IV – APPENDICES

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APPENDIX A

SECTION 6-410. WATER SUPPLY.

A. **General**.

1. All development shall include provisions for the construction of water distribution facilities complete with valves, fire hydrants, and other appurtenances designed in accordance with this Section. As a minimum, the water distribution system shall provide a service connection(s) at the approximate mid-point of the front property line of each individual lot or parcel within the development. Where more than one building is located or planned on one lot or parcel of property, or when water main construction is required on the property for fire protection, the proposed construction shall also include all water main construction and appurtenances within the lot or parcel except service lines.

2. Specification references made herein for manufactured materials such as pipe, hydrants, valves and fittings refer to designation of the American Water Works Association (AWWA) or of the American National Standards Institute (ANSI). Water distribution systems shall be constructed in accordance with the "Standard Specifications for Water and Sewer Main Construction in Illinois," latest edition, unless otherwise modified in this Section.

B. **Basic Design Standards**.

1. **System Extension**.

a. Extension to the water distribution system shall form a complete network extension or a part of a complete network extension that includes all primary mains, secondary mains, and gridiron mains, complimenting the existing distribution system network.

b. Primary mains are those mains that form the arterial portion of the system. Primary mains under construction within a development are further defined as mains that are sixteen (16) inches or larger. Primary mains within or adjacent to a development shall be sized and located in accordance with the Comprehensive Water System Study of the Village, latest edition. Secondary mains shall be sized, looped, and spaced as required for fire flows and shall have a minimum diameter of eight (8) inches.

c. Gridiron mains shall form a grid to supply water to the local fire hydrants and service lines. Gridiron mains shall have a minimum diameter of eight (8) inches. Dead end water mains shall not be allowed.

d. The proposed system extensions shall be arranged so that the service interruptions caused by a break in any main will be limited to thirty-two (32) residential units or one thousand (1000) feet in all non-residential areas. The maximum number of valves for a shut down shall be three (3); four (4) may be allowed in unique cases with the approval of the Village.

2. **Maximum Day Consumption**. For purposes of water main design, maximum day consumption for water main design shall be based on the following table:

Maximum Day

Type of Establishment	Unit	Consumption Gal/day/unit*
Retail	(> 100,000 sq.ft.)	105
Retail	(< 100,000 sq.ft.)	65
Office	Person (1 shift)	50
Industrial	Person (1 shift)	75
Restaurant	Meal Served	15
Theater	Per Seat	10
Hotel	Per Guest	210

* Quantities are exclusive of process water requirements which must be estimated and added.

For other than residential developments, when the details of the development are not known, maximum day consumption and fire flow may be estimated by the Village Engineer. Such estimate shall not relieve the owner or developer of the responsibility of providing adequate main capacity for any and all future needs within the development.

3. **Head Losses**. Head losses in relation to velocity in water mains shall be computed using the Hazen-Williams formula:

$$V = .318\ (C)(R)^{0.63}(S)^{0.54}$$

Where V = Velocity, in units of feet per second
C = 100
R = Hydraulic radius, in units of feet
S = Hydraulic gradient, in units of feet per foot

4. **Main Capacity**. Primary mains, secondary mains, and gridiron mains shall be sized to provide sufficient capacity to deliver the required fire flow plus the consumption at the maximum daily rate to all areas served by the proposed construction.

5. **Required Fire Flow and Pressure**. A separate fire flow report shall be prepared that indicates that at selected locations, and at any other locations that may be selected by the Village Engineer, the fire flows required, in excess of maximum daily consumptive demands, will be supplied using a "C" factor of 100, ignoring fittings, and with a minimum residual hydrant pressure of twenty (20) psi. Required fire flow shall be computed as detailed in the "Guide for Determination of Required Fire Flow," latest edition, published by the Insurance Service Office. Watermains shall be sized and set at grades to provide ISO fire protection flow rates. The developer shall bear the cost of the flow studies. Flow tests are to be performed to verify compliance w/ the guide.

Single-Family Residential	1500	GPM @ 25 PSI

Multi-Family Residential	2500	GPM @ 25 PSI
Commercial - Industrial	3500	GPM @ 25 PSI

6. **Fire Hydrant Spacing**.

   a. Fire hydrants shall be installed so that the near corner of all construction on the site that could burn will not be further than one hundred fifty (150) feet from a fire hydrant, and the maximum distance between fire hydrants shall be 350 ft. Fire hydrants shall be provided so as to provide the required fire flows to structures as described in the "Fire Suppression Rating Schedule," latest edition, published by the Insurance Service Office. Six (6) inch main extensions serving hydrants shall not be more than one hundred (100) feet long. Where water transmission lines or offsite water lines are installed in existing right-of-ways or in existing easements, hydrants must be installed at six hundred (600) foot intervals.

   b. Fire hydrants shall be placed on private property when the Fire Chief determines that fire hydrants are at too great a distance to provide proper protection for multi-family, commercial or industrial properties. Easements shall be provided for all hydrants on private property.

   c. Fire hydrants shall be placed within one hundred (100) feet of all sprinkler and or standpipe siamese connections provided on buildings unless otherwise directed by the Fire District because of existing or proposed circumstances.

7. **Valve Spacing**. A sufficient number of valves shall be provided so that a break or other failure will not affect more than thirty-two (32) residential units or one thousand (1000) feet of main in nonresidential areas. All valves 6" and larger must be installed in valve vaults.

C. **Material Specifications and Details**. All water distribution system elements shall conform to the following specifications:

1. **Duction Iron Pipe**.

   a. Pipe class thickness - ANSI A21.50 (AWWA C150), minimum thickness, Class 51

   b. Pipe - ANSI A21-51 (AWWA C151)

   c. Pipe lining - ANSI A21.4 (AWWA C104)

   d. Fittings - ANSI 21.10 (AWWA C110)

   e. Joints - mechanical and push-on, ANSI A21.11 (AWWA C111)

   f. Polyvinyl wrapping of all watermains is required unless soils are documented to be non-corrosive.

2. **Valves**.

a. Twelve (12) inch and smaller - iron body, bronze mounted, double disc, parallel seat, non-rising stem gate valves, counter clockwise to open, AWWA C500.

b. Fourteen (14) inch and larger - iron body, rubber seat, butterfly valve, Class 150B, counter clockwise to open, AWWA C504

c. Joint end - mechanical, AWWA C111

3. **Fire Hydrants.** (Exhibit No. WM-06.)

a. East Jordan Iron Works, Inc. 6BR with brass liner, painted Safety yellow. AWWA C502.

b. Valve size, 5 1/4-inch, counter clockwise to open.

c. Nozzles, 2 at 2 1/2-inch, 1 at 4 1/2-inch, with threads conforming to National Standard Specifications.

d. Frangible section (breakaway type) with the break line flange located one (1) inch above finished grade.

e. Hydrant to be installed with MJ swivel Tee with swivel MJ Gland. Auxillary to be flanged attachment to fire hydrant.

4. **Hydrant Valve Box** (Exhibit No. WM-06).

a. Tyler 664-S

b. Lid embossed "WATER"

5. **Air Release Valves**. Aplo, type 200A, 2-inch or valvematic.

6. **Corporation Stops**. (Exhibit No. WM-08). Mueller H15000, 1-inch minimum, AWWA C800

7. **Service Pipe**.

a. Copper tube, 2-inch and smaller, ASTM B88, Type K (1" minimum)

b. Ductile Iron, larger than 2-inch, conform to Section C(1) above.

8. **Curb Stop**.

a. Copper service, Mueller H-15154 as denoted in Exhibit No. WM-08.

b. Ductile iron service, conform to Sections C(2)(a) and C(2)(c) above.

9. **Curb Box**.

a. Copper service, Mueller H-10302 or H-10304 as denoted in Exhibit No. WM-08.

b. Ductile iron service, 4-inch and smaller, conform to Section C(4) above.

c. Ductile iron service, 6-inch and larger, conform to Section C(12) below.

10. **Concrete Thrust Restraints**.

a. Horizontal reactions - thrust restraints at all tees, plugged ends, hydrants, and bends between 11 1/4 degrees and 90 degrees shall conform to Exhibit No. WM-10.

b. Vertical reactions - the engineer shall submit individual designs for each location and comply with AWWA C600, Section 3.8.

c. Material - precast or poured Class X concrete.

d. Where undisturbed earth is not available or not likely to be available to back up pressure type concrete thrust blocks, the engineer shall specify tie rods with or without anchor type concrete thrust blocks and submit design data for such specifications. Care shall be taken when pouring concrete so that the mix will not interfere with access to joints or with hydrant drainage.

11. **Casing Pipes**. Steel pipe - ASTM A120, 0.375" minimum thickness.

12. **Valve Vaults**. (Exhibit Nos. WM-01 and WM-02).

a. Precast reinforced concrete - ASTM C478 and ASTM C443.

b. Size: For 6", 8", 10" and 12" diameter valves, valve vaults shall have a 48" inside diameter; for pressure connections and valves 16" and larger in diameter, valve vaults shall have a 60" inside diameter.

c. Adjustment: No more than two (2) precast concrete adjusting rings with six (6) inch maximum height adjustment shall be allowed.

13. **Castings**.

a. Manhole frame and cover - East Jordan Iron Works, Inc. 1022Z2 and 1020A HD embossed WATER and VILLAGE OF ORLAND PARK with a lid design as denoted on Exhibit No. WM-03.

b. Manhole steps, East Jordan Iron Works, Inc. #8518. 406.

14. **Crushed Granular Bedding**. (Exhibit No. WM-11). Crushed gravel or crushed stone course aggregate -ASTM C33, Size No. 67.

15. **Carrier Pipe**.

a. PVC pipe - AWWA C900, minimum thickness equal to SDR26, push-on type joints.

b. Other pipes - conforming to water main standards of this Section.

D. **Installation Requirements**.

1. **Environmental Protection Agency Permit**. Water system design and construction shall in all respects be in accordance with the regulations of the Environmental Protection Agency, State of Illinois. No construction shall commence until a copy of a permit from this agency is filed with the Village Engineer.

2. **Installation**. The installation of water mains and appurtenances, including services, shall conform to the requirements of this Section and shall conform to AWWA C600.

E. **Water Service Line**.

1. **Installation and Location**. A water service line is a water pipe connected at the water main by a brass corporation stop or a ductile iron fitting. Such pipe is extended horizontally at right angles with the water main to the front line of a lot or single building which it is to serve. The service pipe shall be provided with a brass curb stop or gate valve at the mid-point between the curb and the sidewalk unless otherwise specified by the Village Engineer. A cast iron curb box shall be installed over curb stops or four (4) inch and smaller gate valves. A valve vault shall be provided for gate valves larger than four (4) inches. All water service lines shall be located at the approximate center of each lot at a minimum depth of five (5) feet.

2. **Meters**.

a. All meters shall be installed in a habitable area and shall be accessible for inspection by the Village.

b. All meters shall be per Village standard as determined by the Director of Public Works. Meter size shall be determined by the Village Engineer. All meters other than single family residence shall be installed by a plumbing contractor at his expense. All meter installation shall comply with Village's codes and inspections. Residential meters shall have an AWWA approved gate valve at both ends. Both gate valves shall have female threads to accept male ends of meter couplings. Spread design shall be so only the meter and meter couplings will be between the two (2) valves. (Ord. 2680 - 3/18/96)

c. All 1" meter settings shall have an AWWA approved gate valve at both sides. Both valves shall have female threads to accept male ends of meter couplings. Spread design shall allow only the meter and meter couplings to be between the two (2) valves.

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d. All 1 1/2" meter settings shall have an AWWA approved gate valve at both sides. Both valves shall have male threads to accept female meter unions. Spread

design shall allow only the meter and meter coupling unions to be between the two (2) valves.

e. All 2" and larger meter settings shall receive flanged type meters per Village standard. A high quality brass gate valve shall be located immediately adjacent to companion flanges. (Ord.2860 - 3/18/96)

f. All meter settings of 2 inch size and larger will be equipped with a by-pass system that can be padlocked in the off position when authorized and approved by the Director of Public Works. (Ord.2860 - 3/18/96)

g. All meter settings require a reading device that is external to the meter. Conduit or thinwall is required when necessary to facilitate installation and maintenance of the reading device. Conduit shall be placed so the reading device will be mounted near the gas meter, 18" to 36" above foundation. (Ord.2860 - 3/18/96)

h. At all water meter settings, an electrical jumper wire shall be installed so the meter may be removed without breaking continuity, or interfering with the maintenance of the metering equipment. The wire size shall be equal to, or greater than the neutral conductor of the largest service supplied to the building by the Commonwealth Edison Company. Ground wires should be located to service side of meter wherever possible.

i. All special meter applications, including sprinkler systems, meter vaults, back flow preventors, and fire systems, shall require special review and authorization by the Director of Building Department and Director of Public Works. (Ord.2860 - 3/18/96)

3. **Back Flow Prevention**. Back flow prevention devices should be required in conformance with other applicable Village regulations.

4. **Water Service Connection Requirements**.

a. **Residential and Commercial**.

1. Each residential unit shall have a separate metered water service to each unit. The service line shall be individually tapped into the water main and extended into the unit without passing through the property of another unit. Location and placement of wiring conduit shall be determined by the Village Plumbing Inspector and installed by the contractor.

2. Multi-floor residential buildings can be served by one (1) adequately sized water service line into a meter room. Inside the meter room, the

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service shall be manifolded to accept one (1) meter per unit served and one (1) meter for any common purpose water use. The manifold shall be constructed similarly to a single meter setting with padlock type valving

device as approved by the Village Plumbing Inspector.

3. The meter room shall be accessible from a public area and constructed solely for water meter housing. A separate conduit shall be installed by the electrical contractor from each meter to a common point area on the building exterior. Location and placement of the wiring shall be determined by the Village Plumbing Inspector.

F. **Fire Service Line**. All fire sprinklers shall be connected to the water system through a separate fire service line constructed in accordance with the requirements in this Section.

G. **Water Main Protection**. All water main, storm sewer and sanitary sewer construction shall meet the requirements of this Section.

1. **Horizontal Separation**.

a. A water main shall be laid at least ten (10) feet horizontally from any existing or proposed storm or sanitary sewer line.

b. Should local conditions prevail which would prevent a lateral separation of ten (10) feet, a water main may be laid closer than ten (10) feet to a storm or sanitary sewer provided the main is laid in a separate trench or on an undisturbed earth shelf located to one side of the sewer and at such an elevation that the bottom of the water main is a least eighteen (18) inches above the top of the sewer. In such cases, water main shall be laid with as much horizontal clearance for sewer as possible.

c. If it is impossible to obtain proper horizontal and vertical separation as stipulated in Subsections (a) or (b) above, both the water main and the length of sewer between adjacent manholes shall be constructed of push-on or mechanical-joint ductile iron pipe, or pre-stressed concrete pipe and shall be pressure-tested to assure water tightness before backfilling.

2. **Vertical Separation**.

a. Whenever a water main must cross house sewers, storm drains, or sanitary sewer, the water main shall be laid at such an elevation that the bottom of the water main is eighteen (18) inches above the top of the drain or sewer. This vertical separation shall be maintained for that portion of the water main located within ten (10) feet, horizontally, of any sewer or drain crossed. Said ten (10) feet is to be measured at the normal distance from the water main to the drain or sewer.

b. Where conditions exist that the minimum vertical separation set forth in a subsection above cannot be maintained, or it is necessary for the water main to pass under a sewer or drain, one of the following two measures must be taken:

1. The water main shall be installed within a PVC carrier pipe and the carrier pipe shall extend on each side of the crossing until the normal distance from the water main to the sewer or drain line is at least ten (10) feet.

2. The involved sewer or drain shall be constructed from manhole to manhole with "O" ring pipe conforming to ASTM 361 or other pipe material which would conform to water main standards.

H. **Construction Requirements**.

1. **Excavation**.

a. The trench shall be excavated so that the water main shall have a minimum of five (5) feet of cover. The trench for the pipe shall be excavated at least twelve (12) inches wider than the external diameter of the pipe but not wider than the widths denoted on Exhibit No. WM-11.

b. Bell holes of sufficient depth shall be provided across the bottom of the trench to accommodate the bell of the pipe, to provide sufficient room for joint making and to insure uniform bearing for the pipe.

c. Where a firm foundation is not found to exist for the bottom of the trench at the required depth due to soft, spongy or other unsuitable soil, such unsuitable soil shall be removed for the full width of the trench or tunnel and replaced with well compacted unwashed gravel or an equal substitute, or crushed stone if such compacted material proves unsatisfactory. Where rock in either ledge or boulder formation is encountered, it shall be removed below grade and replaced with a well-compacted cushion of unwashed gravel having a thickness under the pipe of not less than eight (8) inches.

2. **Sheeting and Bracing**.

a. Sheeting and bracing shall be used in the excavation area as may be necessary for the safety of the work and the public, for the protection of the workmen and to prevent damage to adjacent properties.
b. Sheeting shall not be removed until the backfill has been placed and thoroughly compacted.

3. **Laying Water Main**.

a. The contractor shall keep the trench free from water while the water main is being placed and until the pipe joint has been sealed to the satisfaction of the Village Engineer.

b. Adequate provision shall be made for the safety, storage and protection of all water pipe prior to actual installation in the trench. Care shall be taken to prevent damage to the pipe castings, both inside and out. Provisions shall be made to keep the inside of the pipe clean throughout its storage period and to keep mud nd/or other debris from being deposited therein. All pipe shall be thoroughly cleaned on the inside before laying of the pipe. Proper equipment shall be used for the safe handling, conveying and laying of the pipe. All pipe shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes, or other

suitable tools or equipment, in such manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

c. In making joints, all portions of the joining materials and the socket and spigot ends of the joining pipe shall be wiped clean of all foreign materials. The actual assembly of the jointing shall be in accordance with the manufacturer's installation instructions and/or as directed by the Village Engineer. During construction, until jointing operations are complete, the open ends of all pipes shall be at all times protected and sealed with temporary watertight plugs.

4. **Pipe Cutting**.

a. The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to cement lining and so as to leave a smooth end at right angles to the axis of the pipe.

b. When machine cutting is not available for cutting pipe twenty (20) inches in diameter or larger, the electric-arc cutting method shall be permitted, using a carbon or steel rod. Only qualified and experienced workmen shall be allowed to perform this work.

c. The flame cutting of pipe by means of an oxyacetylene torch shall not be allowed.

5. **Trench**.

a. The trench bottom shall be flat and shall provide full bearing of the length of the pipe.

b. Thrust blocks shall be used to prevent movement at all bends, tees, caps, valves and hydrants.

c. Backfilling of the trench shall be accomplished by careful replacement of the excavated material after the pipe and the bedding material have been installed. Any pipe installed within two (2) feet of a pavement edge or curb and gutter shall be backfilled to the top of the trench with granular material in compliance with SSR & BC.

6. **Fire Hydrant**.

a. Fire hydrants shall be placed as specified on engineering plans. All hydrants shall stand plumb, their nozzle pointing normal to the road. They shall conform to the established grade, with nozzles at twenty-four (24) inches above the finished ground.

b. A drainage pit two (2) feet in diameter and two (2) feet deep shall be excavated below each hydrant and filled completely a minimum of one cubic yard of crushed stone under and around the bowl of the hydrant and to a level six (6) inches

above the waste opening. No hydrant drainage pit shall be connected to a sewer.

c. Hydrant leads and extensions shall be provided as needed in order to maintain adequate setback from the water main and to provide a minimum of twenty-four (24) inches distance from steamer port to final ground elevation.

7. **Water Main Installation**. During water main installation, to make a closure between two pipe ends, or between pipe end fittings, or between pipe end and valve, short lengths shall be used with proper connections or couplings. Repair sleeves shall not be used to make closures during new construction.

8. **Dewatering**. Where water is encountered in the trench, it shall be removed during pipe-laying and jointing operations. Trench water shall not be allowed to enter the pipe at any time.

9. **Connections to Existing Mains**. All connections to the Village water distribution system shall be made under full water service pressure unless otherwise approved by the Village Engineer at locations approved by the Village Engineer.

I. **Pressure Test**.

1. As part of the construction, the water mains shall be pressure tested in accordance with this Section.

2. All newly laid pipe shall be subjected to a hydrostatic pressure of one hundred fifty (150) pounds per square inch. Duration of each pressure test shall be for a period of not less than two (2) hours. Each valved section of pipe shall be filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe. Before applying the specified test pressure, all air shall be expelled from the pipe. All leaks shall be repaired until tight. Any cracked or defective pipes, fittings, valves, or hydrants discovered in consequence of this pressure test shall be removed and replaced and the test repeated until satisfactory results are obtained.

