNO DIRECTION ENP.

**NOTES:**

- 1. THE TRAFFIC SIGNAL CONTROL EQUIPMENT FOR THIS PROJECT SHALL BE THE LATEST EDITIONS.
- 2. THE EXISTING VIDEO DETECTION SYSTEM SHALL BE REPLACED WITH A NEW VIDEO DETECTION SYSTEM FOR ALL LEGS OF THE INTERSECTION.

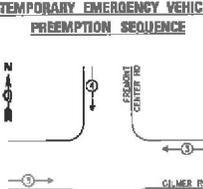
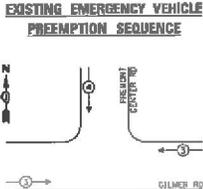
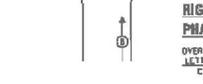
TS 8171 NO. 9

FILE NAME: 88 - Temporary Traffic Signal Installation Plan	SHEET NO. 4 OF 4	DESIGNED - OS	REVISIONS -		8075 West Highway Blvd., Suite 400 Denver, CO 80235 Property of KLOA, Inc. P.O. Box 8847	<b>TEMPORARY TRAFFIC SIGNAL INSTALLATION PLAN AND          REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT PLAN          GILMER RD AND FREMONT CENTER RD</b>		DATE: 04/27/2021	SHEET NO.	COUNTY	PROJECT NO.
	DRAWN - OS	CHECKED - LA	REVISIONS -		SCALE: 1"=20'	SHEET NO.	COUNTY	PROJECT NO.			



**LEGEND:**

- PROTECTED PHASE
- PROTECTED/PERMITTED PHASE
- PEDESTRIAN PHASE
- OVERLAP



**TEMPORARY CABLE PLAN**  
NOT TO SCALE

- NOTES:**
- REMOVE 3-SECTION HEAD AND INSTALL NEW 5-SECTION HEAD.
  - REMOVE 3-SECTION HEAD AND INSTALL NEW 5-SECTION HEAD. HAS LEFT-TURN BURN SECTIONS AND DISABLE VEHICLE PHASE 1 UNTIL RESTRICTED LEFT-TURN LANE AND SOUTH LEG IS OPENED TO TRAFFIC.
  - DAD SIGNAL HEADS AND DISABLE VEHICLE PHASE B UNTIL SOUTH LEG IS OPENED TO TRAFFIC.
  - REMOVE VIDEO CAMERA AND INSTALL NEW VIDEO CAMERA.
  - REMOVE ONE DIRECTION EYP AND INSTALL NEW TWO DIRECTION EYP.

**TRAFFIC SIGNAL ELECTRICAL SERVICE REQUIREMENTS**

TYPE	NO. OF LAMPS	LED WATTAGE	% OPERATION	TOTAL WATTAGE
SIGNAL				154.0
YELLOW	13	10	10	24.7
GREEN	13	11	40	57.2
PERMISSIVE ARROW	18	9	10	16.2
P.B. SIGNAL	4	9	100	36.0
CONTROLLER	1	100	100	100.0
UPS	1	75	100	28.0
VIDEO SYSTEM	1	105	100	350.0
BLANK-OUT SIGN	-	75	5	-
FLASHER	-	-	50	-
STREET NAME SIGN	3	64	50	96.0
LUMINAIRS	2	250	50	250.0
			TOTAL	894.5

**SCHEDULE OF QUANTITIES**

ITEM DESCRIPTION	UNIT	TOTAL
TRAFFIC CONE AND PROTECTION STANDING 500MM (UNDERGROUND CONDUIT, GALVANIZED STEEL, 3" DIA.)	L	500
ELECTRIC CABLE IN CONDUIT - SIGNAL, 14 SC	FOOT	218
ELECTRIC CABLE IN CONDUIT - SIGNAL, 14 SC	FOOT	480
DRILL EXISTING ROADSIDE	EA	-
SIGNAL HEAD, LED, 3-PACK, 3-SECTION, BRACKET MOUNTED	EACH	2
SIGNAL HEAD, LED, 3-PACK, 5-SECTION, BRACKET MOUNTED	EACH	2
TRAFFIC SIGNAL BRACKET, CONCRETE, FERRIS PLASTIC	EA	2
LIGHT DETECTOR	EA	1
TEMPORARY TRAFFIC SIGNAL INSTALLATION	EA	1
MODIFY EXISTING CONTROLLER	EA	1
REMOVE EXISTING CONTROLLER CABINET	EA	1
REMOVE EXISTING CABLE FROM CONDUIT	EA	1530
REMOVE EXISTING WAPPS SIGNAL EQUIPMENT	EA	1
VIDEO DETECTION SYSTEM COMPLETE - INTERSECTION	EA	1
RE-PROGRAMME TRAFFIC SIGNAL SYSTEM LEVEL 2	EA	1
TEMPORARY TRAFFIC SIGNAL TYPING	EA	1