3. All testing shall be done before the installation of service lines. Suitable means shall be provided for determining the quantity of water lost by leakage under the specified test pressure. Allowable leakage shall not be greater than that computed as follows:

$$L = \frac{(N)\,(D)\,(P)}{7400}$$

L = Allowable leakage in gallons per hour
N = number of joints in length of pipeline tested
D = Nominal diameter of the pipe in inches
P = Average test pressure during leakage test in pounds per square inch gauge.

Leakage is defined as the quantity of water required to be supplied to the newly laid pipe necessary to maintain the specified leakage test pressure.

J. **Preliminary Flushing**. Prior to chlorination, the main shall be flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the pressure test is made. Because such flushing removes only the lighter solids, it cannot be relied upon to remove heavy material allowed to get into the main during laying. If no hydrant is installed at the end of the main, a tap should be provided large enough to affect a velocity in the main of at least two and one-half (2 1/2) feet per second.

K. **Disinfection**.

1. The preferred point of application of the chlorinating agent shall be at the beginning of the pipeline extension or any valved section of it and through a corporation stop in the top of the newly laid pipe. The injector for delivering the chlorine-gas into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension.

2. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine-gas. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall be at least fifty (50) ppm, or enough to meet the requirements during the retention period. This may require as much as one hundred (100) ppm of chlorine in the water left in the line after chlorination.

3. Valves shall be manipulated so that the strong chlorine solution in the line being treated shall not flow back into the line supplying the water.

4. Treated water shall be retained in the pipe long enough to destroy all spore-forming bacteria. This retention period shall be at least twenty-four (24) hours. After the chlorine-treated water has been retained for the required time, the chlorine residual at the pipe extremities and at other representative points should be at least 10 pm.

5. In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

6. All water mains shall be disinfected and tested according to the requirements of the "Standards for Disinfecting Water Mains," AWWA C601, and as required by this Section. All disinfection, as required by this Section, shall be performed by an independent firm exhibiting experience in the methods and techniques of this operation, and shall be approved by the Village Engineer.

L. **Final Flushing and Testing**.

1. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline at its extremities until the replacement water, throughout its length shall, upon test, be approved as safe water by the Village Engineer. This quality of water delivered by the new main should continue for a period of at least two (2) full days as demonstrated by laboratory examination of samples taken from a tap located and installed in such a way as to prevent outside contamination. Samples should never be taken from an unsterilized hose or from a fire hydrant because such samples seldom meet current bacteriological

standards.

2. After disinfecting and flushing, a minimum of two (2) water samples shall be collected by the contractor on two successive days, with notice given, so that the collection may be witnessed by the Village Engineer. Bacteriological sampling and analysis of the samples shall be performed by a laboratory approved by the Illinois Department of Public Health and the Village Engineer. Should the initial treatment result in an unsatisfactory bacterial test, the procedure shall be repeated until satisfactory results are obtained. The contractor or developer shall pay for the sampling and analysis. Results of the analysis shall be transmitted by the laboratory directly to the Village Engineer. Test results shall indicate the date the sample was collected, the date the analysis was made, the exact locations at which samples were taken, the firm submitting the sample, and the project at which the samples were collected. Sufficient samples shall be collected in order to insure that the system is bacteriologically safe.

M. **Exhibits**. Exhibits labelled WM-01 through WM-11 are typical specifications of water main standards that shall be applied to any improvements required by these regulations.

N. **Acceptance of Water Supply**.

1. Once the water supply system has been completed according to the specifications set forth in this Section, the Director of Engineering shall, upon the request of the developer, inspect the system and prepare a list of items for repair (punch list). The list shall be given or sent to the developer and when repairs have been made, the Director of Engineering shall accept the system for operational use only. During the time after the acceptance by the Village for maintenance, the developer shall be responsible for any delinquencies incurred within the system, including but not limited to water main leaks, adjustment to manhole frames and bent curb boxes. Upon reaching approximately eighty (80) percent development of building construction, the Director of Engineering will reinspect the water supply system for any delinquencies which may have occurred and prepare a list of items for repair. The list shall be given or sent to the developer and when the repairs have been made to the satisfaction of the Director of Engineering, the Director shall accept the system for the Village. (Ord. 2570 - 5/2/94)

2. All construction shall meet the requirements and acceptance by the Illinois Environmental Protection Agency prior to the acceptance by the Director of Engineering. (Ord. 2570 5/2/94)

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APPENDIX B

INDEX OF SPECIAL PROVISIONS

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LOCAL AGENCY SPECIAL PROVISIONS:

13. CCDD MATERIALS MANAGEMENT ALLOWANCE

13. STREET LIGHT CIRCUIT CONSTRUCTION

14. TRAFFIC SIGNAL

14. MODIFY EXISTING TRAFFIC SIGNAL INSTALLATION

14. FINAL CONNECTION OF EXISTING FIBER OPTIC AND TRACER CABLES

IDOT TRAFFIC SIGNAL SPECIAL PROVISIONS

STATE OF ILLINOIS
SPECIAL PROVISIONS

The following Special Provisions supplement the Illinois Department of Transportation's (IDOT) "Standard Specifications for Road and Bridge Construction," adopted January 1, 2012, (hereinafter referred to as the "Standard Specifications"); the "Manual on Uniform Traffic Control Devices for Streets and Highways" and the "Manual of Test Procedures of Materials", in effect on the date of invitation for bids; and the "Supplemental Specifications and Recurring Special Provisions," latest edition as indicated on the Check Sheet included herein, and Standard Specifications for Water and Sewer Main Construction in Illinois latest edition. In case of conflict with any part or parts of the Standard Specifications, these Special Provisions shall take precedence and shall govern.

DESCRIPTION OF WORK:

The work included in this contract shall consist of furnishing all labor, materials, equipment, and other incidentals necessary for the westerly extension of 156th Street in the Village of Orland Park from LaGrange Road (US Route 45) to South Ravinia Road. The improvements to LaGrange Road include construction of a southbound right turn lane. The length of the 156th Street extension is approximately 1,021 feet with a proposed cross-section consisting of a 36-foot edge-to-edge bituminous pavement with Village type curb and gutter. Also included within this contract is proposed mill, widening and HMA overlay of S. Ravinia Avenue for approximately 620 feet and of 156th St. east of U.S. Rte. 45 (LaGrange Road) for approximately 280 feet. There will be a proposed 8'bike path along the south side and 5' P.C.C. sidewalk along the south side of 156th Street within the Village Right-Of-Way (ROW). There will be no sidewalk along the north side of the street. An enclosed storm sewer system shall be constructed for street drainage. The storm sewer will outlet into a proposed sedimentation basin as part of this project. There will be a proposed water main installed the length of the improvement along 156th Street, as well as Street Lighting. The style and manufacturer for the light poles and luminaries will be those as specified here within the plans and specifications. The project also includes traffic signal installation, and other incidental and miscellaneous items of work in accordance with the Plans, Standard Specifications, and these Special Provisions.

LOCATION OF WORK:

This project is located at between US Rte. 45 (LaGrange Road) and Ravinia Avenue at 156th Street intersection in the village of Orland Park, Cook County, Illinois. Total project length is approximately 2,855 feet (0.54 miles). A location map is shown on the cover of the plans.

REDUCTION IN THE SCOPE OF WORK

The "Summary of Quantities" is a listing of work to be accomplished. However, due to budgetary constraints the awarding authority reserves the right to reduce the scope of work to be completed under the contract. No allowance will be made for delay or anticipated profits as the result of a decrease in the quantities of work to be performed.

REFERENCE POINTS

The Design Engineer will provide base lines, benchmarks and reference points, which in Design Engineer's judgment are necessary to enable the Contractor to proceed with the work. The Contractor shall provide all stakes, markers, labor, and assistance required by the Engineer.

The Contractor shall be responsible for laying out the work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the Village. The Contractor shall report to the Village representative whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for accurate replacement or relocations of such reference points by professionally qualified personnel.

LIMITATIONS OF ENGINEERS AUTHORITY

The Design Engineer will assist the Village representative during the bidding and construction period, providing construction document interpretation and clarification. The Design Engineer will provide base lines, benchmarks and reference points, assist the Contractor with interpretation of the Plans and Specifications. The Design Engineer and/or the Village will not supervise, direct, control, or have authority over or be responsible for the Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the Contractor's failure to perform or furnish the work in accordance with the Contract Documents.

The Design Engineer and/or the Village will not be responsible for the acts or omissions of the Contractor or any subcontractor, any supplier, or of any other person or organization performing or furnishing any of the work.

PRECONSTRUCTION CONFERENCE

Preconstruction conference will be scheduled to be held no later than 20 days after the effective date of the Agreement. The conference shall be attended by authorized representatives of the Contractor and major subcontractors. The Village will advise other interested parties and request their attendance.

Information will be distributed and discussed concerning at least the following items:

1. Highway Permit (OPER 1045) and Individual Highway Permit Bond (OPER 1046) shall be coordinated with ENGINEER submitted to IDOT prior to the Pre-Construction Conference. Contractor will Provide Individual Highway Permit Bond in the amount of $30,000 of which related costs shall be included in the total bid amount and no additional compensation shall be allowed.
2. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and Village Representative.
3. Channels and procedures for communication.
4. Construction schedule, including sequence of critical work.
5. Contract Documents, including distribution of required copies of original documents and revisions.
6. Processing of Shop Drawings and other data submitted to the Design Engineer for review.
7. Processing of Bulletins, field decisions, and Change Orders.
8. Rules and regulations governing performance of the work; and

9. Procedure for safety and first aid, security, quality control, housekeeping, and other matters.

DUST CONTROL WATERING

This work shall consist of the exclusive control of dust resulting from construction operations and is not intended for use in the compaction of earth embankments, as specified under Article 107.36 of the Standard Specifications. Dust shall be controlled by the uniform application of sprinkled water and shall be applied only when directed by the Engineer, in a manner meeting his approval. All equipment used for this work shall meet the Engineer's approval and shall be equipped with adequate measuring devices for metering the exact amount of water discharged. This work shall include furnishing all labor, water and equipment for controlling dust as herein specified.

This work will not be measured for but be included in the unit prices bid and no additional compensation will be allowed.

TRAFFIC CONTROL AND PROTECTION:

Traffic control shall be in accordance with the applicable sections of the Standard Specifications, the Supplemental Specifications, the "Illinois Manual Uniform Traffic Control Devices for Street and Highways," and any special details and Highway Standards contained in the plans, and the Special Provisions contained herein.

Special attention is called to Article 107.09 and Sections 701, 702, and 783 of the Standard Specifications and the following Highways Standards, Supplemental Specifications, Details, Quality Standard for Work Zone Traffic Control Devices, Recurring Special Provisions, and Special Provisions contained herein relating to traffic control.

The Contractor shall contact the Village at least 72 hours in advance of beginning work. Construction operations shall be conducted in a manner such that streets will be open to emergency traffic and accessible as required to local traffic. Removal and replacement of curb and gutter and driveways shall be planned so as to cause a minimum of inconvenience to the abutting property owners.

The work shall be accomplished such that the streets will be left open to local traffic at the end of each working day. It will also be necessary to provide advance notice to residents, police, fire, school districts, and trash haulers when access to any street will be temporarily closed or limited.

At the preconstruction meeting, the Contractor shall furnish the name and telephone number of the individual in his direct employ who is to be responsible for the installation and maintenance of the traffic control of this project and where the above individual may be reached during non-working hours. If the actual installation and maintenance are to be accomplished by a subcontractor, consent shall be requested of the Engineer at the time of the preconstruction meeting in accordance with Article 108.01 of the Standard Specifications. This shall not relieve the Contractor of the requirements to have a responsible individual in his direct employ supervise this work.

This work will be paid for at the contract lump sum price for TRAFFIC CONTROL AND PROTECTION, which price shall be payment in full for all labor, materials, transportation, handling and

incidentals necessary to furnish, install, maintain, replace, relocate and remove all traffic control devices indicated in the Highway Standards and Standard Specifications.

TRAFFIC CONTROL DEFICIENCY:

The Contractor is expected to comply with the Standard Specifications, contract plans, and these Special Provisions concerning traffic control and protection. All traffic control devices shall be kept clean and neat appearing, and shall be replaced immediately if they become ineffective due to damage or defacement.

Failure to comply with the Standard Specifications, contract plans, or these Special Provisions concerning traffic control will result in a charge of $300.00 per day, in addition, if the Contractor fails to respond, the Village may correct the deficiencies and all cost thereof will be deducted from monies due or which may become due the Contractor. This corrective action will in no way relieve the Contractor of his/her contractual requirements or responsibilities.

SEQUENCE OF CONSTRUCTION:

The contractor shall perform his work in a manner causing minimal inconvenience to the residents and motoring public. On streets where curb and gutter is to be removed and replaced, or for pavement widening, the contractor shall limit his operations to one side of the street only. Once the widening and curb and gutter is complete, the contractor may move to the other side of the street to start the widening/ curb and gutter removal and replacement operations. The trenches created by the removal operations in front of the Driveways shall be filled with Aggregate to provide access to the residents to their driveways.

No additional compensation shall be allowed to the contractor for the above requirements, but will be included in the various contract items.

BITUMINOUS MATERIALS (PRIME COAT):

This work shall be done in accordance with Section 406 of the Standard Specifications except as modified herein.

406.05 Preparation , Priming and Leveling of Brick, Concrete, HMA or Aggregate Bases. Change the prime coat application rate to "0.1 gal/sq yd" in the first paragraph of Article 406.05(b)

406.05 Preparation and Priming of Aggregate Bases. Change the prime coat application rate to "0.5 gal/sq yd" in the second paragraph of Article 406.05(b)

406.14 Basis of Payment. Revise the first paragraph of this Article to read:
"406.14 Basis of payment. This work shall be paid for at the contract unit price per gallon for BITUMINOUS MATERIALS (PRIME COAT)."

CONSTRUCTION DEBRIS

Add the following to the third paragraph of Article 202.03 of the Standard Specifications:

"The Contractor shall not conduct any generation, transportation, or recycling of construction or demolition debris, clean or general or uncontaminated soil generated during construction, remodeling, repair, and demolition of utilities, structures, and roads that is not commingled with any waste, without the maintenance of documentation identifying the hauler, generator, place of origin of the debris or soil, the weight or volume of debris or soil, and the location, owner, and operator of the facility where the debris or soil was transferred, disposed, recycled or treated. This documentation must be maintained by the Contractor for 3 years."

DEBRIS REMOVAL:

Materials resulting from the removal of driveways, bituminous surfaces, etc. shall be removed at the end of each day to an approved site. In the judgment of the Village, if the material is not removed in a timely manner, the Village will have the material removed and the Contractor shall be billed (charged) accordingly.

PROTECTION AND RESTORATION OF PROPERTY:

The Contractor shall take all necessary precautions for the protection of public and private property. The Contractor is responsible for the damage or destruction of property resulting from neglect, misconduct, or omission in his/her manner of method of execution or non-execution of the work or caused by defective work, or the use of unsatisfactory materials or equipment, and such responsibility shall not be released until the work has been completed and accepted and the requirements of these specifications complied with.

Whenever public or private property is so damaged or destroyed, the Contractor shall, at his/her expense, restore such property to a condition equal to that which existed prior to such damage or injury by repairing, rebuilding, or replacing it as may be directed, or he/she shall otherwise make good such damage or destruction in an acceptable manner. If he/she fails to do so, the Village will withhold any payouts toward completed work until arrangements are made to correct any damage as described above.

CONSTRUCTION WATER SUPPLY

The use of fire hydrants or existing streams, creeks, wetlands or ponds is strictly prohibited. The Contractor shall provide a water truck and driver as required to obtain and transport this water. The Contractor shall be responsible for obtaining water from an approved source. If this water is from a source other than his yard, written approval from the agency having jurisdiction for the source of the water must be received by the Contractor prior to use of the water.

REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL

This work shall be performed in accordance with Section 202 of the IDOT Standard Specifications for Road and Bridge Construction. Removal shall be made to a depth as depicted in the plan cross sections and per Report: Geotechnical Site Investigation by Malcolm Pirnie, Inc. Dated January 24, 2006 for removal of Organic Clays (Soft to Medium and Hard) necessary to encounter soils with suitable bearing value as described in the Standard Specifications. The soft to medium organic clays shall be used for

topsoil on site and the remainder shall be properly disposed of off-site by the Contractor. The disposal of unsuitable material will not be reimbursed and the cost should be included in the unit price of the pay item.

Final quantity determination shall be based on cross-sections taken at the time of construction.

This work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL. The Contractor shall construct POROUS GRANULAR EMBANKMENT, SPECIAL; GEOTECHNICAL FABRIC FOR GROUND STABILIZATION; and EMBANKMENT per Sections 205, 209, and 202, respectively. Filling of the undercut areas will be paid for separately at the contract unit price for cubic yards for POROUS GRANULAR EMBANKMENT, SPECIAL and cubic yards for EARTH EXCAVATION.

CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED

This work shall be performed in accordance with applicable portions of Section 664 of the IDOT Standard Specifications for Road and Bridge Construction. Contractor shall submit shop drawings of the proposed Gate 24 feet in width (hinged at each edge of the drive back of curb) to be reviewed by the Village prior to material order.

This work will be paid for at the contract unit price per Foot for CHAIN LINK FENCE TO BE REMOVED AND RE-ERECTED. This contract price shall include the proposed Gate and proper disposal of unused Fence material.

DUCTILE IRON WATER MAIN, VALVES, HYDRANTS AND CONNECTIONS

This work shall consist of construction of water main, water valves, fire hydrants with auxiliary valves and vaults, water main connections, elbows, tees, swivel tees, chlorination and testing. The construction of water mains; fire hydrants and valves; elbows and tees; including protection from sewers, pressure testing, and disinfection, shall be in accordance with the "Standard Specifications for Water & Sewer Main Construction in Illinois", latest edition and Section 6-410 - Water Supply of the Village of Orland Park Subdivision Standard Code. This work will be paid for at the contract unit price in Feet for DUCTILE IRON WATER MAIN, of diameter specified; Each for FIRE HYDRANTS WITH AUXILIARY VALVE AND VALVE BOX; Each for GATE VALVES, of diameter specified; Each for VALVE VAULTS, TYPE A, 4' DIAMETER, TYPE 1 FRAME, CLOSED LID. The cost for construction of water main connections, tees, swivel tees, chlorination and disinfection testing shall be included in the Contract unit price of DUCTILE IRON WATER MAIN, of diameter specified.

CCDD/LUST MATERIALS ANALYSIS, MANAGEMENT & COMPLIANCE

To comply with Public Act 96-1416, the Contractor shall be responsible for all IEPA documentation and testing required to haul and dispose of Clean Construction or Demolition Debris. All costs that involve the analysis, management, and compliance of all excavated material that is to be hauled and disposed from the site are to be included in the lump sum unit price for CCDD/LUST MATERIALS ANALYSIS, MANAGEMENT, & COMPLIANCE.

The purpose of this item is to ensure that excavated materials leaving the site are properly analyzed, and managed for transport to the respective IEPA permitted handling facility. The Contractor shall acquire the services of a third party environmental engineer that specializes in the analysis, identification and management of excavated materials associated with CCDD and LUST IEPA regulations.

The third party engineer must provide a Statement of Qualifications indicating their previous experience in the analysis, identification, and management of excavated materials in the State of Illinois. The Statement must be presented to the Engineer no more than ten (10) days after the low bidder receives their Notice of Award.

Prior to Construction the third party engineer shall perform the following preliminary soil investigations to analyze and identify excavated materials:

LUST Locations:

1. Perform a minimum of one (1) soil boring adjacent to the LUST location at the point where the deepest proposed excavation I to occur.
2. Soil samples shall be collected and tested every 2-foot for BTEX, PNA, and SPLP metals up to the depth of proposed excavation.

Remaining Locations:

1. Perform a minimum of five (5) soil borings at even intervals throughout the project at the point where the deepest proposed excavation is to occur.
2. Soil samples shall be collected and tested every 2-foot for BTEX, PNA, and SPLP metals up to the depth of proposed excavation.

The third party engineer shall then submit to the Engineer an Identification & Operations Plan that shall list the following:

1. Identification and classification procedures of excavated materials from the site.
2. Establish probable limits and quantities for the following materials:
    a. Special Waste as identified in Section 669 of the State Standards.
    b. Clean Construction Demolition Debris as identified per Publix Act 96-1416.
    c. Non-special Waste as identified in Section 669 of the State Standards.
3. Provide a list of approved disposal sites AND include contractor haul costs on a per load basis.

The Engineer shall review and approve the Identification and Operations Plan. Contractor shall not commence any excavation activity until the Plan has been approved.