ENERGY COSTS TO:  
LAKE COUNTY DIVISION OF TRANSPORTATION  
800 W WINCHESTER RD  
LIBERTYVILLE, IL 62049-1381  
ENERGY SUPPLY: CONTACT \_\_\_\_\_  
PHONE: 618-338-3532  
COMPANY: COMMUNICAL TR EDISON  
ACCOUNT NUMBER: \_\_\_\_\_

DESIGNED - DS	REVISION -
DRAWN - DS	REVISION -
CHECKED - LA	REVISION -
DATE - 10/29/2020	REVISION -



8075 Woodbridge Road, Suite 100  
Libertyville, IL 62049-1381  
PROJECT 20411

TEMPORARY CABLE PLAN, TEMPORARY PHASE DESIGNATION DIAGRAM, TEMPORARY EMERGENCY VEHICLE PREEMPTION SEQUENCE, AND SCHEDULE OF QUANTITIES - GILMER RD AND FREMONT CENTER RD	1	OF	1
SCALE	1/4" = 1'-0"	DATE	10/29/2020
SECTION	NO. 1	DATE	10/29/2020
CONTRACT NO.		CONTRACT NO.	

25 10 SHY RD. 10

## Chris Heinen

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**From:** Paul Weaver <pweaver832@aol.com>  
**Sent:** Saturday, October 22, 2022 8:15 AM  
**To:** JPNelson@lakecountyil.gov; BDuckert@lakecountyil.gov; Chris Heinen; CDonze@walbecgroup.com  
**Cc:** mhammes@hammesholdings.com  
**Subject:** KLOA final revisions to Gilmer/Freemont Center intersection  
**Attachments:** VHW Signal Specs\_Stnds Gilmer\_FremontCenter 2022-10-19.pdf

**Follow Up Flag:** Flag for follow up  
**Flag Status:** Flagged

Please find the below comments and attached update Final info for this interchange.  
If acceptable , please issue the authorization to proceed.

Thank you

Comments from KLOA.

1. Instead of removing the EVP from the southbound mast arm and putting it on the northbound span, why not just change the EVP head to a one channel, 2 direction head? **The EVP has been revised to be shown as a new two-way detector replacing the existing one-way detector on the existing mast arm on the south leg. Pay items and quantities have been revised accordingly.**
2. Volumes turning into and out of the facility at the same time would be low. A right turn overlap is not necessary. Change the northbound near right signal head to a 3-section head. **The proposed northbound near-right signal head has been revised to a 3-section head with 5C cable. Pay items and quantities have been revised accordingly.**
3. The plans call for an addition of a detection camera and a modify of the cabinet. The current video detection in place is an Econolite Terra system that is no longer in production. The contractor will need to supply a camera that will either function with the Terra system or supply a different detection system. The permanent signal will require a new video detection system be installed.
  - a. Alternatively, the contractor could put in a new detection system, replacing the current detection cameras and add one to the temporary span which would then be relocated to the new permanent mast arm. **The existing video cameras are now shown to be replaced and a new Video Detection System Complete Intersection. Pay items and specs have been added accordingly.**
4. Maintenance of the traffic signal and partial span wire signals will be required until the permanent signal is constructed, activated, and accepted by LCDOT. **Noted.**

Thanks.