During construction the Contractor's third party engineer shall be responsible to inspect, screen/analyze, identify, and certify the materials leaving the site. The third party engineer shall provide to the Engineer copies of all testing results, trucking manifests and other required documentation regarding the identification and disposal of excavated material.

CCDD Handling:

The following provision shall apply to all materials classified by the third party engineer as CCDD.

PART 1 GENERAL

1.1. SECTION INCLUDES

A. Regulatory requirements.
B. Definition.
C. Use as fill.
D. Exceptions.
E. Contractor's responsibilities.

1.2. REGULATORY REQUIREMENTS

A. The Illinois Environmental Protection Agency (IEPA) Bureau of Land regulates fill pits remain to protect groundwater and ensure that they remain uncontaminated when filled with soil and construction debris. This action is mandated under Public Act 96-1416.
B. This specification was developed to guide the Contractor in complying with the requirements of IEPA. The Contractor is fully responsible for adhering to legal and regulatory requirements whether or not they are listed in this specification.

1.3. DEFINITION

A. Clean construction or demolition debris (CCDD) is uncontaminated broken concrete without protruding metal bars, bricks, rock, stone, or reclaimed asphalt pavement generated from construction or demolition activities.
B. When uncontaminated soil is mixed with any of these materials, the uncontaminated soil is also considered CCDD.
C. Uncontaminated soil that is not mixed with other CCDD materials is not CCDD.
D. For the purposes of CCDD classification, industrial/commercial property includes any real property that does not meet the definition of residential property, conservation property, or agricultural property and includes public roadway right-of-ways.

1.4. USE AS FILL

A. Filling quarries, mines and other excavations with CCDD Requires a permit from the Illinois EPA's Bureau of Land. Per the IEPA "Other excavations" do not include holes, trenches, or similar earth removal created as part of normal construction, removal, or maintenance of a structure, utility or transportation infrastructure.
B. A list of existing CCDD fill locations is attached to this specification section. This list may not be current at the time bids are due or that CCDD is to be removed from the Site.

1.5. EXCEPTIONS

A. In lieu of following the requirements specified herein for the use of CCDD as fill, the Contractor may elect to dispose of construction debris as a waste.
B. If the Contractor chooses to dispose of construction debris as a waste, they must abide by all applicable State and local regulations governing waste disposal.

1.6. CONTRACTOR'S RESPONSIBILITIES

A. All fees associated with using CCDD as fill, including fees imposed by the Illinois EPA, are the responsibility of the Contractor and should be included in the Contract Price.

B. It is the Contractors responsibility to check that the attached list is current prior to removing CCDD from the Site. CCDD used as fill must be at a location approved by the Illinois EPA.

C. The third party engineer is responsible to submit form #LPC-663 (attached herein) to the IEPA. Neither the Owner nor the Engineer will sign the required certification forms.

D. The third-party engineer should reference the numerical standards listed in 35 Ill. Adm. Code 742, Tiered Approach to Corrective Action Objectives (TACO) for making the determination whether the CCDD meets the requirements of uncontaminated soil.

Measurement and Payment

This work will be measured for payment in accordance with Article 109.04.b of the Standard Specifications. All submittals will be reviewed by the Engineer and the Village. Upon approval from the Village payments shall be made from the Lump Sum CCDD/LUST MATERIALS ANALYSIS, MANAGEMENT, & COMPLIANCE. The price shall be considered payment in full for all materials, labor and equipment to perform this work including soil borings an placing trench backfill material in the investigation boring locations.

Permitted CCDD Fill Applications

Name	Site Number	Site Address	City	Zip	Phone	Contact Last Name	Contact First Name
City of Princeton CCDD Facility	0118193005	1600N Rd., R.R.6	Princeton	61356	815-875-2631	Wright	Steve
Brookville Quarry CCDD	0158200001	US Rt 52/ IL Rt 64	Brookville	61064	815-626-5192	Arnold	Robert
Fitzmar Landfill Inc	0310450011	28th St and East End Ave	Chicago Height	60411		Orr	Kathleen
Lambrecht Property-CCDD	0311055032	Glenwood Dyer Rd & Frontage Rd	Glenwood	60425	815-726-7722	Klingberg	Daniel
Reliable Lyons CCDD	0311715020	4226 S Lawndale Ave	Lyons	60534		Haworth	William
Hanson Material Service Yd 585	0311745012	9101 W 47th St	McCook	60525	708-485-8211	Hall	Bret
Vulcan Construction Materials LP McCook Quarry	0311745029	5500 E Joliet Rd	McCook	60525	708-485-6602	Van Kovering	Kelly
Richton Park-CCDD	0311800001	22100 Central Rd	Richton Park	60471	708-449-1250	Butler	James
Gifford East-CCDD	0314125046	1395 Gifford Rd	Elgin	60120		Haworth	William
Little, Willis-CCDD	0418055004	CR 2100 E	Murdock	61941	217-832-9511	Little	Myron
Prairie Material Sales Yd 92	0890255034	1151 Penney Rd	East Dundee	60118	847-844-8257	Plummer	David
Prairie Material Sales Yd 91	0890305044	1 South 396 Lorang Rd	Elburn	60119	630-557-2396	Plummer	David
Central Blacktop Co Inc	0890805023	Bowes Road	South Elgin	60177		Vondra	Michael
Fox River Stone Co	0890805051	1300 South Route 31	South Elgin	60177	847-742-6060	Wallace	Sarah
Raymond Street-CCDD	0890805066	1400 Route 25	South Elgin	60177	630-497-8700	Haworth	William
Middle St CCDD	0894125006	1155 W Middle St	South Elgin	60177	630-497-8700	Haworth	William
47 Acres/Southwind Business Park	0894125007	2250 Southwind Blvd	Bartlett	60103	630-497-8700	Haworth	William
Beverly Materials CCDD	0894250020	32W007 Route 72	East Dundee	60118	847-695-9300	Zumbrunn	David
Palumbo Management CCDD	0898065017	32W638 E Main St/E of Higgins Rd	East Dundee	60118	312-455-1181	Palumbo	Joseph
Blue Heron Business Park-Bartlett	0898075002	23108 W Bartlett Rd	Bartlett	60103		Haworth	William
Lakeview Estates CCDD	0898105004	NE Harter Rd @ Lorang Rd	Kaneville	60144		Koty	John
EF Heil LLC Site 2	0918000002	2405 Waldron Road	Kankakee	60901	815-436-3500	Grande	Patrick
Prairie Material Sales Yd 95	0918065001	8215-C N Route 45/52	Manteno	60950	815-468-8700	Plummer	David
Midwest Aggregates	0970055126	28435 W Rte 173	Antioch	60002	847-395-2595	Mertes	Jim

Name	Site Number	Site Address	City	Zip	Phone	Contact Last Name	Contact First Name
Cannon Pit	0990305107	I-80 & Rte178	LaSalle	61301	815-664-2341	Hoxsey	Bruce
Sheridan Sand & Gravel-Wiensland	0991105008	105 S Wiensland	Sheridan	60551	815-496-2826	Vardijan	Branko
Hedrick Property CCDD Site	0994905104	800 W Second St	Streator	61364	815-257-0649	Koty	John
Sheridan Sand & Gravel-N 4201 Rd	0998215024	2679 N 4201 Rd	Sheridan	60551	815-496-2421	Vardijan	Branko
Twoomey Pit CCDD	1078120003	2000th Ave & 2050th St	Lawndale	61751		Reichle	Joe
Petersen Sand & Gravel CCDD	1110600018	914 W Rte 120	Lakemoor	60050	847-395-3313	Thelen	Steve
Prairie Material Sales Yd 90	1110655054	8293 S Route 23	Marengo	60152	815-568-5554	Plummer	David
Thelen Sand & Gravel	1114200001	28955 E IL Rt 173	Antioch	60002	847-395-3313	Steve	Thelen
Reliable Sand and Gravel Co Inc	1118115015	2121 S River Road	McHenry	60051	815-385-5020	Roberts	Don
Rowe Construction Co-Downs	1138120003	700 North & 2000 East	Downs	61736	309-830-5060	Luker	Phil
Downs CCDD Facility	1138123002	West of Co Rd 200 E; South of Co Rd 750N	Downs	61736		Bottens	Joseph Shane
McAdam & Associates CCDD	1610656079	340 34th Ave	Rock Island	61201	309-786-6027	McAdam	David
Buckhart Sand & Gravel Co Inc	1670755002	10499 Buckhart Rd	Rochester	62563	217-525-1752	Ealey	Charles
Farmdale Pit	1798065010	22493 Farmdale Rd	East Peoria	61611	309-699-0961	Moore	Steve
Anna Quarries Inc	1810050003	1000 Quarry Road	Anna	62906	618-833-5121	Pyatt	William
Galt Road CCDD Facility	1958095004	13237 Galt Road	Sterling	61081	815-626-5192	Arnold	Robert
Quality Ready Mix Concrete Co	1958105001	13134 Galt Rd	Sterling	61081	815-772-7181	Holesinger	Randy
Chicago Street CCDD, LLC	1970455178	1127 S Chicago St	Joliet	60436	815-723-3000	Sandeno	Kenneth
E F Heil LLC Site 1	1970805144	12152 S Npville/Plainfield Rd	Plainfield	60585	815-436-7465	Heil	Edward
Hanson Material Service Yd 588	1970900001	Route 53	Romeoville	60446	815-838-6200	Hall	Bret
Orange Crush LLC-Romeoville	1970905104	1001 Independence Ave	Romeoville	60446	708-544-9440	Ehlert	Clifford
Land & Lakes Clean Fill Site	1970905141	1371 N Joliet Rd	Romeoville	60446	847-825-5000	Cowhey Jr	James
Richards St CCDD	1974450034	800 S Richards St	Joliet	60432	815-726-6284	Hess Jr	Phil
Elmhurst Chicago Stone Co-Barbers Corners	1978030002	351 Royce Road	Bolingbrook	60490	630-832-4000	Peter	Stamatopoulos
DeBe Land Dev Inc Quarry	1978095150	1450 South Brandon Road	Joliet	60436-85	708-460-1725	Koty	John
FJV Development	1978175017	3210 Mound Rd	Joliet	60436	773-847-1900	Koty	John

Name	Site Number	Site Address	City	Zip	Phone	Contact Last Name	Contact First Name
Vulcan-Bolingbrook Quarry A&B	1978200006	22700 111th St	Naperville	60564	630-904-1110	Van Kovering	Kelly
North Shore-CCDD	2010175083	9034 N Second St	Machesney Par	61115	815-654-4700	Kutz	Troy
Pierpont Quarry	2010306479	So Pierpont Ave	Rockford	61102	815-654-4700	Kutz	Troy
Cooling CCDD Site	2010306480	5815 Kilburn Ave	Rockford	61101	815-654-4700	Kutz	Troy
Sandy Hollow Quarry	2010306481	3801 Sandy Hollow Rd	Rockford	61109	815-654-4700	Kutz	Troy
Northern IL Svc Auburn CCDD	2010306610	1901 Harrison Rd	Rockford	61101	815-874-4422	Klinger	Wayne
Northern Illinois Svc Co	2010405051	4950 Rockton Rd	Roscoe	61073	815-874-4422	Klinger	Wayne
Stenstrom Sand & Gravel CCDD	2010405066	5200 Rhodes St	Roscoe	61104	815-398-3478	Sockness	Dave
Speedway Quarry	2010506331	9572 Forest Hills Road	Loves Park	61111	815-633-1500	Sockness	Dave
Roscoe Rock & Sand CCDD	2018105003	5029 McCurry Road	Roscoe	61073	815-389-1858	Bauch	Margaret

Total Number of Sites 60

CCDD MATERIALS MANAGEMENT ALLOWANCE

Description
This work shall cover unforeseen costs borne unto the Contractor for CCDD materials that have been rejected from the CCDD site and require additional waste investigation and/or remediation. Due to limited space at the project the rejected material must be transported to the Contractor's or other approved facility so the load can be examined by the third party engineer. The rejected material must be placed in a temporary facility that meets the requirements of Article 669.11 of the Standard Specifications. The rejected materials shall be placed on and covered in visqueen while a determination is made by the third party engineer.

If the rejected material is analyzed and identified as Special Waste by the third party engineer AND is verified by the Engineer, the material disposal shall be loaded and transported in accordance with Article 669.09 of the Standard Specifications. The material shall be paid for under the Special Waste unit price item.

If the rejected material is analyzed and identified as a Non-Special waste by the third party engineer AND is verified by the Engineer, the material shall be loaded and hauled in accordance with the Non-Special waste provisions of Article 669.10 of the Standard Specifications. The handling, transporting, and disposal of this material to a regulated waste facility shall be paid under this allowance item.

It is hereby understood that the Village of Hinsdale shall reserve judgment on payment out of this allowance. The Contractor is forewarned that all efforts shall be made first with the third party engineer and the permitted CCDD site. Payments from this allowance shall only be recommended if determined by the Engineer that reasonable efforts were made to obtain approvals for the material and due to unforeseen circumstances the materials were rejected.

Measurement and Payment
This work will be measured for payment in accordance with Article 109.04.b of the Standard Specifications. All submittals will be reviewed by the Engineer and the Village. Upon approval from the Village payments shall be made from the CCDD MATERIALS MANAGEMENT ALLOWANCE, Lump Sum which shall include the costs for all materials, labor and equipment to load, unload, protect, and transport rejected CCDD material. The Allowance specified for this work shall be $15,000 to be paid in part in accordance with amount of work provided.

STREET LIGHT CIRCUIT CONSTRUCTION

This work shall be performed in accordance with applicable portions of Section 830 of the IDOT Standard Specifications for Road and Bridge Construction and the construction plan and details herein. Contractor shall provide light pole shop drawings for review by Village prior to ordering materials. All materials and labor to construct the complete circuit as depicted in the construction documents including the electric cable, electric cable connections, conduit, and secondary pedestal construction for the proposed lighting circuit will be paid for at the contract unit price per Foot of ELECTRIC CABLE IN CONDUIT – COMPLETE. The work required for construction of the Street Lights including foundations shall be paid for at the contract unit price per Each for LIGHT POLE ALUMINUM, 30' MH, 8' DAVIT ARM & WL66 EVOLAIRE LED.

TRAFFIC SIGNAL

The traffic signal shall be constructed in accordance with the IDOT District One Traffic Signal Specifications included herein.

MODIFY EXISTING TRAFFIC SIGNAL INSTALLATION

This work shall consist of modifying the existing temporary traffic signal installation in accordance with the details and notes included in the plans or as directed by the Engineer. This work shall also conform to the requirements of the "Temporary Traffic Signal Installation" special provision within the Traffic Signal Specifications.

The Contractor shall utilize the existing temporary traffic signal equipment wherever possible. Any modifications required to the existing installation shall be completed under traffic while the temporary traffic signals remain in service.

Once the permanent traffic signals are operational, the temporary traffic signal installation shall be removed. All equipment and materials from the temporary traffic signal installation shall be disposed of, by the Contractor, outside the right-of-way.

This work will be paid for at the contract unit price per each for MODIFY TEMPORARY TRAFFIC SIGNAL INSTALLATION.

FINAL CONNECTION OF EXISTING FIBER OPTIC AND TRACER CABLES

This work shall consist of removing the existing fiber optic and tracer cables from the existing controller and overhead span wire upon removal of the temporary traffic signal installation. The fiber optic and tracer cables shall then be pulled through the proposed conduit and handholes to the proposed controller cabinet without splicing. This work will not be paid for separately, but shall be included in the cost of the various proposed traffic signal pay items.

APPENDIX C

TRAFFIC SIGNAL SPECIFICATIONS
Effective: May 22, 2002
Revised: January 1, 2012

These Traffic Signal Special Provisions and the "District One Standard Traffic Signal Design Details" supplement the requirements of the State of Illinois "Standard Specifications for Road and Bridge Construction." The intent of these Special Provisions is to prescribe the materials and construction methods commonly used for traffic signal installations. All material furnished shall be new. The locations and the details of all installations shall be as indicated on the Plans or as directed by the Engineer. Traffic signal construction and maintenance work shall be performed by personnel holding IMSA Traffic Signal Technician Level II certification. The work to be done under this contract consists of furnishing and installing all traffic signal work as specified in the Plans and as specified herein in a manner acceptable and approved by the Engineer.

SECTION 720 SIGNING

MAST ARM SIGN PANELS

Add the following to Article 720.02 of the Standard Specifications:

Signs attached to poles or posts (such as mast arm signs) shall have mounting brackets and sign channels which are equal to and completely interchangeable with those used by the District Sign Shops. Signfix Aluminum Channel Framing System is currently recommended, but other brands of mounting hardware are acceptable based upon the Department's approval.

DIVISION 800 ELECTRICAL

SUBMITTALS.

Revise Article 801.05 of the Standard Specifications to read:

All material approval requests shall be submitted in accordance with the District's current Electrical Product Data and Documentation Submittal Guidelines. General requirements include:

1. Material approval requests shall be made at the preconstruction meeting, including major traffic signal items listed in the table in Article 801.05. Material or equipment which is similar or identical shall be the product of the same manufacturer, unless necessary for system continuity. Traffic signal materials and equipment shall bear the U.L. label whenever such labeling is available.
2. Product data and shop drawings shall be assembled by pay item and separated from of other pay item submittals. Only the top sheet of each pay item submittal will be stamped by the Department with the review status, except shop drawings for mast arm pole assemblies and the like will be stamped with the review status on each sheet.
3. Partial or incomplete submittals will be returned without review.

4. Certain non-standard mast arm poles and structures will require additional review from IDOT's Central Office. Examples include ornamental/decorative and non-standard length mast arm pole assemblies. The Contractor shall account for the additional review time in his schedule.
5. The contract number or permit number, project location/limits and corresponding pay code number must be on each sheet of correspondence,, catalog cuts and mast arm poles and assemblies drawings.
6. 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 be complete with all test data, dates, and times.
7. After the Engineer reviews the submittals for conformance with the design concept of the project, the Engineer will stamp the drawings indicating their status as 'Approved', 'Approved-As-Noted', 'Disapproved', or 'Incomplete'. Since the 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 Department's approval thereof. The Contractor must still be in full compliance with contract and specification requirements.
8. All submitted items reviewed and marked 'APPROVED AS NOTED', 'DISAPPROVED', or 'INCOMPLETE' are to 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.
9. Exceptions to and deviations from the requirements of the Contract Documents will not be allowed. 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 Engineer. In general, substitutions will not be acceptable. Requests for substitutions must 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 Engineer.

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 One. The Department reserves the right to request any controller and cabinet to be tested at the equipment supplier facilities prior to field installation, at no extra cost to this contract.

MAINTENANCE AND RESPONSIBILITY.

Revise Article 801.11 of the Standard Specifications to read:

a. Existing traffic signal installations and/or any electrical facilities at all or various locations 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 State of Illinois, Department of Transportation, Division of Highways, County, Private Developer, or the Municipality in which they are located. Once the Contractor has begun any work on any portion of the project, all traffic signals within the limits of this contract or those which have the item "Maintenance of Existing Traffic Signal Installation," "Temporary Traffic Signal Installation(s)" and/or "Maintenance of Existing Flashing Beacon Installation," shall become the full responsibility of the Contractor. Automatic Traffic Enforcement equipment is not owned by the State and the Contractor shall not be responsible for maintaining it during construction. The Contractor shall supply the Engineer, Area Traffic Signal Maintenance and Operations Engineer, IDOT ComCenter and the Department's Electrical Maintenance Contractor with two 24-hour emergency contact names and telephone numbers.

b. When the project has a pay item for "Maintenance of Existing Traffic Signal Installation," "Temporary Traffic Signal Installation(s)" and/or "Maintenance of Existing Flashing Beacon Installation," the Contractor must notify both the Area Traffic Signal Maintenance and Operations Engineer at (847) 705-4424 and the Department's Electrical Maintenance Contractor, of their intent to begin any physical construction work on the Contract or any portion thereof. This notification must be made a minimum of seven (7) working days prior to the start of construction to allow sufficient time for inspection of the existing traffic signal installation(s) and transfer of maintenance to the Contractor. If work is started prior to an inspection, maintenance of the traffic signal installation(s) will be transferred to the Contractor without an inspection. The Contractor will 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 or replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection otherwise the traffic signal installation will not be accepted.

c. Contracts such as pavement grinding or patching which result in the destruction of traffic signal loops do not require maintenance transfer, but require a notification of intent to work and an inspection. A minimum of seven (7) working days prior to the loop removal, the Contractor shall notify the Area Traffic Signal Maintenance and Operations Engineer at (847) 705-4424 and the Department's Electrical Maintenance Contractor, at which time arrangements will be made to adjust the traffic controller timing to compensate for the absence of detection. Damaged Automatic Traffic Enforcement equipment, including cameras, detectors, or other peripheral equipment, shall be replaced by others, per Permit agreement, at no cost to the contract. See additional requirements in these specifications under Inductive Loop Detector.

d. The Contractor is advised that the existing and/or temporary traffic signal installation must remain in operation during all construction stages, except for the

most essential down time. Any shutdown of the traffic signal installation, which exceeds fifteen (15) minutes, must have prior approval of the Engineer. Approval to shutdown the traffic signal installation will only be granted during the period extending from 10:00 a.m. to 3:00 p.m. on weekdays. Shutdowns shall not be allowed during inclement weather or holiday periods.

e. The Contractor shall be fully responsible for the safe and efficient operation of the traffic signals. Any inquiry, complaint or request by the Department, the Department's Electrical Maintenance Contractor or the public, shall be investigated and repairs begun within one hour. Failure to provide this service will result in liquidated damages of $500 per day per occurrence. In addition, the Department reserves the right to assign any work not completed within this timeframe to the Electrical Maintenance Contractor. All costs associated to repair this uncompleted work shall be the responsibility of the Contractor. Failure to pay these costs to the Electrical 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. The District's Electrical Maintenance Contractor may inspect any signalizing device on the Department's highway system at any time without notification.

f. Any proposed activity in the vicinity of a highway-rail grade crossing must 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.

DAMAGE TO TRAFFIC SIGNAL SYSTEM.

Add the following to Article 801.12(b) of the Standard Specifications to read:

Any traffic signal control equipment damaged or not operating properly from any cause whatsoever shall be replaced with new equipment meeting current District One traffic signal specifications and provided by the Contractor at no additional cost to the Contract and/or owner of the traffic signal system, all as approved by the Engineer. Final replacement of damaged equipment must meet the approval of the 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.

Automatic Traffic Enforcement equipment, such as 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.

TRAFFIC SIGNAL INSPECTION (TURN-ON).

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

It is the intent to have all electric work completed and equipment field tested by the vendor prior to the Department's "turn-on" field inspection. If in the event the Engineer determines work is not complete and the inspection will require more than two (2) hours to complete, the inspection shall be canceled and the Contractor will be required to reschedule at another date. The maintenance of the traffic signals will not be accepted until all punch list work is corrected and re-inspected.

When the road is open to traffic, except as otherwise provided in Section 850 of the Standard Specifications, the Contractor may request a turn-on and inspection of the completed traffic signal installation at each separate location. This request must be made to the Area Traffic Signal Maintenance and Operations Engineer at (847) 705-4424 a minimum of seven (7) working days prior to the time of the requested inspection. The Department will not grant a field inspection until notification is provided from the Contractor that the equipment has been field tested and the intersection is operating according to Contract requirements. The Department's facsimile number is (847) 705-4089. The Contractor must invite local fire department personnel to the turn-on when Emergency Vehicle Preemption (EVP) is included in the project. When the contract includes the item RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM, OPTIMIZE TRAFFIC SIGNAL SYSTEM, or TEMPORARY TRAFFIC SIGNAL TIMINGS, the Contractor must notify the SCAT Consultant of the turn-on/detour implementation schedule, as well as stage changes and phase changes during construction.

The Contractor must 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. The Contractor shall be responsible to provide a police officer to direct traffic at the time of testing.

The Contractor shall provide a representative from the control equipment vendor's office to attend the traffic signal inspection for both permanent and temporary traffic signal turn-ons. Upon demonstration that the signals are operating and all work is completed in accordance with the Contract and to the satisfaction of the Engineer, the Engineer will then allow the signals to be placed in continuous operation. The Agency that is responsible for the maintenance of each traffic signal installation will assume the maintenance upon successful completion of this inspection.

The District requires the following from the Contractor at traffic signal turn-ons.

1. One set of signal plans of record with field revisions marked in red ink.
2. Written notification from the Contractor and the equipment vendor of satisfactory field testing.
3. A knowledgeable representative of the controller equipment supplier shall be required at the traffic signal turn-on. The representative shall be knowledgeable of the cabinet design and controller functions.
4. A copy of the approved material letter.
5. One (1) copy of the operation and service manuals of the signal controller and associated control equipment.
6. Five (5) copies 11" x 17" (280 mm X 430 mm) of the cabinet wiring diagrams.

7. The controller manufacturer shall supply a printed form, not to exceed 11" x 17" (280 mm X 430 mm) for recording the traffic signal controller's timings; backup timings; coordination splits, offsets, and cycles; TBC Time of Day, Week and Year Programs; Traffic Responsive Program, Detector Phase Assignment, Type and Detector Switching; and any other functions programmable from the keyboard. The form shall include a location, date, manufacturer's name, controller model and software version. The form shall be approved by the Engineer and a minimum of three (3) copies must be furnished at each turn-on. The manufacturer must provide all programming information used within the controller at the time of turn-on.
8. All manufacturer and contractor warrantees and guarantees required by Article 801.14.

Acceptance of the traffic signal equipment by the Department shall be based upon inspection results at the traffic signal "turn on." If approved, traffic signal acceptance shall be verbal at the "turn on" inspection followed by written correspondence from the Engineer. The Contractor shall be responsible for all traffic signal equipment and associated maintenance thereof until Departmental acceptance is granted.

All equipment and/or parts to keep the traffic signal installation operating shall be furnished by the Contractor. No spare traffic signal equipment is available from the Department.

All punch list work shall be completed within two (2) weeks after the final inspection. The Contractor shall notify the Electrical Maintenance Contractor to inspect all punch list work. Failure to meet these time constraints shall result in liquidated damage charges of $500 per month per incident.

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 shall be subject to removal and disposal at the Contractor's expense.

RECORD DRAWINGS

The requirements listed for Electrical Installation shall apply for Traffic Signal Installations in Article 801.16. Revise the 2nd paragraph of Article 801.16 of the Standard Specifications to read:

a. "When the work is complete, and seven days before the request for a final inspection, the full-size set of contract drawings. Stamped "RECORD DRAWINGS", shall be submitted to the Engineer for review and approval and shall be stamped with the date and the signature of the Contractor's supervising Engineer or electrician. The record drawings shall be submitted in PDF format on CDROM as well as hardcopy for review and approval.

b. In addition to the record drawings, copies of the final catalog cuts which have been Approved or Approved as Noted shall be submitted in PDF format along with the record drawings. The PDF files shall clearly indicate the pay item either by filename or PDF Table of Contents referencing the respective pay item

number for multi-item PDF files. Specific part or model numbers of items which have been selected shall be clearly visible."

c. Additional requirements are listed in the District's Electrical Product Data and Documentation Guidelines.

Add the following to Article 801.16 of the Standard Specifications:

"In addition to the specified record drawings, the Contactor shall record GPS coordinates of the following traffic signal components being installed, modified or being affected in other ways by this contract:

- All Mast Arm Poles and Posts
- Handholes
- Conduit roadway crossings
- Controller Cabinets
- Communication Cabinets
- Electric Service Disconnect locations
- CCTV Camera installations
- Fiber Optic Splice Locations

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

1. Description of item
2. Designation or approximate station if the item is undesignated
3. Latitude
4. Longitude

Examples:

Description	Designation	Latitude	Longitude
Mast Arm Pole Assembly (dual, combo, etc)	MP (SW, NW, SE or NE corner)	41.580493	-87.793378
FO mainline splice handhole	HHL-ST31	41.558532	-87.792571
Handhole	HH	41.765532	-87.543571
Electric Service	Elec Srv	41.602248	-87.794053
Conduit crossing	SB IL83 to EB I290 ramp SIDE A	41.584593	-87.793378
PTZ Camera	PTZ	41.584600	-87.793432
Signal Post	Post	41.558532	-87.792571
Controller Cabinet	CC	41.651848	-87.762053
Master Controller Cabinet	MCC	41.580493	-87.793378
Communication Cabinet	ComC	41.558532	-87.789771

Fiber splice connection	Toll Plaza34	41.606928	-87.794053

Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 100 feet. Upon verification, data collection can begin. Data collection can be made as construction progresses, or can be collected after all items are installed. If the data is unacceptable the contractor shall make corrections to the data collection equipment and or process and submit the data for review and approval as specified.

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have a minimum 5 meter accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years."

Delete the last sentence of the 3rd paragraph of Article 801.16.

LOCATING UNDERGROUND FACILITIES.

Revise Section 803 to the Standard Specifications to read:

If this Contract requires the services of an Electrical Contractor, the Contractor shall be responsible at his/her own expense for locating existing IDOT electrical facilities prior to performing any work. If this Contract does not require the services of an Electrical Contractor, the Contractor may request one free locate for existing IDOT electrical facilities from the District One Electrical Maintenance Contractor prior to the start of any work. Additional requests may be at the expense of the Contractor. The location of underground traffic facilities does not relieve the Contractor of their responsibility to repair any facilities damaged during construction at their expense.

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, locally owned equipment, and leased enforcement camera system facilities, the local Counties or Municipalities may need to be contacted: in the City of Chicago contact Digger at (312) 744-7000 and for all other locations contact J.U.L.I.E. at 1-800-892-0123 or 811.

RESTORATION OF WORK AREA.

Add the following article to Section 801 of the Standard Specifications:

801.17 Restoration of work area. Restoration of the traffic signal work area shall be included in the related pay items such as foundation, conduit, handhole, trench and backfill, underground

raceways, etc. All roadway surfaces such as shoulders, medians, sidewalks, pavement, etc. shall be replaced in kind. All damage to mowed lawns shall be replaced with an approved sod, and all damage to unmowed fields shall be seeded. All brick pavers disturbed in the work area shall be restored to their original configuration as directed by the Engineer. All damaged brick pavers shall be replaced with a comparable material approved by the Engineer. Restoration of the work area shall be included in the contract without any extra compensation allowed to the Contractor.

ELECTRIC SERVICE INSTALLATION.
Revise Section 805 of the Standard Specifications to read:

Description.
This work shall consist of all materials and labor required to install, modify, or extend the electric service installation. All installations shall meet the requirements of the details in the "District One Standard Traffic Signal Design Details" and applicable portions of the Specifications.

General.
The electric service installation shall be the electric service disconnecting means and it shall be identified as suitable for use as service equipment.

The electric utility contact information is noted on the plans and represents the current information at the time of contract preparation. The Contractor must request in writing for service and/or service modification within 10 days of contract award and must follow-up with the electric utility to assure all necessary documents and payment are received by the utility. The Contractor shall forward copies of all correspondence between the contractor and utility company to the Engineer and Area Traffic Signal Maintenance and Operations Engineer. The service agreement and sketch shall be submitted for signature to the IDOT's Traffic Operations Programs Engineer.

Materials.

a. General. The completed control panel shall be constructed in accordance with UL Std. 508A, Industrial Control Panel, and carry the UL label. Wire terminations shall be UL listed.

b. Enclosures.
    1. Pole Mounted Cabinet. The cabinet shall be UL 50, NEMA Type 4X, unfinished single door design, fabricated from minimum 0.080-inch (2.03 mm) thick Type 5052 H-32 aluminum. Seams shall be continuous welded and ground smooth. Stainless steel screws and clamps shall secure the cover and assure a watertight seal. The cover shall be removable by pulling the continuous stainless steel hinge pin. The cabinet shall have an oil-resistant gasket and a lock kit shall be provided with an internal O-ring in the locking mechanism assuring a watertight and dust-tight seal. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. A minimum size of 14-inches (350 mm) high, 9-inches (225 mm) wide and 8-inches (200 mm) in depth is required. The cabinet shall be channel mounted to a wooden utility pole using assemblies recommended by the manufacturer.

2. Ground Mounted Cabinet. The cabinet shall be UL 50, NEMA Type 3R unfinished single door design with back panel. The cabinet shall be fabricated from Type 5052 H-32 aluminum with the frame and door 0.125-inch (3.175 mm) thick, the top 0.250-inch (6.350 mm) thick and the bottom 0.500-inch (12.70 mm) thick. Seams shall be continuous welded and ground smooth. The door and door opening shall be double flanged. The door shall be approximately 80% of the front surface, with a full length tamperproof stainless steel .075-inch (1.91 mm) thick hinge bolted to the cabinet with stainless steel carriage bolts and nylocks nuts. The locking mechanism shall be slam-latch type with a keyhole cover. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. A minimum size of 40-inches (1000 mm) high, 16-inches (400 mm) wide and 15-inches (375 mm) in depth is required. The cabinet shall be mounted upon a square Type A concrete foundation as indicated on the plans. The foundation is paid for separately.

c. Surge Protector. Overvoltage protection, with LED indicator, shall be provided for the 120 volt load circuit by the means MOV and thermal fusing technology. The response time shall be <5n seconds and operate within a range of –40C to +85C. The surge protector shall be UL 1449 Listed.

d. Circuit Breakers. Circuit breakers shall be standard UL listed molded case, thermal-magnetic bolt-on type circuit breakers with trip free indicating handles. 120 volt circuit breakers shall have an interrupting rating of not less than 65,000 rms symmetrical amperes. Unless otherwise indicated, the main disconnect circuit breaker for the traffic signal controller shall be rated 60 amperes, 120 V and the auxiliary circuit breakers shall be rated 10 amperes, 120 V.

e. Fuses, Fuseholders and Power Indicating Light. Fuses shall be small-dimensional cylindrical fuses of the dual element time-delay type. The fuses shall be rated for 600 V AC and shall have a UL listed interrupting rating of not less than 10,000 rms symmetrical amperes at rated voltage. The power indicating light shall be LED type with a green colored lens and shall be energized when electric utility power is present.

f. Ground and Neutral Bus Bars. A single copper ground and neutral bus bar, mounted on the equipment panel shall be provided. Ground and neutral conductors shall be separated on the bus bar. Compression lugs, plus 2 spare lugs, shall be sized to accommodate the cables with the heads of the connector screws painted green for ground connections and white for neutral connections.

g. Utility Services Connection. The Contractor shall notify the Utility Company marketing representative a minimum of 30 working days prior to the anticipated date of hook-up. This 30 day advance notification will begin only after the Utility Company marketing representative has received service charge payments from the Contractor. Prior to contacting the Utility Company marketing representative for service connection, the service installation controller cabinet and cable must be installed for inspection by the Utility Company.

h. Ground Rod. Ground rods shall be copper-clad steel, a minimum of 10 feet (3.0m) in length, and 3/4 inch (20mm) in diameter. Ground rod resistance measurements to ground shall be 25 ohms or less. If necessary additional rods shall be installed to meet resistance requirements at no additional cost to the contract.

Installation.

a. General. The Contractor shall confirm the orientation of the traffic service installation and its door side with the engineer, prior to installation. All conduit entrances into the service installation shall be sealed with a pliable waterproof material.

b. Pole Mounted. Brackets designed for pole mounting shall be used. All mounting hardware shall be stainless steel. Mounting height shall be as noted on the plans or as directed by the Engineer.

c. Ground Mounted. The service installation shall be mounted plumb and level on the foundation and fastened to the anchor bolts with hot-dipped galvanized or stainless steel nuts and washers. The space between the bottom of the enclosure and the top of the foundation shall be caulked at the base with silicone.

Basis of Payment.

The service installation shall be paid for at the contract unit price each for SERVICE INSTALLATION of the type specified which shall be payment in full for furnishing and installing the service installation complete. The CONCRETE FOUNDATION, TYPE A, which includes the ground rod, shall be paid for separately. SERVICE INSTALLATION, POLE MOUNTED shall include the 3/4 inch (20mm) grounding conduit, ground rod, and pole mount assembly. Any charges by the utility companies shall be approved by the engineer and paid for as an addition to the contract according to Article 109.05 of the Standard Specifications.

GROUNDING OF TRAFFIC SIGNAL SYSTEMS.

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. See IDOT District One Traffic Signal detail plan sheets for additional information.

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 were 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 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 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.

3. All metallic and non-metallic raceways containing traffic signal circuit runs 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, listed pressure connectors, listed clamps or other approved listed means.

GROUNDING EXISTING HANDHOLE FRAME AND COVER.

Description.
This work shall consist of all materials and labor required to bond the equipment grounding conductor to the existing handhole frame and handhole cover. All installations shall meet the requirements of the details in the "District One Standard Traffic Signal Design Details," and applicable portions of the Standard Specifications and these specifications.

The equipment grounding conductor shall be bonded to the handhole frame and to the handhole cover. Two (2) ½-inch diameter x 1 ¼-inch long hex-head stainless steel bolts, spaced 1.75-inches apart center-to-center shall be fully welded to the frame and to the cover to accommodate a heavy duty Listed grounding compression terminal (Burndy type YGHA or approved equal). The grounding compression terminal shall be secured to the bolts with stainless steel split-lock washers and nylon-insert locknuts.

Welding preparation for the stainless steel bolt hex-head to the frame and to the cover shall include thoroughly cleaning the contact and weldment area of all rust, dirt and contaminates. The

Contractor shall assure a solid strong weld. The welds shall be smooth and thoroughly cleaned of flux and spatter. The grounding installation shall not affect the proper seating of the cover when closed.

The grounding cable shall be paid for separately.

Method of Measurement.
Units measured for payment will be counted on a per handhole basis, regardless of the type of handhole and its location.

Basis of Payment.
This work shall be paid for at the contract unit price each for GROUNDING EXISTING HANDHOLE FRAME AND COVER which shall be payment in full for grounding the handhole complete.

COILABLE NON-METALLIC CONDUIT.

Description.
This work shall consist of furnishing and installing empty coilable non-metallic conduit (CNC) for detector loop raceways.

General.
The CNC installation shall be in accordance with Sections 810 and 811 of the Standard Specifications except for the following:

Add the following to Article 810.03 of the Standard Specifications:

CNC meeting the requirements of NEC Article 353 shall be used for detector loop raceways to the handholes.

Add the following to Article 811.03 of the Standard Specifications:

On temporary traffic signal installations with detector loops, CNC meeting the requirements of NEC Article 353 shall be used for detector loop raceways from the saw-cut to 10 feet (3m) up the wood pole, unless otherwise shown on the plans

Basis of Payment.
All installations of CNC for loop detection shall be included in the contract and not paid for separately.

HANDHOLES.

Add the following to Section 814 of the Standard Specifications:

All handholes shall be concrete, poured in place, with inside dimensions of 21-1/2 inches (549mm) minimum. Frames and lid openings shall match this dimension. The cover of the handhole frame shall be labeled "Traffic Signals" with legible raised letters.

For grounding purposes the handhole frame shall have provisions for a 7/16 inch (15.875mm) diameter stainless bolt cast into the frame. The covers shall have a stainless steel threaded stint extended from the eye hook assembly for the purpose of attaching the grounding conductor to the handhole cover.

The minimum wall thickness for heavy duty hand holes shall be 12 inches (300mm).

All conduits shall enter the handhole at a depth of 30 inches (760mm) except for the conduits for detector loops when the handhole is less than 5 feet (1.52 m) from the detector loop. All conduit ends should be sealed with a waterproof sealant to prevent the entrance of contaminants into the handhole.

Steel cable hooks shall be coated with hot-dipped galvanization in accordance with AASHTO Specification M111. Hooks shall be a minimum of 1/2 inch (12.7 mm) diameter with two 90 degree bends and extend into the handhole at least 6 inches (150 mm). Hooks shall be placed a minimum of 12 inches (300 mm) below the lid or lower if additional space is required.

GROUNDING CABLE.

The cable shall meet the requirements of Section 817 of the "Standard Specifications," except for the following:

Add the following to Article 817.02 (b) of the Standard Specifications:

Unless otherwise noted on the Plans, traffic signal grounding conductor shall be one conductor, #6 gauge copper, with a green color coded XLP jacket.

The traffic signal grounding conductor shall be bonded, using a Listed grounding connector (Burndy type KC/K2C, as applicable, or approved equal), to all proposed and existing traffic signal mast arm poles and traffic/pedestrian signal posts, including push button posts. The grounding conductor shall be bonded to all proposed and existing pull boxes, handhole frames and covers and other metallic enclosures throughout the traffic signal wiring system and noted herein and detailed on the plans. The grounding conductor shall be bonded to conduit terminations using rated grounding bushings. Bonding to existing handhole frames and covers shall be paid for separately.

Add the following to Article 817.05 of the Standard Specifications:

Basis of Payment.
Grounding cable shall be measured in place for payment in foot (meter). Payment shall be at the contract unit price for ELECTRIC CABLE IN CONDUIT, GROUNDING, NO. 6, 1C, which price includes all associated labor and material including grounding clamps, splicing, exothermic welds, grounding connectors, conduit grounding bushings, and other hardware.