Luay Aboona, PE, PTOE

*Principal*

Paul C. Weaver

**Project 4 Services, LLC.**

7722 Hawthorne Rd

Mequon, WI 53097

414-731-0795

paulw@project4services.com



# COUNTRYSIDE FIRE PROTECTION DISTRICT

600 N. Deerpath Drive • Vernon Hills • Illinois • 60061

Phone 847.367.5511 • Fax 847.367.5521

[www.countrysidefire.com](http://www.countrysidefire.com)

Chuck Smith, Chief

Bruce Brown, President

June 3, 2022

Chris Heinen  
Community Development Director  
Village of Hawthorn Woods  
2 Lagoon Drive  
Hawthorn Woods, IL 60047

Re: Technical Review #1 – New building – The Barn at Hawthorn Woods  
27901 N. Gilmer Rd. Hawthorn Woods IL  
PR 75-22; Site development of land and new building equaling 8,855 sq ft  
Date of Plans: 05/04/22 Date Plans Rec'd: 05/27/22

Dear Mr. Heinen:

We have reviewed a set of plans for the site development for The Barn at Hawthorn Woods. They will be adding a new 2 story A-2 building that is approximately 8,855 sq. ft. The plans show an occupancy load of 347 persons. The plans indicate they are using ICC 2018, the Fire Prevention Bureau has completed this review in accordance with the International Building and Fire Codes 2015, NFPA Life Safety Code 101, the Illinois Accessibility Code, local code amendments and good fire safety practices. We have the following comments for the Petitioner.

1. The plans do not show the location of the Fire Department Connection (FDC). The fire hydrants shall be located within 100' from the FDC.
2. The plans show a well being installed, if a hydrant main is not installed in the beginning of this project then a tank shall be installed to hold enough water for the fire sprinkler system. This should be discussed with a fire sprinkler company to determine the size of the water storage tank.
3. If the water main is not installed in the beginning of the construction for this project then a drafting dry hydrant shall be installed in one of the retention ponds to provide water in the event of a fire on the property. Contact the Fire Department to discuss this further.
4. The plan does show a fire hydrant near the front of the building. An additional hydrant shall be located at the entrance drive into the property as well. Additional hydrants may be needed if the property is built out as it does show a future hotel.
5. There shall be no obstructions (trees, bushes, fences, signs, etc.) within a 4 foot diameter. The hydrant shall have a flag which extends above the fire hydrant. The hydrants shall be painted safety yellow and the caps safety blue.
6. The underground water mains for each building shall be tested and flushed in accordance with NFPA 24 prior to connecting the sprinkler systems. Contact the fire department and the water department to schedule a fire inspector to witness the flushing and conduct a flow test.
7. The new building shall provide proper emergency responder radio coverage for first responders (BDA). IFC 2015 section 510.1 shall be followed.
8. Fire department apparatus access is adequate. Access to and through the construction project shall be provided during the demolition and through the construction process. Contact the fire department to order the Knox Box Key pad locks.
9. The plans show an elevator in the building, if this is a passenger elevator then the elevator shall comply with our ordinance to accommodate our stretcher. The elevators shall be large enough to accommodate our EMS stretcher. Vernon Hills Building Code Amendment Section 511.1. In order to accommodate emergency response stretchers, elevators shall be at minimum 3500 lb, inside car dimensions of 80" X 65", side-slide

PROUDLY SERVING

Vernon Hills, Hawthorn Woods, Long Grove, Kildeer, Indian Creek and Unincorporated areas of Lake County  
SINCE 1959



door and top hand rail set at 36". It is important that the inside car have a side slide door and that the inside hand rail be set at the maximum allowable height from the floor of 36-inch under ADA standards. The rest of the elevators throughout the building can be any size you would like.