RAILROAD INTERCONNECT CABLE.

The cable shall meet the requirements of Section 873 of the Standard Specifications, except for the following:

Add to Article 873.02 of the Standard Specifications:

The railroad interconnect cable shall be three conductor stranded #14 copper cable in a clear polyester binder, shielded with #36 AWG tinned copper braid with 85% coverage, and insulated with .016" polyethylene (black, blue, red). The jacket shall be black 0.045 PVC or polyethylene.

Add the following to Article 873.05 of the Standard Specifications:

Basis of Payment.
This work shall be paid for at the contract unit price per foot (meter) for ELECTRIC CABLE IN CONDUIT, RAILROAD, NO. 14 3C, which price shall be payment in full for furnishing, installing, and making all electrical connections in the traffic signal controller cabinet. Connections in the railroad controller cabinet shall be performed by railroad personnel.

FIBER OPTIC TRACER CABLE.

The cable shall meet the requirements of Section 817 of the "Standard Specifications," except for the following:

Add the following to Article 817.03 of the Standard Specifications:

In order to trace the fiber optic cable after installation, the tracer cable shall be installed in the same conduit as the fiber optic cable in locations shown on the plans. The tracer cable shall be continuous, extended into the controller cabinet and terminated on a barrier type terminal strip mounted on the side wall of the controller cabinet. The barrier type terminal strip and tracer cable shall be clearly marked and identified. All tracer cable splices shall be kept to a minimum and shall incorporate maximum lengths of cable supplied by the manufacturer. The tracer cable will be allowed to be spliced at handholes only. The tracer cable splice shall use a Western Union Splice soldered with resin core flux and shall be soldered using a soldering iron. Blow torches or other devices which oxidize copper cable shall not be allowed for soldering operations. All exposed surfaces of the solder shall be smooth. The splice shall be covered with a black shrink tube meeting UL 224 guidelines, Type V and rated 600v, minimum length 4 inches (100 mm) and with a minimum 1 inch (25 mm) coverage over the XLP insulation, underwater grade.

Add the following to Article 817.05 of the Standard Specifications:

Basis of Payment.
The tracer cable shall be paid for separately as ELECTRIC CABLE IN CONDUIT, TRACER, NO. 14 1C per foot (meter), which price shall include all associated labor and material for installation.

MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION.

Revise Articles 850.02 and 850.03 of the Standard Specifications to read:

Procedure.
The energy charges for the operation of the traffic signal installation shall be paid for by others. 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 with IMSA Level II certification on staff to provide signal maintenance.

This item shall include maintenance of all traffic signal equipment at the intersection, including emergency vehicle pre-emption equipment, master controllers, uninterruptible power supply (UPS and batteries), telephone service installations, communication cables, conduits to adjacent intersections, and other traffic signal equipment, but shall not include Automatic Traffic Enforcement equipment, such as Red Light Enforcement cameras, detectors, or peripheral equipment, not owned by the State.

Maintenance.
The maintenance shall be according to MAINTENANCE AND RESPONSIBILITY in Division 800 of these specifications and the following:.

The Contractor shall check all controllers every two (2) weeks, which will include visually inspecting all timing intervals, relays, detectors, and pre-emption equipment to ensure that they are functioning properly. This item includes, as routine maintenance, all portions of emergency vehicle pre-emption equipment. The Contractor shall maintain in stock at all times a sufficient amount of materials and equipment to provide effective temporary and permanent repairs.

The Contractor shall provide immediate corrective action when any part or parts of the system fail 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 or otherwise removed from normal operation, 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 Engineer. The Contractor shall be required to place stop signs (R1-1-36) at each approach of the intersection as a temporary means of regulating traffic. When the signals operate in flash, the Contractor shall furnish and equip all their vehicles assigned to the maintenance of traffic signal installations with a sufficient number of stop signs as specified herein. The Contractor shall maintain a sufficient number of spare stop signs in stock at all times to replace stop signs which may be damaged or stolen.

The Contractor shall provide the Engineer with a 24 hour telephone number for the maintenance of the traffic signal installation and for emergency calls by the Engineer.

Traffic signal equipment which is lost or not returned to the Department for any reason shall be replaced with new equipment meeting the requirements of the Standard Specifications and these special provisions.

The Contractor shall respond to all emergency calls from the Department or others within one hour after notification 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 contract. The Contractor may institute 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 cannot contact the Contractor's designated personnel, the Engineer shall have the State's Electrical Maintenance Contractor perform the maintenance work required. The State's Electrical Maintenance Contractor shall bill the Contractor for the total cost of the work. The Contractor shall pay this bill within thirty (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 Electrical Maintenance Contractor to make reviews of the Existing Traffic Signal Installation that has been transferred to the Contractor for Maintenance.

TRAFFIC ACTUATED CONTROLLER.

Add the following to Article 857.02 of the Standard Specifications:

Controllers shall be NTCIP compliant NEMA TS2 Type 1, Econolite ASC/3S-1000 or Eagle/Siemens M50 unless specified otherwise on the plans or elsewhere on these specifications. Only controllers supplied by one of the District One approved closed loop equipment manufacturers will be allowed. The controller shall be the most recent model and software version supplied by the manufacturer at the time of the approval and include the standard data key. The traffic signal controller shall provide features to inhibit simultaneous display of a circular yellow ball and a yellow arrow display. Individual load switches shall be provided for each vehicle, pedestrian, and right turn over lap phase. The controller shall prevent phases from being skipped during program changes and after all preemption events.

Add the following to Article 857.03 of the Standard Specifications:

The Contractor shall arrange to install a standard voice-grade dial-up telephone line to the RAILROAD, FULL-ACTUATED CONTROLLER AND CABINET as called for on the traffic signal installation plans. If the traffic signal installation is part of a traffic signal system, a telephone line is usually not required, unless a telephone line is called for on the traffic signal plans. The Contractor shall follow the requirements for the telephone service installation as contained in the current District One Traffic Signal Special Provisions under Master Controller.

MASTER CONTROLLER.

Revise Articles 860.02 - Materials and 860.03 - Installation of the Standard Specifications to read:

Only controllers supplied by one of the District approved closed loop equipment manufacturers will be allowed. Only NEMA TS 2 Type 1 Eagle/Siemens and Econolite closed loop systems shall be supplied. The latest model and software version of master controller shall be supplied.

Functional requirements in addition to those in Section 863 of the Standard Specifications include:

The system commands shall consist of, as a minimum, six (6) cycle lengths, five (5) offsets, three (3) splits, and four (4) special functions. The system commands shall also include commands for free or coordinated operation.

Traffic Responsive operation shall consist of the real time acquisition of system detector data, data validation, and the scaling of acquired volumes and occupancies in a deterministic fashion so as to cause the selection and implementation of the most suitable traffic plan.

Upon request by the Engineer, each master shall be delivered with up to three (3) complete sets of the latest edition of registered remote monitoring software with full manufacture's support. Each set shall consist of software on CD, DVD, or other suitable media approved by the Engineer, and a bound set of manuals containing loading and operating instruction. One copy of the software and support data shall be delivered to the Agency in charge of system operation, if other than IDOT. One of these two sets will be provided to the Agency Signal Maintenance Contractor for use in monitoring the system.

The approved manufacturer of equipment shall loan the District one master controller and two intersection controllers of the most recent models and the newest software version to be used for instructional purposes in addition to the equipment to be supplied for the Contract.

The Contractor shall arrange to install a standard voice-grade dial-up telephone line to the master controller. This shall be accomplished through the following process utilizing District One staff. This telephone line may be coupled with a DSL line and a phone filter to isolate the dial-up line. An E911 address is required.

The cabinet shall be provided with an Outdoor Network Interface for termination of the telephone service. It shall be mounted to the inside of the cabinet in a location suitable to provide access for termination of the telephone service at a later date.

Full duplex communication between the master and its local controllers is recommended, but at this time not required. The data rate shall be 1200 baud minimum and shall be capable of speeds to 38,400 or above as technology allows. The controller, when installed in an Ethernet topology, may operate non-serial communications.

The cabinet shall be equipped with a 9600 baud, auto dial/auto answer modem. It shall be a US robotics 33.6K baud rate or equal.

As soon as practical or within one week after the contract has been awarded, the Contractor shall contact (via phone) the Administrative Support Manager in the District One Business Services Section at (847) 705-4011 to request a phone line installation.

A follow-up fax transmittal to the Administrative Support Manager (847-705-4712) with all required information pertaining to the phone installation is required from the Contractor as soon as possible or within one week after the initial request has been made. A copy of this fax transmittal must also be faxed by the Contractor to the Traffic Signal Systems Engineer at (847)

705-4089. The required information to be supplied on the fax shall include (but not limited to): A street address for the new traffic signal controller (or nearby address); a nearby existing telephone number; what type of telephone service is needed; the name and number of the Contractor's employee for the telephone company to contact regarding site work and questions.

The usual time frame for the activation of the phone line is 4-6 weeks after the Business Services Section has received the Contractor supplied fax. It is, therefore, imperative that the phone line conduit and pull-string be installed by the Contractor in anticipation of this time frame. On jobs which include roadway widening in which the conduit cannot be installed until this widening is completed, the Contractor will be allowed to delay the phone line installation request to the Business Services Section until a point in time that is 4-6 weeks prior to the anticipated completion of the traffic signal work. The contractor shall provide the Administrative Support Manager with an expected installation date considering the 4-6 week processing time.

The telephone line shall be installed and activated one month before the system final inspection.

All costs associated with the telephone line installation and activation (not including the Contract specified conduit installation between the point of telephone service and the traffic signal controller cabinet) shall be paid for by the District One Business Services Section (i.e., this will be an IDOT phone number not a Contractor phone number).

UNINTERRUPTIBLE POWER SUPPLY.

Add the following to Article 862.01 of the Standard Specifications:

The UPS shall have the power capacity to provide normal operation of a signalized intersection that utilizes all LED type signal head optics, for a minimum of six hours.

Add the following to Article 862.02 of the Standard Specifications:

Materials shall be according to Article 1074.04 as modified in UNINTERRUPTIBLE POWER SUPPLY in Division 1000 of these specifications.

Add the following to Article 862.03 of the Standard Specifications:

The UPS shall additionally include, but not be limited to, a battery cabinet. The UPS shall provide reliable emergency power to the traffic signals in the event of a power failure or interruption.

Revise Article 862.04 of the Standard Specifications to read:

Installation.
When a UPS is installed at an existing traffic signal cabinet, the UPS cabinet shall partially rest on the lip of the existing controller cabinet foundation and be secured to the existing controller cabinet by means of at least four (4) stainless steel bolts. The UPS cabinet shall be completely enclosed with the bottom and back constructed of the same material as the cabinet.

When a UPS is installed at a new signal cabinet and foundation, it shall be mounted as shown on the plans.

At locations where UPS is installed and Emergency Vehicle Priority System is in use, any existing incandescent confirmation beacons shall be replaced with LED lamps in accordance with the District One Emergency Vehicle Priority System specification at no additional cost to the contract. A concrete apron 67 in. x 50 in. x 5 in. (1702mm x 1270mm x 130mm) shall be provided on the side of the existing Type D Foundation, where the UPS cabinet is located. The concrete apron shall follow the District 1 Standard Traffic Signal Design Detail, Type D for Ground Mounted Controller Cabinet and UPS Battery Cabinet. The concrete apron shall follow Articles 424 and 202 of the Standard Specifications.

This item shall include any required modifications to an existing traffic signal controller as a result of the addition of the UPS.

Revise Article 862.05 of the Standard Specifications to read:

Basis of Payment.
This work will be paid for at the contract unit price per each for UNINTERRUPTIBLE POWER SUPPLY SPECIAL. Replacement of Emergency Vehicle Priority System confirmation beacons and any required modifications to the traffic signal controller shall be included in the cost of the UNINTERRUPTIBLE POWER SUPPLY SPECIAL item. The concrete apron and earth excavation required shall be included in the cast of the UNINTERRUPTIBLE POWER SUPPLY SPECIAL item.

FIBER OPTIC CABLE.

Add the following to Article 871.01 of the Standard Specifications:

The Fiber Optic cable shall be installed in conduit or as specified on the plans.

Add the following to Article 872.02 of the Standard Specifications:

The control cabinet distribution enclosure shall be CSC FTWO12KST-W/O 12 Port Fiber Wall Enclosure or an approved equivalent. The fiber optic cable shall provide six fibers per tube for the amount of fibers called for in the Fiber Optic Cable pay item in the Contract. Fiber Optic cable may be gel filled or have an approved water blocking tape.

Add the following to Article 871.04 of the Standard Specifications:

A minimum of six multimode fibers from each cable shall be terminated with approved mechanical connectors at the distribution enclosure. Fibers not being used shall be labeled "spare." Fibers not attached to the distribution enclosure shall be capped and sealed. A minimum of 13.0 feet (4m) of extra cable length shall be provided for controller cabinets. The controller cabinet extra cable length shall be stored as directed by the Engineer.

Add the following to Article 871.06 of the Standard Specifications:

The distribution enclosure and all connectors will be included in the cost of the fiber optic cable.

MAST ARM ASSEMBLY AND POLE.

Revise Article 877.01 of the Standard Specifications to read:

Description.
This work shall consist of furnishing and installing a steel mast arm assembly and pole and a galvanized steel or extruded aluminum shroud for protection of the base plate.

Revise Article 877.03 of the Standard Specifications:

Mast arm assembly and pole shall be as follows.

(a) Steel Mast Arm Assembly and Pole and Steel Combination Mast Arm Assembly and Pole. The steel mast arm assembly and pole and steel combination mast arm assembly and pole shall consist of a traffic signal mast arm, a luminaire mast arm or davit (for combination pole only), a pole, and a base, together with anchor rods and other appurtenances. The configuration of the mast arm assembly, pole, and base shall be according to the details shown on the plans.

(1) Loading. The mast arm assembly and pole, and combination mast arm assembly and pole shall be designed for the loading shown on the Highway Standards or elsewhere on the plans, whichever is greater. The design shall be according to AASHTO "Standard Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals" 1994 Edition for 80 mph (130 km/hr) wind velocity. However, the arm-to-pole connection for tapered signal and luminaire arms shall be according to the "ring plate" detail as shown in Figure 11-1(f) of the 2002 Interim, to the AASHTO "Standard Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals" 2001 4th Edition.

(2) Structural Steel Grade. The mast arm and pole shall be fabricated according to ASTM A 595, Grade A or B, ASTM A 572 Grade 55, or ASTM A 1011 Grade 55 HSLAS Class 2. The base and flange plates shall be of structural steel according to AASHTO M 270 Grade 50 (M 270M Grade 345). Luminaire arms and trussed arms 15 ft (4.5 m) or less shall be fabricated from one steel pipe or tube size according to ASTM A 53 Grade B or ASTM A 500 Grade B or C. All mast arm assemblies, poles, and bases shall be galvanized according to AASHTO M 111.

(3) Fabrication. The design and fabrication of the mast arm assembly, pole, and base shall be according to the requirements of the Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals published by AASHTO. The mast arm and pole may be of single length or sectional design. If section design is used, the overlap shall be at least 150 percent of the maximum diameter of the overlapping section and shall be assembled in the factory.

The manufacturer will be allowed to slot the base plate in which other bolt circles may fit, providing that these slots do not offset the integrity of the pole.

Circumferential welds of tapered arms and poles to base plates shall be full penetration welds.

(4) Shop Drawing Approval. The Contractor shall submit detailed drawings showing design materials, thickness of sections, weld sizes, and anchor rods to the Engineer for approval prior to fabrication. These drawings shall be at least 11 x 17 in. (275 x 425 mm) in size and of adequate quality for microfilming. All product data and shop drawings shall be submitted in electronic form on CD-ROM

(b) Anchor Rods. The anchor rods shall be ASTM F 1554 Grade 105, coated by the hot-dip galvanizing process according to AASHTO M 232, and shall be threaded a minimum of 7 1/2 in. (185 mm) at one end and have a bend at the other end. The first 12 in. (300 mm) at the threaded end shall be galvanized. Two nuts, one lock washer, and one flat washer shall be furnished with each anchor rod. All nuts and washers shall be galvanized.

(c) The galvanized steel or extruded aluminum shroud shall have dimensions similar to those detailed in the "District One Standard Traffic Signal Design Details." The shroud shall be installed such that it allow air to circulate throughout the mast arm but not allow infestation of insects or other animals, and such that it is not hazardous to probing fingers and feet.

Add the following to Article 877.04 of the Standard Specifications:

The shroud shall not be paid for separately but shall be included in the cost of the mast arm assembly and pole.

CONCRETE FOUNDATIONS.

Add the following to Article 878.03 of the Standard Specifications:

All anchor bolts shall be according to Article 1006.09, with all anchor bolts hot dipped galvanized a minimum of 12 in. (300 mm) from the threaded end.

Concrete Foundations, Type "A" for Traffic Signal Posts shall provide anchor bolts with the bolt pattern specified within the "District One Standard Traffic Signal Design Details." All Type "A" foundations shall be a minimum depth of 48 inches (1220 mm).

Concrete Foundations, Type "C" for Traffic Signal Cabinets with Uninterruptible Power Supply (UPS) cabinet installations shall be a minimum of 72 inches (1830 mm) long and 31 inches (790 mm) wide. All Type "C" foundations shall be a minimum depth of 48 inches (1220 mm). The concrete apron in front of the Type IV or V cabinet shall be 36 in. x 48 in. x 5 in. (915 mm X 1220 mm X 130 mm). The concrete apron in front of the UPS cabinet shall be 36 in. x 67 in. x 5 in. (915 mm X 1700 mm X 130 mm). Anchor bolts shall provide bolt spacing as required by the manufacturer.

Concrete Foundations, Type "D" for Traffic Signal Cabinets shall be a minimum of 48 inches (1220 mm) long and 31 inches (790 mm) wide. All Type "D" foundations shall be a minimum

depth of 48 inches (1220 mm). The concrete apron shall be 36 in. x 48 in. x 5 in. (910 mm X 1220 mm X 130 mm). Anchor bolts shall provide bolt spacing as required by the manufacturer.

Concrete Foundations, Type "E" for Mast Arm and Combination Mast Arm Poles shall meet the current requirements listed in the Highway Standards.

Foundations used for Combination Mast Arm Poles shall provide an extra 2-1/2 inch (65 mm) raceway.

No foundation is to be poured until the Resident Engineer gives his/her approval as to the depth of the foundation.

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

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

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

LIGHT EMITING DIODE (LED), SIGNAL HEAD, RETROFIT

Description.
This work shall consist of retrofitting an existing polycarbonate traffic signal head with a traffic signal module, pedestrian signal module, and pedestrian countdown signal module, with light emitting diodes (LEDs) as specified in the plans.

Materials.
Materials shall be according to LIGHT EMITTING DIODE (LED) AND OPTICALLY PROGRAMMED LED SIGNAL HEAD, AND LIGHT EMITTING DIODE (LED) PEDESTRIAN SIGNAL HEAD in Divisions 880, 881 and 1000 of these specifications.

Add the following to Article 880.04 of the Standard Specifications:

Basis of Payment.
This item shall be paid for at the contract unit price each for SIGNAL HEAD, LED, RETROFIT, or PEDESTRIAN SIGNAL HEAD, LED, RETROFIT, for the type and number of polycarbonate signal heads, faces, and sections specified, which price shall be payment in full for 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 faces and the method of mounting.

LIGHT EMITTING DIODE (LED) PEDESTRIAN SIGNAL HEAD

Add the following to the third paragraph of Article 881.03 of the Standard Specifications:

No mixing of different types of pedestrian traffic signals or displays will be permitted.

Add the following to Article 881.03 of the Standard Specifications:

(a) Pedestrian Countdown Signal Heads.

(1) Pedestrian Countdown Signal Heads shall not be installed at signalized intersections where traffic signals and railroad warning devices are interconnected.

(2) Pedestrian Countdown Signal Heads shall be 16 inch (406mm) x 18 inch (457mm), for single units with the housings glossy black polycarbonate. 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.

(3) Each pedestrian signal LED module shall be fully MUTCD compliant and shall consist of double overlay message combining full LED symbols of an Upraised Hand and a Walking Person. "Egg Crate" type sun shields are not permitted. Numerals shall measure 9 inches (229mm) in height and easily identified from a distance of 120 feet (36.6m).

Add the following to Article 881.04 of the Standard Specifications:

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

DETECTOR LOOP.

Revise Section 886 of the Standard Specifications to read:

Description.
This work shall consist of furnishing and installing a detector loop in the pavement.