10. Signs shall be posted in visible locations along the accessible roads in front of each of the buildings indicating "No Parking – Fire Lane". The sign shall be 12 inches wide by 18 inches high, with red lettering and a white background. Signs are to be installed prior to occupancy and maintained by the property owner on all non-public drives and parking areas. Fire lanes shall be maintained so that there are no obstructions, including ice or snow, to vehicular access.
11. The building address numbers and/or suite numbers shall be Arabic numerals with a minimum of 6" inches high and a minimum width of 0.5 inch. We also request the address number be posted on any monument sign.
12. Knox Box Key Safes shall be required to access the building. The Knox Boxes shall be mounted and keys provided for all locked areas. Contact the fire department to order the Knox Box and discuss the locations.
13. The buildings require a full automatic sprinkler protection along with an automatic fire alarm system. The systems shall be installed in accordance with the appropriate NFPA standards, local ordinances and good fire safety practices. Sprinkler and fire alarm contractors will be required to submit shop drawings and calculations for review, approval and permit prior to starting work.
14. The fire alarm panels shall be equipped to be able to send point ID through the radio monitoring device to our dispatch center.
15. The automatic fire alarm system for the buildings shall be connected to the Countryside Fire Protection District Communication Center located at 740 N. Lakeview Parkway, Vernon Hills. Contact Jon Bowlby (224-430-2229) FSS Technologies, 516 W. Campus Dr. Arlington Heights, IL. 60004, [Jon.Bowlby@FssTechnologies.com](mailto:Jon.Bowlby@FssTechnologies.com) to coordinate the remote station connection and receive monitoring & service contracts. The system shall be installed in accordance with NFPA 72 local ordinances and good fire safety practices.
16. Provide any attic hatch/roof hatch with a ladder for fire department and maintenance access on all buildings. Minimum size of the opening shall be 2' x 3'.
17. A Reduced Pressure Backflow Preventer (RPBP) is required for each buildings sprinkler system. A metered by-pass is **NOT** required. The RPBP shall be certified prior to occupancy.
18. Additional fire and safety requirements are subject to a building permit plan review.
19. The Countryside Fire Protection District has the following requirements for new commercial development fees:
  - Developer fees for commercial buildings are assessed at a rate of \$.20 per square foot. Total amount of square footage for the building is approximately 8,855 square feet. The total amount for this project will be \$1,771.00.
  - Payment will be due at the time of permitting for the commercial building. We will process an invoice when building plans are submitted for review and approval.

We have no further comments at this time. Thank you for your cooperation and consideration. Should you have any questions, please call me at 847-918-6142 or [rcielek@countrysidefire.com](mailto:rcielek@countrysidefire.com).

Sincerely,



Lt. Ron Cielek  
Division Chief of Fire Prevention



**PLANNING CONSULTANTS MEMORANDUM**

**Date:** May 20, 2022  
**To:** Chris Heinen, Community Development Director  
 Village of Hawthorn Woods  
**From:** Rolf Campbell Associates, Village Planning Consultants  
**Re:** **Landscape Plan Review Memo: The Barn at Hawthorn Woods – Commercial Lot  
 27901 North Gilmer Road  
 Hawthorn Woods, Illinois**

Category	B Retail Business/Commercial District Zoning Standards	Proposed Conditions	Remarks
<b>Minimum Landscape Setbacks</b>			
<i>Landscape Yards</i>			*Potentially 50' required from Parking Lot to West Lot Line (see note 2 below)
<i>West</i>	5 ft. (50' from Residential)	18.5 ft. West for Parking*	
<i>North</i>	5 ft.	302 ft. from Parking Lot North	
<i>East</i>	5 ft.	263 ft. from Parking Lot East	
<i>South</i>	5 ft.	778 ft. from Parking Lot South	

**Landscape Plan prepared by Teska Associates, dated May 6, 2022**

Based on our review of these submittals we offer the following comments:

1. It appears that the Geometrics Plan from Pearson, Brown & Associates, dated May 4, 2022 and sheet SP3 from Teska Associates both differ from sheet L1 from Teska Associates. The parking lot areas shown in the Geometrics plan and sheet SP3 appear to not have the landscape islands shown on the plan. The L1 plan shows the correct parking lot islands at a rate of 1 parking lot island per 100' or less.
2. The existing property located to the southwest of the subject property is zoned AG in unincorporated Lake County. However, the property contains a home on the property. The Village is requested to determine if this is considered a residential property. If it is determined that this is a residential property, then a 50' landscape buffer is required between the parking lot and the property line to the west. Currently, this is proposed to only have a setback of 18.5' according to the Geometrics Plan.
3. The total property area is 15.78 Acres and 50% of the property shall be determined as open space. However, because there is a wetland area of 2.15 acres and a septic area of 0.47, this can be reduced from 15.78 Acres to 13.17 Acres. Using 50% of 13.17 Acres for required open space area, this can be reduced to 6.58 Acres which is a total of 286,755 square feet.

Based on this calculation, 287 – 3” caliper trees open space trees or equivalent are required. The plan already has proposed 188.8 shade trees (see table below for calculations). An additional 99 trees are needed (either existing or proposed) to meet the open space requirements. A tree preservation plan and tree removal plan are needed to confirm if the existing trees meets this requirement.

OPEN SPACE TREE CALCULATIONS	287 Shade Trees Required or Equivalents Required per Ordinance		
Plant Material	Proposed Trees on Plan	Shade Tree Equivalents Proposed	Trees Required
<i>3” Caliper Shade Trees</i>	76 Shade Trees	76	<b>99 Existing Trees Needed to Remain and be Counted for Open Space Tree Requirements</b>
<i>2” or 6’ Ht. Ornamental Trees</i>	55 Ornamental Trees	27.5	
<i>6’ Ht. Evergreen Trees</i>	75 Evergreen Trees	75	
<i>Deciduous / Evergreen Shrubs</i>	53 Shrubs	5.3	
<i>Perennials Square Footage</i>	2,500 sf of Perennials	5	

**Total: 188.8 Shade Trees Provided on Plan**

4. Provide a tree preservation plan and tree removal/replacement plan and to indicate if any protected trees are removed to be replaced. per Section 9-17-3, 9-17-4, and 9-17-5.
5. Per section 9-17-6 (5); provide the location, quantity, size and species (both common and scientific names) of all proposed plant material including groundcover.

**Summary:**

Note that this Memorandum includes only a summary of our finding from our review of the submittals received, and we are available to review any questions related to this summary and our findings at your convenience.

**Reviewed Submittal Documents:** (Based on the Plan Set dated May 6, 2022)

- Preliminary Engineering Plans (9 Sheets) prepared by Pearson, Brown & Associates, dated May 4, 2022
- Parcel Study Area (3 Sheets) prepared by Teska Associates, Inc, dated May 6, 2022
- Conceptual Landscape Plan (3 Sheets) prepared by Teska Associates, Inc. dated May 6, 2022
- Prefabricated Post and Beam Building Concept Plans (14 Sheets) prepared by Timberlyne, not dated
- Architectural Construction Documents (10 Sheets) prepared by DesignSmith, dated May 6, 2022
- Site Lighting Photometric Plan (1 Sheet) prepared by Enterprise Lighting & Control, dated April 27, 2022

**EXHIBIT "C"**

**FINDINGS OF FACT**



2 LAGOON DRIVE - HAWTHORN WOODS, ILLINOIS 60047 - (847) 438-5500

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## FINDINGS OF FACT

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Public Hearing Date:  
November 8, 2022

**HH-HW-RE, LLC. – Request of Special Use Planned Development for a proposed event venue located at 27951 N. Gilmer Road & 22662 W. Illinois Route 176.**

*Based upon the evidence presented to the Planning, Building, and Zoning (PB&Z) Commission at the public hearing, the PB&Z Commission makes the following findings of fact with respect to the requested special use planned development permit in connection therewith.*

9-15-7:

1. General:

- a. The uses permitted by such exceptions as may be requested or recommended are necessary or desirable and appropriate to the purpose of the development.  
**Finding:** The PB&Z Commission finds that the proposed uses for the development are desirable for the Village and the surrounding community.
- b. The uses permitted in such development are not of such nature or so located as to exercise an undue detrimental influence or effect upon the surrounding neighborhood.  
**Finding:** The PB&Z Commission finds that the proposed development fits within the overall nature of the site and is not detrimental to the surrounding properties.
- c. That any industrial park areas established in the planned unit development conform to all requirement therefor as set forth elsewhere in this Title.  
**Finding:** N/A
- d. That all minimum requirements pertaining to commercial, residential, institutional, or other uses established in the planned unit development shall be subject to the requirements for each individual classification as established elsewhere in this Title, except as may be specifically varied in the ordinance granting and establishing a planned unit development use.  
**Finding:** The PB&Z Commission finds that the uses for the property are subject to the individual classifications.
- e. When private streets and common driveways are made a part of the planned unit development or private common open space or recreation facilities are provided, the applicant shall submit, as part of the application, the method and arrangement

whereby these private facilities shall be operated and maintained. Such arrangements for operating and maintaining private facilities shall be subject to the approval of the Village Board.

**Finding:** The PB&Z Commission finds that the proposed roadway system will function appropriately with the overall layout of the site.

2. Residential:

- a. Residential density for a planned unit development shall not be greater than the recommended density, as shown in this Title for the Village, nor shall any lot to be used for residential purposes be less in area or dimension than that required by the district regulations applicable to the district in which the planned unit development is located, except that the Plan Commission may recommend and the Village Board may grant a reduction in such lot area and dimension, but not more than fifteen percent (15%) when the planned unit development provides common open space equal to not less than ten percent (10%) of the gross area of the planned unit development.