Procedure.
A minimum of seven (7) working days prior to the Contractor cutting loops, the Contractor shall have the proposed loop locations marked and contact the Area Traffic Signal Maintenance and Operations Engineer (847) 705-4424 to inspect and approve the layout. When preformed detector loops are installed, the Contractor shall have them inspected and approved prior to the pouring of the Portland cement concrete surface, using the same notification process as above.

Installation.
Loop detectors shall be installed according to the requirements of the "District One Standard Traffic Signal Design Details." Saw-cuts (homeruns on preformed detector loops) from the loop to the edge of pavement shall be made perpendicular to the edge of pavement when possible in

order to minimize the length of the saw-cut (homerun on preformed detector loops) unless directed otherwise by the Engineer or as shown on the plan.

The detector loop cable insulation shall be labeled with the cable specifications.

Each loop detector lead-in wire shall be labeled in the handhole using a Panduit PLFIM water proof tag, or an approved equal, secured to each wire with nylon ties.

Resistance to ground shall be a minimum of 100 mega-ohms under any conditions of weather or moisture. Inductance shall be more than 50 and less than 700 microhenries. Quality readings shall be more than 5.

(a) Type I. All loops installed in new asphalt pavement shall be installed in the binder course and not in the surface course. The edge of pavement, curb and handhole shall be cut with a 1/4 inch (6.3 mm) deep x 4 inches (100 mm) saw cut to mark location of each loop lead-in.

(b) Loop sealant shall be a two-component thixotropic chemically cured polyurethane either Chemque Q-Seal 295, Percol Elastic Cement AC Grade or an approved equal. The sealant shall be installed 1/8 inch (3 mm) below the pavement surface, if installed above the surface the overlap shall be removed immediately.

(c) Detector loop measurements shall include the saw cut and the length of the loop lead-in to the edge of pavement. The lead-in wire, including all necessary connections for proper operations, from the edge of pavement to the handhole, shall be included in the price of the detector loop. Unit duct, trench and backfill, and drilling of pavement or handholes shall be included in detector loop quantities.

(d) Preformed. This work shall consist of furnishing and installing a rubberized or crosslinked polyethylene heat resistant preformed traffic signal loop in accordance with the Standard Specifications, except for the following:

(e) Preformed detector loops shall be installed in new pavement constructed of Portland cement concrete using mounting chairs or tied to re-bar or the preformed detector loops may be placed in the sub-base. Loop lead-ins shall be extended to a temporary protective enclosure near the proposed handhole location. The protective enclosure shall provide sufficient protection from other construction activities and may be buried for additional protection.

(f) Handholes shall be placed next to the shoulder or back of curb when preformed detector loops enter the handhole. Non-metallic coilable duct, included in this pay item, shall be used to protect the preformed lead-ins from back of curb to the handhole.

(g) Preformed detector loops shall be factory assembled with ends capped and sealed against moisture and other contaminants. Homeruns and interconnects shall be pre-wired and shall be an integral part of the loop assembly. The loop configurations and homerun lengths shall be assembled for the specific application. The loop and homerun shall be constructed using 11/16 inch (17.2 mm) outside diameter (minimum), 3/8 inch (9.5 mm) inside diameter (minimum) Class A oil resistant synthetic cord reinforced hydraulic hose with 250 psi (1,720 kPa) internal pressure rating or a similarly sized XLPE cable jacket. Hose for the loop and

homerun assembly shall be one continuous piece. No joints or splices shall be allowed in the hose except where necessary to connect homeruns or interconnects to the loops. This will provide maximum wire protection and loop system strength. Hose tee connections shall be heavy duty high temperature synthetic rubber. The tee shall be of proper size to attach directly to the hose, minimizing glue joints. The tee shall have the same flexible properties as the hose to insure that the whole assembly can conform to pavement movement and shifting without cracking or breaking. For XLPE jacketed preformed loops, all splice connections shall be soldered, sealed, and tested before being sealed in a high impact glass impregnated plastic splice enclosure. The wire used shall be #16 THWN stranded copper. The number of turns in the loop shall be application specific. Homerun wire pairs shall be twisted a minimum of four turns per foot. No wire splices will be allowed in the preformed loop assembly. The loop and homeruns shall be filled and sealed with a flexible sealant to insure complete moisture blockage and further protect the wire. The preformed loops shall be constructed to allow a minimum of 6.5 feet of extra cable in the handhole.

Method of Measurement.
This work will be measured for payment in feet (meters) in place. Type I detector loop will be measured along the sawed slot in the pavement containing the loop and lead-in, rather than the actual length of the wire. Preformed detector loops will be measured along the detector loop and lead-in embedded in the pavement, rather than the actual length of the wire.

Basis of Payment.
This work shall be paid for at the contract unit price per foot (meter) for DETECTOR LOOP, TYPE I or PREFORMED DETECTOR LOOP as specified in the plans, which price shall be payment in full for furnishing and installing the detector loop and all related connections for proper operation.

EMERGENCY VEHICLE PRIORITY SYSTEM.

Revise Section 887 of the Standard Specifications to read:

It shall be the Contractor's responsibility to contact the municipality or fire district to verify the brand of emergency vehicle pre-emption 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 new installations shall be equipped with Confirmation Beacons as shown on the "District One Standard Traffic Signal Design Details." The Confirmation Beacon shall consist of a 6 watt Par 38 LED flood lamp with a 30 degree light spread, maximum 6 watt energy consumption at 120V, and a 2,000 hour warranty for each direction of pre-emption. The lamp shall have an adjustable mount with a weatherproof enclosure for cable splicing. All hardware shall be cast aluminum or stainless steel. Holes drilled into signal poles, mast arms, or posts shall require rubber grommets. In order to maintain uniformity between communities, the confirmation beacons shall indicate when the control equipment receives the pre-emption signal. The pre-emption movement shall be signalized by a flashing indication at the rate specified by Section 4L.01 of the "Manual on Uniform Traffic Control Devices," and other applicable sections of future editions. The stopped pre-empted movements shall be signalized by a continuous indication.

All light operated systems shall include security and transit preemption software and operate at a uniform rate of 14.035 Hz ±0.002, or as otherwise required by the Engineer, and provide compatible operation with other light systems currently being operated in the District.

This item shall include any required modifications to an existing traffic signal controller as a result of the addition of the EMERGENCY VEHICLE PRIORITY SYSTEM.

Basis of Payment.
The work shall be paid for at the contract unit price each for furnishing and installing LIGHT DETECTOR and LIGHT DETECTOR AMPLIFIER. Furnishing and installing the confirmation beacon shall be included in the cost of the Light Detector. Any required modifications to the traffic signal controller shall be included in the cost of the LIGHT DETECTOR AMPLIFIER. The preemption detector amplifier shall be paid for on a basis of (1) one each per intersection controller and shall provide operation for all movements required in the pre-emption phase sequence.

TEMPORARY TRAFFIC SIGNAL INSTALLATION.

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, uninterruptible 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 equipment vendor will be allowed to assemble the temporary traffic signal cabinet. Also, an approved equipment vendor shall assemble and test a temporary railroad traffic signal cabinet. (Refer to the "Inspection of Controller and Cabinet" specification). A representative of the approved control equipment vendor shall be present at the temporary traffic signal turn-on inspection.

Construction Requirements.

(a) Controllers.

1. Only controllers supplied by one of the District approved closed loop equipment manufacturers 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 as modified herein.

2. Only control equipment, including controller cabinet and peripheral equipment, supplied by one of the District approved closed loop equipment manufacturers 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 current software installed.

(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 District 1 Traffic Signal Specifications for "Grounding of Traffic Signal Systems."

(d) Traffic Signal Heads. All traffic signal sections and pedestrian signal sections shall be 12 inches (300 mm). 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. 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 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 item 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.

3. Temporary wireless interconnect, complete. The radio interconnect system shall be compatible with Eagle or Econolite controller closed loop systems. This item shall include all temporary wireless interconnect components, complete, at the adjacent existing traffic signal(s) to provide a completely operational closed loop system. This item 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 this item.

    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 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 manufacturers recommendations.

The following radio equipment is currently approved for use in Region One/District One: Encom Model 5100 and Intuicom Communicator II.

(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 ±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 as shown on the plans or as directed by the Engineer. Pedestrian push buttons shall be provided for all pedestrian signal heads/phases as shown on the plans or as directed by the Engineer. All approaches shall have vehicular detection provided by vehicle detection system as shown on the plans or 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. A representative of the approved control equipment vendor 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) Uninterruptible Power Supply. All temporary traffic signal installations shall have Uninterruptible Power Supply (UPS). The UPS cabinet shall be mounted to the temporary traffic signal cabinet and meet the requirements of Uninterruptible Power Supply in Divisions 800 and 1000 of these specifications.

(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.

(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 MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION in Division 800 of these specifications. 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, District One Traffic Signal Specifications 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 aerially 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. Unless otherwise directed by the Engineer, temporary portable traffic signals shall be restricted to use on roadways of less than 8000 ADT that have limited access to electric utility service, shall not be installed on projects where the estimated need exceeds ten (10) weeks, and shall not be in operation during the period of November through March. The Contractor shall replace the temporary portable traffic signals with temporary span wire traffic signals noted herein at no cost to the contract if the bridge project or Engineer requires temporary traffic signals to remain in operation into any part of period of November through March. If, in the opinion of the engineer, the reliability and safety of the

temporary portable traffic signal is not similar to that of a temporary span wire traffic signal installation, the Contractor shall replace the temporary portable traffic signals with temporary span wire traffic signals noted herein at no cost to the contract.

2. The controller and LED signal displays shall meet the Standard Specifications and all other requirements in this TEMPORARY TRAFFIC SIGNAL INSTALLATION specification.

3. Work shall be according to Article 701.18(b) of the Standard Specifications except as noted herein.

4. 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 applicatble 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 nonoperating equipment according to Article 701.11.

g. Basis of Payment. This work will be paid for according to Article 701.20(c).

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 complete, temporary fiber optic interconnect system complete, all material required, the installation and complete removal of the temporary traffic signal. Each intersection will be paid for separately.

REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT.

Add the following to Article 895.05 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 State shall be delivered by the Contractor to the State's Traffic Signal Maintenance Contractor's main facility. The Contractor shall contact the State's Electrical Maintenance Contractor 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 5 copies of a list of equipment that is to remain the property of the State, 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 with these requirements, it will be rejected by the State's Electrical Maintenance Contractor. 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 State's Electrical Maintenance Contractor 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 State. 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 Department for any reason shall be replaced with new equipment meeting the requirements of these Specifications at no cost to the contract.

TRAFFIC SIGNAL PAINTING.

Description.
This work shall include surface preparation, powder type painted finish application and packaging of new galvanized steel traffic signal mast arm poles and posts assemblies. All work associated with applying the painted finish shall be performed at the manufacturing facility for the pole assembly or post or at a painting facility approved by the Engineer. Traffic signal mast arm shrouds and post bases shall also be painted the same color as the pole assemblies and posts.

Surface Preparation.
All weld flux and other contaminates shall be mechanically removed. The traffic mast arms and post assemblies shall be degreased, cleaned, and air dried to assure all moisture is removed.

Painted Finish.
All galvanized exterior surfaces shall be coated with a urethane or triglycidyl isocyanurate (TGIC) polyester powder to a dry film thickness of 2.0 mils. Prior to application, the surface shall be mechanically etched by brush blasting (Ref. SSPC-SP7) and the zinc coated substrate preheated to 450 °F for a minimum one (1) hour. The coating shall be electrostatically applied and cured by elevating the zinc-coated substrate temperature to a minimum of 400 °F.

The finish paint color shall be one of the manufacturer's standard colors and shall be as selected by the local agency responsible for paint costs. The Contractor shall confirm, in writing, the color selection with the local responsible agency and provide a copy of the approval to the Engineer and a copy of the approval shall be included in the material catalog submittal.

Painting of traffic signal heads, pedestrian signal heads and controller cabinets is not included in this pay item.

Any damage to the finish after leaving the manufacturer's facility shall be repaired to the satisfaction of the Engineer using a method recommended by the manufacturer and approved by the Engineer. If while at the manufacturer's facility the finish is damaged, the finish shall be re-applied at no cost to the contract.

Warranty.
The Contractor shall furnish in writing to the Engineer, the paint manufacturer's standard warranty and certification that the paint system has been properly applied.

Packaging.
Prior to shipping, the poles and posts shall be wrapped in ultraviolet-inhibiting plastic foam or rubberized foam.

Basis of Payment.

This work shall be paid for at the contract unit price each for PAINT NEW MAST ARM AND POLE, UNDER 40 FEET (12.19 METER), PAINT NEW MAST ARM AND POLE, 40 FEET (12.19 METER) AND OVER, PAINT NEW COMBINATION MAST ARM AND POLE, UNDER 40 FEET (12.19 METER), PAINT NEW COMBINATION MAST ARM AND POLE, 40 FEET (12.19 METER) AND OVER, or PAINT NEW TRAFFIC SIGNAL POST of the length specified, which shall be payment in full for painting and packaging the traffic signal mast arm poles and posts described above including all shrouds, bases and appurtenances.

ILLUMINATED STREET NAME SIGN

Description.
This work shall consist of furnishing and installing a LED internally illuminated street name sign.

Materials.
Materials shall be in accordance with ILLUMINATED STREET NAME SIGN in Division 1000 of these specifications.

Installation.
The sign can be mounted on most steel mast arm poles. Mounting on aluminum mast arm pole requires supporting structural calculations. Some older or special designed steel mast arm poles may require structural evaluation to assure that construction of the mast arm pole is adequate for the proposed additional loading. Structural calculations and other supporting documentation as determined by the Engineer shall be provided by the contractor for review by the Department.

The sign shall be located on a steel traffic signal mast arm no further than 8-feet from the center of the pole to the center of the sign at a height of between 16 to 18-feet above traveled pavement. Mounting hardware shall be Pelco model SE-5015, or approved equal, utilizing stainless steel components.

Signs shall be installed such that they are not energized when traffic signals are powered by an alternate energy source such as a generator or uninterruptible power supply (UPS). The signs shall be connected to the generator or UPS bypass circuitry.

Basis of Payment.
This work will be paid for at the contract unit price each for ILLUMINATED STREET NAME SIGN, of the length specified which shall be payment in full for furnishing and installing the LED internally illuminated street sign, complete with circuitry and mounting hardware including photo cell, circuit breaker, fusing, relay, connections and cabling as shown on the plans for proper operation and installation.

RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM.

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 disks, copies of computer simulation files for the existing optimized system and a timing database that includes intersection displays 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 new or modified intersection(s) shall be forwarded to IDOT for review prior to implementation.
   c. Consultant shall conduct on-site implementation of the timings at the turn-on and make fine-tuning adjustments to the timings of the subject intersection in the field to alleviate observed adverse operating conditions and to enhance operations.

2. The following deliverables shall be provided for LEVEL I Re-Optimization.

a. Consultant shall furnish to IDOT a cover letter describing the extent of the re-optimization work performed.
b. Consultant shall furnish an updated intersection graphic display for the subject intersection to IDOT and to IDOT's Traffic Signal Maintenance Contractor.

(b) LEVEL II Re-Optimization

1. In addition to the requirements described in the LEVEL I Re-Optimization above, the following tasks are associated with LEVEL II Re-Optimization.
   a. Traffic counts shall be taken at the subject intersection after the traffic signals are approved for operation by the Area Traffic Signal Operations Engineer. Manual turning movement counts shall be conducted from 6:30 a.m. to 9:30 a.m., 11:00 a.m. to 1:00 p.m., and 3:30 p.m. to 6:30 p.m. on a typical weekday from midday Monday to midday Friday. The turning movement counts shall identify cars, and single-unit, multi-unit heavy vehicles, and transit buses.
   b. As necessary, the intersections shall be re-addressed and all system detectors reassigned in the master controller according to the current standard of District One.
   c. Traffic responsive program operation shall be evaluated to verify proper pattern selection and lack of oscillation and a report of the operation shall be provided to IDOT.

2. The following deliverables shall be provided for LEVEL II Re-Optimization.
   a. Consultant shall furnish to IDOT one (1) copy of a technical memorandum for the optimized system. The technical memorandum shall include the following elements:
      (1) Brief description of the project
      (2) Printed copies of the analysis output from Synchro (or other appropriate, approved optimization software file)
      (3) Printed copies of the traffic counts conducted at the subject intersection
   b. Consultant shall furnish to IDOT two (2) CDs for the optimized system. The CDs shall include the following elements:
      (1) Electronic copy of the technical memorandum in PDF format
      (2) Revised Synchro files (or other appropriate, approved optimization software file) including the new signal and the rest of the signals in the closed loop system
      (3) Traffic counts conducted at the subject intersection
      (4) New or updated intersection graphic display file for the subject intersection
      (5) The CD shall be labeled with the IDOT system number and master location, as well as the submittal date and the consultant logo. The CD case shall include a clearly readable label displaying the same information securely affixed to the side and front.

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.

OPTIMIZE TRAFFIC SIGNAL SYSTEM.

Description.
This work shall consist of optimizing a closed loop traffic signal system.

OPTIMIZE TRAFFIC SIGNAL SYSTEM applies when a new or existing closed loop traffic signal system is to be optimized and a formal Signal Coordination and Timing (SCAT) Report is to be prepared. The purpose of this work is to improve system performance by optimizing traffic signal timings, developing a time of day program and a traffic responsive program.

After the signal improvements are completed, the signal system shall be 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 disks, copies of computer simulation files for the existing optimized system and a timing database that includes intersection displays 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) The following tasks are associated with OPTIMIZE TRAFFIC SIGNAL SYSTEM.

1. Appropriate signal timings and offsets shall be developed for each intersection and appropriate cycle lengths shall be developed for the closed loop signal system.

2. Traffic counts shall be taken at all intersections after the permanent traffic signals are approved for operation by the Area Traffic Signal Operations Engineer. Manual turning movement counts shall be conducted from 6:30 a.m. to 9:30 a.m., 11:00 a.m. to 1:00 p.m., and 3:30 p.m. to 6:30 p.m. on a typical weekday from midday Monday to midday Friday. The turning movement counts shall identify cars, and single-unit and multi-unit heavy vehicles.

3. As necessary, the intersections shall be re-addressed and all system detectors reassigned in the master controller according to the current standard of District One.

4. A traffic responsive program shall be developed, which considers both volume and occupancy. A time-of-day program shall be developed for used as a back-up system.

5. Proposed signal timing plan for the new or modified intersection shall be forwarded to IDOT for review prior to implementation.

6. Consultant shall conduct on-site implementation of the timings and make fine-tuning adjustments to the timings in the field to alleviate observed adverse operating conditions and to enhance operations.

7. Speed and delay studies shall be conducted during each of the count periods along the system corridor in the field before and after implementation of the proposed timing plans for comparative evaluations. These studies should utilize specialized electronic timing and measuring devices.

(b) The following deliverables shall be provided for OPTIMIZE TRAFFIC SIGNAL SYSTEM.

1. Consultant shall furnish to IDOT one (1) copy of a SCAT Report for the optimized system. The SCAT Report shall include the following elements:

Cover Page in color showing a System Map
Figures 1. System overview map – showing system number, system schematic map with numbered system detectors, oversaturated movements, master location, system phone number, cycle lengths, and date of completion. 2. General location map in color – showing signal system location in the metropolitan area. 3. Detail system location map in color – showing cross street names and local controller addresses. 4. Controller sequence – showing controller phase sequence diagrams.
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Tab 2. Turning Movement Counts 1. Turning Movement Counts (Showing turning movement counts in the intersection diagram for each period, including truck percentage)
Tab 3. Synchro Analysis 1. AM: Time-Space diagram in color, followed by intersection Synchro report (Timing report) summarizing the implemented timings. 2. Midday: same as AM 3. PM: same as AM
Tab 4: Speed, Delay Studies 1. Summary of before and after runs results in two (2) tables showing travel time and delay time. 2. Plot of the before and after runs diagram for each direction and time period.
Tab 5: Environmental Report 1. Environmental impact report including gas consumption, NO2, HCCO, improvements.
Tab 6: Electronic Files 1. Two (2) CDs for the optimized system. The CDs shall include the following elements: a. Electronic copy of the SCAT Report in PDF format b. Copies of the Synchro files for the optimized system c. Traffic counts for the optimized system d. New or updated intersection graphic display files for each of the system intersections and the system graphic display file including system detector locations and addresses.

Basis of Payment.

The work shall be paid for at the contract unit each for OPTIMIZE TRAFFIC SIGNAL SYSTEM, which price shall be payment in full for performing all work described herein for the entire traffic signal system. Following the completion of traffic counts, 25 percent of the bid price will be paid. Following the completion of the Synchro analysis, 25 percent of the bid price will be paid. Following the setup and fine tuning of the timings, the speed-delay study, and the TRP programming, 25 percent of the bid price will be paid. The remaining 25 percent will be paid when the system is working to the satisfaction of the engineer and the report and CD have been submitted.