**Finding:** N/A

- b. Business uses may be included as part of a planned residential development when the Plan Commission finds that such business uses are beneficial to the overall planned unit development and will not be injurious to adjacent or neighboring properties. Such business uses shall not be greater in area than ten percent (10%) of the planned unit development.

**Finding:** N/A

- c. The open areas provided in the part of the planned development containing only residential structures shall be preserved over the life of the planned unit development for use only by the residents of the planned development.

**Finding:** N/A

- d. For that part of a planned development devoted to residential uses, the Plan Commission may recommend and the Village Board of Trustees may approve, access to a dwelling by a driveway or pedestrian walk easement, and spacing between buildings of lesser widths or depths than required by district regulation for the district in which the planned development is located, provided:

**Finding:** N/A

- e. That adequate provisions are made which perpetuate during the period of the special use, access easements and off-street parking spaces for use by the residents of the dwelling served;

**Finding:** N/A

- f. The spacing between buildings shall be approved by the Plan Commission and shall be consistent with the application of recognized site planning principles for securing a unified development, and due consideration is given to the openness normally afforded by intervening streets.

**Finding:** N/A

- g. The yards for principal buildings along the periphery of the development shall be not less in width or depth than required for permitted uses in the district regulations applicable to the districts in which the planned development is located; and the plan is developed to afford adequate protection to neighboring properties as recommended by the Village Board of Trustees.

**Finding:** N/A

- 3. Cluster Subdivision: In any one-family cluster subdivision, the Plan Commission may recommend and the Village Board may authorize the following exceptions to the regulations of the district in which the cluster subdivision is permitted as a special use:

- a. A reduction of the lot area by not more than five percent (5%) and in no case shall the lot area be less than twenty thousand (20,000) square feet.

**Finding:** N/A

- b. A reduction of the lot width to:  
100 feet in the R-1 District

**Finding:** N/A

90 feet in the R-2 District

**Finding:** N/A

- c. Lot Area:

- i. That in the part of the planned development containing only residential uses, the minimum lot area per dwelling unit may be not more than five percent (5%) less than that required for permitted uses in the district regulations applicable to the district in which the planned development is located.

**Finding:** N/A

- ii. Reduction of such lot area be recommended by the Plan Commission and approved by the Village Board only where there is contained within the planned development permanent open area, the area and location of which shall meet with the approval of the Commission, and that such open space shall not be less than that which would pertain if developed on individual lots.

**Finding:** N/A

- iii. Such open areas shall be preserved over the life of the planned development, for use only by the residents of the planned development or dedicated to the Village for school, park, playground or other public uses.

**Finding:** N/A

- d. That in a planned development devoted to residential use, the Plan Commission may recommend and the Village Board may approve, access to a dwelling by a driveway or pedestrian walk easement; however, off-street parking facilities for such dwellings shall be located not more than two hundred feet (200') from the dwelling served; yards of lesser widths or depths than required for permitted uses in the district regulations applicable to the district in which the planned development is located; provided:

- i. That protective covenants are recorded which perpetuate access easements and off-street parking spaces for use by the residents of the dwellings served;  
**Finding:** N/A
  - ii. That spacing between buildings shall be consistent with the application of recognized site planning principles for securing a unified development and due consideration is given to the openness normally afforded by intervening streets and alleys;  
**Finding:** N/A
  - iii. Spacing between principal buildings within a part of a planned development shall be equivalent to such spacing as would be required between buildings by district regulations for the district in which it is located.  
**Finding:** N/A
- e. That in a planned business development, the following additional requirements are hereby specified:
- i. All buildings shall be set back not less than thirty feet (30') from all streets bounding the site;  
**Finding:** The PB&Z Commission finds that the proposed building setback for the event venue conforms to this requirement.
  - ii. Required off-street parking space shall be provided in the ratio of not less than ten (10) parking spaces for every one thousand (1,000) square feet of gross floor area;  
**Finding:** The PB&Z Commission finds that the proposed parking for the event venue conforms to this requirement. They also find that a proposed overflow parking plan should be in place in the event all parking for an event is needed.
  - iii. All walks within the planned development shall be paved with a hard surfaced material meeting the specifications of the Village Engineer;  
**Finding:** The PB&Z Commission finds that the proposed walks for the event venue conforms to this requirement.
  - iv. Any part of the planned development not used for buildings, loading and accessways, shall be attractively landscaped with grass, trees, shrubs or pedestrian walkways, according to a landscape plan, as approved by the Plan Commission;  
**Finding:** The PB&Z Commission finds that the proposed landscaping for the event venue conforms to this requirement.
  - v. The buildings in the planned development shall be planned and designed as a unified and single project.  
**Finding:** The PB&Z Commission finds that the proposed development creates a cohesive commercial center that will complement each of the proposed uses on the site.