TEMPORARY TRAFFIC SIGNAL TIMINGS

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 TIMINGS.

(a) Consultant shall attend temporary traffic signal inspection (turn-on) and/or detour meeting and conduct on-site implementation of the traffic signal timings. Make fine-turning adjustments to the timings in the field to alleviate observed adverse operating conditions and to enhance operations.

(b) Consultant shall provide monthly observation of traffic signal operations in the field.

(c) 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.

(d) Consultant shall make timing adjustments and prepare comment responses as directed by the Area Traffic Signal Operations Engineer.

Basis of Payment.
The work shall be paid for at the contract unit price each for TEMPORARY TRAFFIC SIGNAL TIMINGS, 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.

MODIFYING EXISTING CONTROLLER CABINET.

The work shall consist of modifying an existing controller cabinet as follows:

(a) Uninterruptible Power Supply (UPS). The addition of uninterruptible power supply (UPS) to an existing controller cabinet could require the relocation of the existing controller cabinet items to allow for the installation of the uninterruptible power supply (UPS) components inside the existing controller cabinet as outlined under Sections 862 and 1074.04 of the Standard Specifications.

(b) Light Emitting Diode (LED) Signal Heads, Light Emitting Diode (LED) Optically Programmed Signal Heads and Light Emitting Diode (LED) Pedestrian Signal Heads. The contractor shall verify that the existing load switches meet the requirements of Section 1074.03(5)(b)(2) of the Standard Specifications and the recommended load requirements of the light emitting diode (LED) signal heads that are being installed at the existing traffic signal. If any of the existing load switches do not meet these requirements, they shall be replaced, as directed by the Engineer.

(c) Light Emitting Diode (LED), Signal Head, Retrofit. The contractor shall verify that the existing load switches meet the requirements of Section 1074.03(2) of the Standard Specifications and the recommended load requirements of light emitting diode (LED) traffic signal modules, pedestrian signal modules, and pedestrian countdown signal modules as specified in the plans. If any of the existing load switches do not meet these requirements, they shall be replaced, as directed by the Engineer.

Basis of Payment.
Modifying an existing controller cabinet will be paid for at the contract unit price per each for MODIFY EXISTING CONTROLLER CABINET. This shall include all material and labor required to complete the work as described above, the removal and disposal of all items removed from the controller cabinet, as directed by the Engineer. The equipment for the Uninterruptible Power Supply (UPS) and labor to install it in the existing controller cabinet shall be included in the pay item Uninterruptible Power Supply. Modifying an existing controller will be paid for at the contract unit price per each for MODIFY EXISTING CONTROLLER, per Sections 895.04 and 895.08 of the Standard Specifications.

DIVISION 1000 MATERIALS

PEDESTRIAN PUSH-BUTTON.

Revise Article 1074.02(a) of the Standard Specifications to read:

The pedestrian push-button housing shall be constructed of aluminum alloy according to ASTM B 308 6061-T6 and powder coated yellow, unless otherwise noted on the plans. The housing shall be furnished with suitable mounting hardware.

Revise Article 1074-02(e) of the Standard Specifications to read:

Stations shall be designed to be mounted directly to a post, mast arm pole or wood pole. The station shall be aluminum and shall accept a 3 inch (75mm) round push-button assembly and a regulatory pedestrian instruction sign according to MUTCD, sign series R10-3e 9 x 15 inch sign with arrow(s) for a count-down pedestrian signal. The pedestrian station size without count-down pedestrian signals shall accommodate a MUTCD sign series R10-3b or R10-3d 9 x 12 inch sign with arrow(s).

Add the following to Article 1074.02(a) of the Standard Specifications:

(f) Location. Pedestrian push-buttons and stations shall be mounted directly to a post, mast arm pole or wood pole as shown on the plans and shall be fully accessible from a paved or concrete surface. See the District's Detail sheets for orientation and mounting details.

CONTROLLER CABINET AND PERIPHERAL EQUIPMENT.

Add the following to Article 1074.03 of the Standard Specifications:

(a) (6) Cabinets shall be designed for NEMA TS2 Type 1 operation. All cabinets shall be pre-wired for a minimum of eight (8) phases of vehicular, four (4) phases of pedestrian and four (4) phases of overlap operation.

(b) (5) Cabinets – Provide 1/8" (3.2 mm) thick unpainted aluminum alloy 5052-H32. The surface shall be smooth, free of marks and scratches. All external hardware shall be stainless steel.

(b) (6) Controller Harness – Provide a TS2 Type 2 "A" wired harness in addition to the TS2 Type 1 harness.

(b) (7) Surge Protection – Plug-in type EDCO SHA-1250 or Atlantic/Pacific approved equal.

(b) (8) BIU – Containment screw required.

(b) (9) Transfer Relays – Solid state or mechanical flash relays are acceptable.

(b) (10) Switch Guards – All switches shall be guarded.

(b) (11) Heating – One (1) 200 watt, thermostatically-controlled, Hoffman electric heater, or approved equivalent.

(b) (12) Lighting – One (1) LED Panel shall be placed inside the cabinet top panel and one (1) LED Panel shall be placed on each side of the pull-out drawer/shelf assembly located beneath the controller support shelf. The LED Panels shall be controlled by a wall switch. Relume Traffic Control Box LED Panels and power supply or approved equivalent.

(b) (13) The cabinet shall be equipped with a pull-out drawer/shelf assembly. A 1 ½ inch (38mm) deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of accommodating one (1) complete set of cabinet prints and manuals. This drawer shall support 50 lbs. (23 kg) in weight when fully extended. The drawer shall open and close smoothly. Drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 24 inches (610mm) wide.

(b) (14) Plan & Wiring Diagrams – 12" x 16" (3.05mm x 4.06mm) moisture sealed container attached to door.

(b) (15) Detector Racks – Fully wired and labeled for four (4) channels of emergency vehicle pre-emption and sixteen channels (16) of vehicular operation.

(b) (16) Field Wiring Labels – All field wiring shall be labeled.

(b) (17) Field Wiring Termination – Approved channel lugs required.

(b) (18) Power Panel – Provide a nonconductive shield.

(b) (19) Circuit Breaker – The circuit breaker shall be sized for the proposed load but shall not be rated less than 30 amps.

(b) (20) Police Door – Provide wiring and termination for plug in manual phase advance switch.

(b) (21) Railroad Pre-Emption Test Switch – Eaton 8830K13 SHA 1250 or equivalent.

RAILROAD, FULL-ACTUATED CONTROLLER AND CABINET.

Controller shall comply with Article 1073.01 as amended in these Traffic Signal Special Provisions.

Controller Cabinet and Peripheral Equipment shall comply with Article 1074.03 as amended in these Traffic Signal Special Provisions.

Add the following to Articles 1073.01 (c) (2) and 1074.03 (a) (5) (e) of the Standard Specifications:

Controllers and cabinets shall be new and NEMA TS2 Type 1 design.

A method of monitoring and/or providing redundancy to the railroad preemptor input to the controller shall be included as a component of the Railroad, Full Actuated Controller and Cabinet installation and be verified by the traffic signal equipment supplier prior to installation.

Railroad interconnected controllers and cabinets shall be assembled only by an approved traffic signal equipment supplier. All railroad interconnected (including temporary railroad interconnect) controllers and cabinets shall be new, built, tested and approved by the controller equipment vendor, in the vendor's District One facility, prior to field installation. The vendor

shall provide the technical equipment and assistance as required by the Engineer to fully test this equipment.

UNINTERRUPTIBLE POWER SUPPLY (UPS).

Revise Article 1074.04(a)(1) of the Standard Specifications to read:

The UPS shall be line interactive and provide voltage regulation and power conditioning when utilizing utility power. The UPS shall be sized appropriately for the intersection's normal traffic signal operating connected load, plus 20 percent (20%). The total connected traffic signal load shall not exceed the published ratings for the UPS. The UPS shall provide a minimum of six (6) hours of normal operation run-time for signalized intersections with LED type signal head optics at 77 °F (25 °C) (minimum 700 W/1000 VA active output capacity, with 90 percent minimum inverter efficiency).

Revise the first paragraph of Article 1074.04(a)(3) of the Standard Specifications to read:

The UPS shall have a minimum of four (4) sets of normally open (NO) and normally closed (NC) single-pole double-throw (SPDT) relay contact closures, available on a panel mounted terminal block or locking circular connectors, rated at a minimum 120 V/1 A, and labeled so as to identify each contact according to the plans.

Revise Article 1074.04(a)(10) of the Standard Specifications to read:

The UPS shall be compatible with the District's approved traffic controller assemblies utilizing NEMA TS 1 or NEMA TS 2 controllers and cabinet components for full time operation.

Revise Article 1074.04(a)(17) of the Standard Specifications to read:

When the intersection is in battery backup mode, the UPS shall bypass all internal cabinet lights, ventilation fans, cabinet heaters, service receptacles, any lighted street name signs, any automated enforcement equipment and any other devices directed by the Engineer.

Revise Article 1074.04(b)(2)b of the Standard Specifications to read:

Batteries, inverter/charger and power transfer relay shall be housed in a separate NEMA Type 3R cabinet. The cabinet shall be Aluminum alloy, 5052-H32, 0.125-inch thick and have a natural mill finish.

Revise Article 1074.04(b)(2)c of the Standard Specifications to read:

No more than three batteries shall be mounted on individual shelves for a cabinet housing six batteries and no more than four batteries per shelf for a cabinet housing eight batteries.

Revise Article 1074.04(b)(2)e of the Standard Specifications to read:

The battery cabinet housing shall have the following nominal outside dimensions: a width of 25 in. (785 mm), a depth of 16 in. (440 mm), and a height of 41 to 48 in. (1.1 to 1.3 m). Clearance between shelves shall be a minimum of 10 in. (250 mm).

UPS
End of paragraph 1074.04(b) (2)e

The door shall be equipped with a two position doorstop, one a 90° and one at 120°.

Revise Article 1074.04(b)(2)g of the Standard Specifications to read:

The door shall open to the entire cabinet, have a neoprene gasket, an Aluminum continuous piano hinge with stainless steel pin, and a three point locking system. The cabinet shall be provided with a main door lock which shall operate with a traffic industry conventional No. 2 key. Provisions for padlocking the door shall be provided.

Add the following to Article 1074.04(b)(2) of the Standard Specifications:

j. The battery cabinet shall have provisions for an external generator connection.

Add the following to Article 1074.04(c) of the Standard Specifications:

(8) The UPS shall include a tip or kill switch installed in the battery cabinet, which shall completely disconnect power from the UPS when the switch is manually activated.

(9) The UPS shall incorporate a flanged electric generator inlet for charging the batteries and operating the UPS. The generator connector shall be male type, twist-lock, rated as 15A, 125VAC with a NEMA L5-15P configuration and weatherproof lift cover plate (Hubbell model HBL4716C or approved equal). Access to the generator inlet shall be from a secured weatherproof lift cover plate or behind a locked battery cabinet police panel.

Battery System.
Revise Article 1074.04(d)(3) of the Standard Specifications to read:

All batteries supplied in the UPS shall be either gel cell or AGM type, deep cycle, completely sealed, prismatic leadcalcium based, silver alloy, valve regulated lead acid (VRLA) requiring no maintenance. All batteries in a UPS installation shall be the same type; mixing of gel cell and AGM types within a UPS installation is not permitted.

Revise Article 1074.04(d)(4) of the Standard Specifications to read:

Batteries shall be certified by the manufacturer to operate over a temperature range of -13 to 160 °F (-25 to + 71 °C) for gel cell batteries and -40 to 140 °F (-40 to + 60 °C) for AGM type batteries.

Add the following to Article 1074.04(d) of the Standard Specifications:

(9) The UPS shall consist of an even number of batteries that are capable of maintaining normal operation of the signalized intersection for a minimum of six hours. Calculations shall be provided showing the number of batteries of the type supplied that are needed to satisfy this requirement. A minimum of four batteries shall be provided.

Add the following to the Article 1074.04 of the Standard Specifications:

(e) Warranty. The warranty for an uninterruptible power supply (UPS) shall cover a minimum of two years from date the equipment is placed in operation; however, the batteries of the UPS shall be warranted for full replacement for a minimum of five years from the date the traffic signal and UPS are placed into service.

ELECTRIC CABLE.

Delete "or stranded, and No. 12 or" from the last sentence of Article 1076.04 (a) of the Standard Specifications.

Add the following to the Article 1076.04(d) of the Standard Specifications:

Service cable may be single or multiple conductor cable.

TRAFFIC SIGNAL POST.

Add the following to Article 1077.01 (d) of the Standard Specifications:

All posts and bases shall be steel and hot dipped galvanized. If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with TRAFFIC SIGNAL PAINTING in Division 800 of these specifications.

PEDESTRIAN PUSH-BUTTON POST.

Add the following to Article 1077.02(b) of the Standard Specifications:

All posts and bases shall be steel and hot-dipped galvanized. If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with Traffic Signal Painting in Division 800 of these specifications.

MAST ARM ASSEMBLY AND POLE.

Add the following to Article 1077.03 (a) of the Standard Specifications:

Traffic signal mast arms shall be one piece construction, unless otherwise approved by the Engineer. All poles shall be galvanized. If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with with TRAFFIC SIGNAL PAINTING in Division 800 of these specifications.

The shroud shall be of sufficient strength to deter pedestrian and vehicular damage. The shroud shall be constructed and designed to allow air to circulate throughout the mast arm but not allow infestation of insects or other animals, and such that it is not hazardous to probing fingers and feet. All mounting hardware shall be stainless steel.

LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL HEAD.

Add the following to Section 1078 of the Standard Specifications:

General.
All signal and pedestrian 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 signal and/or pedestrian 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.

Pedestrian signal heads shall be furnished with the international symbolic "Walking Person" and "Upraised Palm" displays. Egg crate sun shields are not permitted.

Signal heads shall be positioned according to the "District One Standard Traffic Signal Design Details."

LED signal heads (All Face and Section Quantities), (All Mounting Types) shall conform fully to the requirements of Articles 1078.01 and 1078.02 of the Standard Specifications amended herein.

1. 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 60 months from the date of delivery. 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 60 months of the date of delivery shall be replaced or repaired. The manufacturer's written warranty for the LED signal modules shall be dated, signed by an Officer of the company 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

c. 12 inch (300 mm) pedestrian, 2 sections

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.

4. Material used for the lens and signal module construction shall conform to ASTM specifications for the materials.

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

1. The minimum initial luminous intensity values for the modules shall conform to the values in Table 1 of the VTCSH (2005) for circular signal indications, and as stated in Table 3 of these specifications for arrow and pedestrian indications at 25 °C.

2. The modules shall meet or exceed the illumination values stated in Articles 1078.01 and 1078.02 the Standard Specifications for circular signal indications, and Table 3 of these specifications for arrow and pedestrian indications, throughout the useful life based on normal use in a traffic signal operation over the operating temperature range.

3. The measured chromaticity coordinates of the modules shall conform to the chromaticity requirements of Section 4.2 of the VTCSH (2005) or applicable successor ITE specifications.

4. The LEDs utilized in the modules shall be AlInGaP technology for red, yellow, Portland orange (pedestrian) and white (pedestrian) indications, and GaN for green 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. The individual LEDs 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
   c. 12 inch (300 mm) pedestrian, 2 sections

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.

(g) The following specification requirements apply to the 12 inch (300 mm) Pedestrian module only. All general specifications apply unless specifically superseded in this section.

1. Each pedestrian signal LED module shall provide the ability to actuate the solid upraised hand and the solid walking person on one 12 inch (300mm) section.

2. Two (2) pedestrian sections shall be installed. The top section shall be wired to illuminate only the upraised hand and the bottom section shall be the walking man.

3. "Egg Crate" type sun shields are not permitted. All figures must be a minimum of 9 inches (225mm) in height and easily identified from a distance of 120-feet (36.6m).

LIGHT EMITTING DIODE (LED) PEDESTRIAN COUNTDOWN SIGNAL HEAD.

Add the following to Article 1078.02 of the Standard Specifications:

General.

1. The module shall operate in one mode: Clearance Cycle Countdown Mode Only. The countdown module shall display actual controller programmed clearance cycle and shall start counting when the flashing clearance signal turns on and shall countdown to "0" and turn off when the steady Upraised Hand (symbolizing Don't Walk) signal turns on. Module shall not have user accessible switches or controls for modification of cycle.

2. At power on, the module shall enter a single automatic learning cycle. During the automatic learning cycle, the countdown display shall remain dark.

3. The module shall re-program itself if it detects any increase or decrease of Pedestrian Timing. The counting unit will go blank once a change is detected and then take one complete pedestrian cycle (with no counter during this cycle) to adjust its buffer timer.

4. The module shall allow for consecutive cycles without displaying the steady Upraised Hand.

5. The module shall recognize preemption events and temporarily modify the crossing cycle accordingly.

6. If the controller preempts during the Walking Person (symbolizing Walk), the countdown will follow the controller's directions and will adjust from Walking Person to flashing Upraised Hand. It will start to count down during the flashing Upraised Hand.

7. If the controller preempts during the flashing Upraised Hand, the countdown will continue to count down without interruption.

8. The next cycle, following the preemption event, shall use the correct, initially programmed values.

9. If the controller output displays Upraised Hand steady condition and the unit has not arrived to zero or if both the Upraised Hand and Walking Person are dark for some reason, the unit suspends any timing and the digits will go dark.

10. The digits will go dark for one pedestrian cycle after loss of power of more than 1.5 seconds.

11. The countdown numerals shall be two (2) "7 segment" digits forming the time display utilizing two rows of LEDs.

12. The LED module shall meet the requirements of the Institute of Transportation Engineers (ITE) LED purchase specification, "Pedestrian Traffic Control Signal Indications - Part 2: LED Pedestrian Traffic Signal Modules," or applicable successor ITE specifications, except as modified herein.

13. 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.

14. In the event of a power outage, light output from the LED modules shall cease instantaneously.

15. The LEDs utilized in the modules shall be AlInGaP technology for Portland Orange (Countdown Numerals and Upraised Hand) and GaN technology for Lunar White (Walking Person) indications.

16. The individual LEDs 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.

Electrical.

1. Maximum power consumption for LED modules is 29 watts.

2. The measured chromaticity shall remain unchanged over the input line voltage range listed of 80 VAC to 135 VAC.

TRAFFIC SIGNAL BACKPLATE.

Delete 1st sentence of Article 1078.03 of the Standard Specifications and add "All backplates shall be aluminum and louvered".

Add the following to the third paragraph of Article 1078.03 of the Standard Specifications. The reflective backplate shall not contain louvers.

Delete second sentence of the fourth paragraph of Article 1078.03 f 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 manufacturer's recommendations. The retro reflective sheeting shall be installed under a controlled environment at the manufacturer/supplier before shipment to the contractor. The aluminum backplate shall be prepared and cleaned, following recommendations of the retro reflective sheeting manufacturer.

INDUCTIVE LOOP DETECTOR.

Add the following to Article 1079.01 of the Standard Specifications:

Contracts requiring new cabinets shall provide for rack mounted detector amplifier cards. Detector amplifiers shall provide LCD displays with loop frequency, inductance, and change of inductance readings.

ILLUMINATED SIGN, LIGHT EMITTING DIODE.

Delete last sentence of Article 1084.01(a) and add "Mounting hardwire shall be black polycarbonate or galvanized steel and similar to mounting Signal Head hardware and bracket specified herein and shall provide tool free access to the interior."

Revise the second paragraph of Article 1084.01(a) to read:

The exterior surface of the housing shall be acid-etched and shop painted with one coat of zinc-chromate primer and two coats of exterior enamel. The housing shall be the same color (yellow or black) to match the existing or proposed signal heads. The painting shall be according to Section 851.

Add the following to Article 1084.01 (b) of the Standard Specifications:

The message shall be formed by rows of LEDs. The sign face shall be 24 inches (600 mm) by 24 inches (600 mm).

Add the following to Article 1084.01 of the Standard Specifications:

(e) The light emitting diode (LED) blank out signs shall be manufactured by National Sign & Signal Company, or an approved equal and consist of a weatherproof housing and door, LEDs and transformers.

ILLUMINATED STREET NAME SIGN

The illuminate street name sign shall be as follows.