4. Variations of Minimum Requirements:

a. Wherever the applicant proposes to provide and set out, by platting, deed, dedication, restriction or covenant, and land or space separate from one-family or multi-family residential districts to be used for parks, playgrounds, commons, greenways or open areas, the Plan Commission may consider and recommend to the Village Board and the Village Board may vary the applicable minimum requirements of the subdivision regulations and this Title which may include, but not necessarily be limited to, the following:

i. Rear yard

**Finding:** The PB&Z Commission finds that the proposed reduction in the side yard is acceptable as additional landscaping and existing landscaping will provide the necessary buffer of any future development.

ii. Side yard

**Finding:** The PB&Z Commission finds that the proposed reduction in the side yard is acceptable as additional landscaping and existing landscaping will provide the necessary buffer of any future development.

iii. Lot area

**Finding:** N/A

iv. Bulk

**Finding:** N/A

v. Intensity of use

**Finding:** N/A

vi. Street width

**Finding:** N/A

vii. Sidewalks

**Finding:** N/A

viii. Public utilities

**Finding:** The PB&Z Commission finds that since the development is currently going to be served by well and septic until such time as utilities are present, no variations are needed.

ix. Off-street parking

**Finding:** N/A

b. Business:

i. Business uses shall be as prescribed by the Plan Commission.

**Finding:** Noted.

ii. All business and storage of materials shall be conducted or stored within a completely enclosed building.

**Finding:** The PB&Z Commission finds that the developer is not depicting any outdoor storage.

iii. Not more than thirty percent (30%) of the lot area shall be covered by buildings or structures.

**Finding:** Noted.

- iv. At least ten percent (10%) of the lot shall be provided for landscape and open space purposes.

**Finding:** Noted.

- v. No building shall be more than thirty-five feet (35') in height.

**Finding:** The PB&Z Commission finds that since the proposed event venue structure is located far off of Gilmer Road and Route 176, the increase in height will be negligible to the traffic on these streets.

- vi. No dwelling shall be permitted in a planned business development.

**Finding:** Noted.

- vii. Off street parking shall be provided and maintained on the same lot based upon three (3) square feet of parking space for each square foot of gross floor area unless the plan commission recommends and the village board requires additional off-street parking space.

**Finding:** Noted.

- viii. Service and loading and unloading facilities shall be provided as recommended and approved by the plan commission.

**Finding:** Noted.

- ix. No building shall be located nearer than fifty feet (50') to any street line.

**Finding:** Noted.

- x. Business developments shall be adequately screened by fencing or landscaping or both along the boundaries of adjacent residential, public open space, schools, churches or other similar uses. The screen planting shall be prepared by a landscape architect and shall meet the approval of the plan commission.

**Finding:** The PB&Z Commission finds that the proposed landscaping for the event venue conforms to this requirement.

- xi. Outdoor lighting shall be so designed in accordance with the provisions outlined in Section 9-19.

**Finding:** The PB&Z Commission finds that the proposed lighting for the event venue shall conform to this requirement.

- xii. Signs shall comply with the regulation of the B retail business/commercial uses permitted in this title.

**Finding:** The PB&Z Commission finds that the proposed signage for the event venue shall conform to this requirement.

5. Industrial:

- a. The standards for industrial areas in a planned unit development shall conform to the applicable standards in this title for industrial areas.

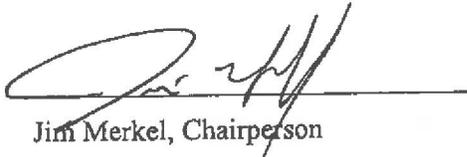
**Finding:** N/A

- b. At least twenty percent (20%) of the industrial land use areas shall be reserved for landscape and open space purposes.

Finding: N/A

All of the above Findings of Fact are subject to the conditions of approval made by the PB&Z Commission on November 8, 2022.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jim Merkel", is written over a solid horizontal line.

Jim Merkel, Chairperson

CMH