(a) Description.
The LEDs shall be white in color and utilize InGaN or UV thermally efficient technology. The LED Light Engines shall be designed to fit inside a standard fluorescent illuminated street sign housing in lieu of fluorescent lamps and ballasts or a slim line type housing. The LED internally-illuminated street name sign shall display the designated street name clearly and legibly in the daylight hours without being energized and at night when energized. The sign assembly shall consist of a four-, six-, or eight-foot aluminum housing. White translucent 3M DG^3 reflective sheeting sign faces with the street name applied in 3M/Scotchlite Series 1177 or current 3M equivalent transparent green shall be installed in hinged doors on the side of the sign for easy access to perform general cleaning and maintenance operations. Illumination shall occur with LED Light Engine as specified.

(b) Environmental Requirements.
The LED lamp shall be rated for use in the ambient operating temperature range of -40 to +50°C (-40 to +122°F) for storage in the ambient temperature range of -40 to +75°C (-40 to +167°F).

(c) General Construction.
1. The LED Light Engine shall be a single, self-contained device, for installation in an existing street sign housing. The power supply must be designed to fit and mounted on the inside wall at one end of the street sign housing. The LED Light Engine shall be mounted within the inner top portion of the housing and no components of the light source shall sit between the sign faces.

2. The assembly and manufacturing processes of the LED Light Engine shall be designed to ensure that all LED and electronic components are adequately supported to withstand mechanical shocks and vibrations in compliance with the specifications of the ANSI, C136.31-2001 standards.

(d) Mechanical Construction.
1. The sign shall be constructed using a weatherproof, aluminum housing consisting of an extruded aluminum top with a minimum thickness of .140" x 10 ¾" deep (including the drip edge). The extruded aluminum bottom is .094" thick x 5 7/8" deep. The ends of the housing shall be cast aluminum with a minimum thickness of .250". A six-foot sign shall be 72 5/8" long and 22 5/16" tall and not weigh more than 77 pounds. An eight-foot sign shall be 96 5/8" long and 22 5/16" tall and not weigh more than 92 pounds. All corners are continuous TIG (Tungsten Inert Gas) welded to provide a weatherproof seal around the entire housing.

2. The door shall be constructed of extruded aluminum. Two corners are continuous TIG welded with the other two screwed together to make one side of the door removable for installation of the sign face. The door is fastened to the housing on the bottom by a full length, .040" x 1 1/8" open stainless steel hinge. The door shall be held secure onto a 1"

wide by 5/32" thick neoprene gasket by three (six total for two-way sign) quarter-turn fasteners to form a watertight seal between the door and the housing.

3. The sign face shall be constructed of .125" white translucent polycarbonate. The letters shall be 8" upper case and 6" lower case. The sign face legend background shall consist of 3M/Scotchlite Series 4090T or current equivalent 3M translucent DG^3 white VIP (Visual Impact Performance) diamond grade sheeting (ATSM Type 9) and 3M/Scotchlite Series 1177 or current 3M equivalent transparent green acrylic EC (electronic cut-able) film applied to the front of the sign face. The legend shall be framed by a white polycarbonate border. A logo symbol and/or name of the community may be included with approval of the Engineer.

4. All surfaces of the sign shall be etched and primed in accordance to industry standards before receiving appropriate color coats of industrial enamel.

5. All fasteners and hardware shall be corrosion resistant stainless steel. No tools are required for routine maintenance.

6. All wiring shall be secured by insulated wire compression nuts.

7. A wire entrance junction box shall be supplied with the sign assembly. The box may be supplied mounted to the exterior or interior of the sign and provide a weather tight seal.

8. A photoelectric switch shall be mounted in the control cabinet to control lighting functions for day and night display. Each sign shall be individually fused.

9. Brackets and Mounting: LED internally-illuminated street name signs will be factory drilled to accommodate mast arm two-point support assembly mounting brackets.

(e) Electrical.

1. Photocell shall be rated 105-305V, turn on at 1.5 fcs. with a 3-5 second delay. A manufacturer's warranty of six (6) years shall be provided. Power consumption shall be no greater than 1 watt at 120V.

2. The LED Light Engine shall operate from a 60 +- 3 cycle AC line power over a voltage range of 80 to 135 Vac rms. Fluctuations in line voltage over the range of 80 to 135 Vac shall not affect luminous intensity by more than +- 10%.

3. Total harmonic distortion induced into the AC power line by the LED Light Engine, operated at a nominal operating voltage, and at a temperature of +25°C (+77°F), shall not exceed 20%.

4. The LED Light Engine shall cycled ON and OFF with a photocell as shown on the detail sheet and shall not exceed the following maximum power values:

4-Foot Sign	60 W
6-Foot Sign	90 W
8-Foot Sign	120 W

The signs shall not be energized when traffic signals are powered by an alternate energy source such as a generator or uninterruptable power source (UPS). The signs shall be connected to the generator or UPS bypass circuitry.

(f) Photometric Requirements.

1. The entire surface of the sign panel shall be evenly illuminated. The average maintained luminous intensity measured across the letters, operating under the conditions defined in Environmental Requirements and Wattage Sections shall be of a minimum value of 100 cd/m^2.

2. The manufacturer shall make available independent laboratory test results to verify compliance to Voltage Range and Luminous Intensity Distribution Sections.

3. Twelve (12) 1.25 watt LED units shall be mounted on 1-inch x 22-inch metal cone printed circuit boards (MCPCB). The viewing angle shall be 120 degrees. LED shall have a color temperature of 5200k nominal, CRI of 80 with a life expectancy of 75,000 hrs.

(g) Quality Assurance.
The LED Light Engine shall be manufactured in accordance with a vendor quality assurance (QA) program. The production QA shall include statistically controlled routine tests to ensure minimum performance levels of the LED Light Engine build to meet this specification. QA process and test result documentations shall be kept on file for a minimum period of seven (7) years. The LED Light Engine that does not satisfy the production QA testing performance requirements shall not be labeled, advertised, or sold as conforming to these specifications. Each LED Light Engine shall be identified by a manufacturer's serial number for warranty purposes. LED Light Engines shall be replaced or repaired if they fail to function as intended due to workmanship or material defects within the first sixty (60) months from the date of acceptance. LED Light Engines that exhibit luminous intensities less than the minimum value specified in Photometric Section within the first thirty-six (36) months from the date of acceptance shall be replaced or repaired.

APPENDIX D

REPORT
GEOTECHNICAL SITE INVESTIGATION

PROPOSED 156TH STREET EXTENSION BETWEEN LAGRANGE ROAD AND RAVINIA AVENUE ORLAND PARK, ILLINOIS

PREPARED FOR
VILLAGE OF ORLAND PARK

Prepared by:
Malcolm Pirnie, Inc.
1515 E. Woodfield Road, Suite 360
Schaumburg, Illinois 60173

January 13, 2005

Project No. 5498001

January 13, 2005

Mr. Scott Creech
Smith Engineering Consultants, Inc.
338 Alana Drive
New Lenox, Illinois 60451

Re: **Report**
Geotechnical Site Investigation
156th Street Extension
Between LaGrange Road and Ravinia Avenue
Orland Park, Illinois
For Village of Orland Park

Dear Mr. Creech:

Malcolm Pirnie, Inc. (MPI) is pleased to submit one copy of the geotechnical subsurface investigation report for the above referenced site for your use. The attached report summarizes the results of the field and laboratory testing programs, and presents our conclusions and recommendations for pavement design, earthwork, and site preparation for the proposed street extension. If you have any questions concerning the findings or recommendations presented herein, or require additional information, please contact us at any time.

Sincerely,
MALCOLM PIRNIE, INC.

Waye Sheu, Ph.D., P.E.
Principal/Senior Geotechnical Engineer

Enclosure

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REPORT
GEOTECHNICAL SITE INVESTIGATION
PROPOSED 156TH STREET EXTENSION BETWEEN LAGRANGE ROAD AND RAVINIA AVENUE
ORLAND PARK, ILLINOIS

1.0 INTRODUCTION

This report presents the results of a geotechnical site investigation conducted by Malcolm Pirnie, Inc. (MPI) for the proposed 156th Street Extension to be constructed between LaGrange Road and Ravinia Avenue in Orland Park, Illinois. The purpose of the geotechnical site investigation is to assess the subsoil and groundwater conditions at the project site and to provide pavement design, earthwork and subgrade improvement recommendations for the proposed roadway. Our work has been performed in accordance with the scope of services described in our proposal dated April 12, 2005, and the proposal addendum dated November 14, 2005.

The proposed 156th Street Extension will be constructed between LaGrange Road and Ravinia Avenue. The site area is currently undeveloped and is bounded to the south by commercial properties, to the east by LaGrange Road, to the west by Ravinia Avenue, and to the north by undeveloped land. The geotechnical subsurface investigation is based on the layout of the 156th Street Extension provided by Smith Engineering Consultants, Inc. (SEC). The site location is presented in Figure 1. The boring locations and the proposed roadway profile are presented in Figure 2. This report summarizes the results of the geotechnical field and laboratory testing programs, and presents our conclusions and recommendations for pavement design, earthwork, and site preparation for the proposed street extension.

MPI recently conducted a geotechnical site investigation for the Lowe's store parcel and outlots immediately across LaGrange Road to the east. The results of the geotechnical site investigation are presented in a report entitled "*Geotechnical Subsurface Investigation Report, Proposed Lowe's Retail Center, Intersection of 94th Avenue and Sunrise Lane, Orland Park, Illinois*", dated January 22, 2004.

2.0 PROPOSED CONSTRUCTION

Based on the drawing "156th Street Extension Plan and Profile" provided by Smith Engineering Consultants, Inc. on November 4, 2005, the proposed street consists of a two-lane road and is approximately 1,000 feet long and 40 feet wide. The roadway will extend from LaGrange Road to the west then turn northwest connecting to Ravinia Avenue. According to SEC's "Wetland Delineation Report for the 156th Street Extension", dated June 2005, the roadway will intersect a wetland area in the middle of the roadway. According to the roadway profile presented in Figure 2,

the roadway may require up to 5 feet of cut in the western portion, up to 3 feet of fill near the central portion (within the wetland area) and near the existing grade in the eastern portion. This roadway profile was generated by revising an original roadway profile dated October 11, 2005, after considering the preliminary geotechnical recommendations provided by Malcolm Pirnie.

3.0 PURPOSE AND SCOPE OF WORK

The objectives of this geotechnical subsurface investigation were to: (1) provide information on subsurface soil and groundwater conditions along the proposed road alignment; (2) evaluate the engineering properties of the site soils by conducting appropriate field and laboratory testing; and (3) to provide pavement design, earthwork and subgrade improvement recommendations for the proposed roadway construction.

The scope of work included the following components:

1. Field Exploration Program - Nine (9) soil borings (SBR-1 trough SBR-9) were drilled near the center line of the proposed road alignment. The borings were drilled to depths between 10.5 feet to 31 feet below the existing ground surface (bgs). The boring logs, along with a more detailed description of the field exploration program, are presented in Appendix A. Boring and weak soil information from the site investigation is summarized in Table 1.

2. Laboratory Examination and Testing – Geotechnical soil samples recovered during the field investigation were examined in our office to confirm field classifications. Selected samples were subjected to laboratory testing, including index tests, and unconfined compression strength tests. A more detailed discussion of the laboratory testing program is included in Appendix A and results are included in Appendix B.

3. Engineering Analysis and Evaluation - The information obtained during the field and laboratory testing programs were analyzed and evaluated. An assessment of the general suitability of the site for the proposed road was made based on a series of engineering analyses. Recommendations for subgrade improvement, pavement design, and earthwork were developed.

4. Report - The results of our study and recommendations, including both field and laboratory data, are presented in this report.

4.0 SITE CONDITIONS

4.1 SURFACE CONDITIONS

The site area is currently undeveloped and covered by tall grasses, shrubs, and trees. According to

the "Wetland Delineation Report for the 156th Street Extension" prepared by SEC, dated June 2005, the central portion of the roadway is covered by wetland vegetation. Based on the plan and profile drawing provided by SEC, there are soil mounds at both ends of the proposed road. The ground surface slopes from both ends toward the wetland area in the middle. There is a drainage ditch located south of the roadway alignment. The wetland area appears to slope toward the south.

4.2 SUBSURFACE CONDITIONS

Our interpretation of the subsurface conditions at the site is based on the results of the exploratory borings and laboratory tests performed during our site investigation.

The subsoil conditions encountered in both end segments of the roadway (borings SBR-1, SBR-2, SBR-5 through SBR-7, drilled outside the wetland area) generally consisted of a thin layer of silty sand overlying hard to very stiff silty clay to an approximate depth of 10 feet, where borings SBR-1, 2, 5 and 6 were terminated. A loose clayey sand layer was encountered in boring SBR-7 beneath the silty clay layer and extended to the maximum depth drilled, 13 feet. Organic matter was encountered in boring SBR-5 in the silty sand and upper portion of silty clay. Groundwater was only encountered in boring SBR-7 at an approximate depth of 12 feet. Borings SBR-1, 2, 5, and 6 were dry.

Borings SBR-3, SBR-4, SBR-8, and SBR-9 were drilled within the wetland area.

Borings SBR-3 and SBR-8 were drilled in a section of roadway that will have minor cut and fill during future roadway construction. The subsoil conditions encountered in borings SBR-3 and SBR-8 consisted of 2 to 4 feet of medium dense silty sand, overlying 2 to 4 feet of medium stiff to hard silty clay. A 3- to 4-foot thick organic clay layer was encountered below the silty clay layer at an approximate depth of 6 feet and extended to approximately 10 and 9 feet below grade in borings SBR-3 and SBR-8, respectively. The organic clay layer was generally stiff to very stiff in consistency. A very soft high plasticity silty clay layer was encountered below the organic clay and extended to approximately 24 to 29 feet below the existing ground surface. A loose silty sand layer was encountered beneath the very soft silty clay. Groundwater was encountered at an approximate depth of 29 feet below grade in SBR-3 and 24 feet in SBR-8 during drilling.

Borings SBR-4 and SBR-9 were drilled in a section of roadway that will have up to 3 feet of fill during future roadway construction. Boring SBR-9 was drilled in approximately 35 feet north of the roadway centerline due to inaccessibility of the area. The subsoil conditions encountered in these two borings are quite different. The subsoil encountered in boring SBR-4 consisted of a 2-foot thick silty sand layer overlying a 4-foot thick stiff to very stiff silty clay layer. Beneath the silty clay layer, an organic clay layer was encountered from 6 feet to 12 feet below grade. The organic clay is medium stiff in consistency. Beneath the organic clay layer, a thin layer of loose clayey sand was encountered overlying a very soft to stiff high plasticity silty clay. At an approximate depth of 22 feet, a medium dense silty to clayey sand layer was encountered beneath the high plasticity silty clay. The subsoil encountered in boring SBR-9 consisted of a 2-foot thick silty sand layer overlying a 7-foot thick hard silty clay with organic to organic clay. Beneath the organic clay layer, a stiff silty clay layer was encountered and extended to the maximum depth drilled, 31 feet. A thin silty sand

layer was encountered within the silty clay layer at an approximate depth of 14 feet. Groundwater was encountered at an approximate depth of 12.5 feet below grade in SBR-4 and 15 feet in SBR-9.

4.3 FROST PENETRATION DEPTH

The frost penetration depth for the project site area is approximately 3.5 feet.

5.0 DISCUSSIONS AND RECOMMENDATIONS

5.1 GENERAL

In general, the subsurface conditions encountered along the roadway alignment vary with competent soils at both ends, and very soft high plasticity silty clay as well as organic soil within the middle section which is located within the wetland area. Based on the roadway layout and profile provided by SEC, various amounts of cut and fill will be needed for the construction of the roadway. The very soft silty clay layer has high compressibility and low shear strengths. When subjected to heavy surcharge (fill), significant amounts of ground subsidence can develop. The organic clay may cause ground subsidence in the future due to the decay of organic matter. Considering the subsoil conditions and anticipated cut and fill for the roadway construction, the roadway alignment may be divided in five sections for the purposes of subgrade preparation and/or improvement (see Figure 2 for section locations and associated stations):

Sections A-1 (Station 289+58 to 292+30) and **A-2** (Station 297+10 to 299+60) – competent subsoil encountered in borings SBR-1, SBR-2, SBR-5 through SBR-7 with cut, or minor fill not exceeding 1 foot;

Section B (Station 295+00 to 297+10) – very soft silty clay with organic clay encountered in borings SBR-3 and SBR-8, however with minor cut or minor fill (less than 1 foot);

Section C-1 (Station 292+30 to 293+90) – hard organic clay encountered in boring SBR-9 with fill anticipated up to 3 feet thick.

Section C-2 (Station 293+90 to 295+00) – stiff to hard organic clay and very soft silty clay encountered in boring SBR-4 with fill anticipated up to 3 feet thick in the southern portion of roadway.

Following is a brief discussion on the subgrade preparation or improvement for each section.

5.2 SECTIONS A-1 (STATION 289+58 TO 292+30) AND A-2 (STATION 297+10 TO 299+60)

Based on the subsoil encountered in borings SBR-1, SBR-2, SBR-5 through SBR-7, Sections A-1

and A-2 have competent subsoil conditions to support the proposed roadway with the exception of a localized area near boring SBR-5, which encountered silty sand to silty clay with organic matter near the existing ground surface. Based on the current roadway profile, it is anticipated that the dark brown soils with organic matter will be stripped off during site preparation. If they are encountered at the base of excavation, they should be removed until native soils without organic matter are encountered. The pavement section may be designed in accordance with Section 5.5 Pavement Section.

5.3 SECTION B (STATION 295+00 TO 297+10)

Section B is located in the eastern portion of the wetland. The subsoil conditions encountered in borings SBR-3 and SBR-8 consisted of a thin layer of silty sand and medium stiff to hard silty clay, over stiff organic clay on top of very soft silty clay. Since there will be less than 1 foot of fill or cut within this section, no significant settlement is anticipated to occur under the roadway surcharge. However, some surface subsidence may develop in the long term due to decay of organic matter. Without removing the organic soils or conducting subgrade improvement, this section of roadway may require more frequent resurfacing and maintenance than Sections A-1 and A-2 founded on competent soils. To help in redistributing the loads and reducing pavement distress, it is recommended that upon completing the subgrade preparation, a layer of geogrid (Tensar BX1200 or equivalent) be placed on the subgrade prior to the placement of the well graded sandy gravel (CA-6) of the pavement section.

5.4 SECTION C-1 (STATION 292+30 TO 293+90)

Section C-1 is located in the western portion of the wetland. The subsoil encountered in boring SBR-9 consisted of an approximately 2-foot thick layer of silty sand overlying a 7-foot thick silty clay with organic or organic clay layer over a stiff silty clay layer. It is anticipated that up to 3 feet of fill will be placed within this section of the road. Considering the consistency of the organic clay, the subgrade may sustain the embankment fill. However, the organic matter within the organic clay or silty clay with organics may decay with time and cause ground subsidence in the future. Without removing the organic soils or conducting subgrade improvement, this section of roadway may require more frequent resurfacing and maintenance than Sections A-1 and A-2 founded on competent soils. To help in redistributing the loads and reducing pavement distress, it is recommended that upon completing the subgrade preparation, a layer of geogrid (Tensar BX1200 or equivalent) be placed on the subgrade prior to the placement of the well graded sandy gravel (CA-6) of the pavement section.

As a prudent measure and due to the shallow depth of organic soils encountered, the Village may elect to remove all organic soils and replace with structural fill. The structural fill may consist of on-site silty sand or silty clay free of debris or organics removed during the site preparation. The structural fill should be placed in accordance with the requirements of Section 5.8.4.

5.5 SECTION C-2 (STATION 293+90 TO 295+00)

Section C-2 is located near the central portion of the wetland. The subsoil encountered in boring SBR-4 consisted of an approximately 2-foot thick layer of silty sand overlying a 4-foot layer of stiff to very stiff silty clay, over a medium stiff to hard organic clay layer followed by loose clayey sand and very soft silty clay. It is anticipated that up to 3 feet of fill will be placed within this section of the road. The surcharge will generate surface subsidence due to the high compressibility of the weak soils. Asphalt pavement placed over the fill materials will require frequent maintenance overlay to compensate for the ground subsidence.

MPI conducted an engineering evaluation of the potential surface subsidence based on the proposed fill thickness and laboratory test results, including the consolidation tests performed on the very soft silty clay for the Lowe's Retail Center site across LaGrange Road. The consolidation test results are included in Appendix B. We estimate that approximately 2.5 inches of settlement may develop for the proposed roadway constructed without subgrade improvement. However, approximately 1.5 inches of settlement will develop during the fill placement and pavement construction process. An additional 1 inch of settlement may develop within five years after the construction of the pavement section. Since most of the fill will be placed along the east bound lane, some differential movements may develop along this section if no subgrade improvement is performed. To help in redistributing the loads and reducing pavement distress, it is recommended that upon completing the subgrade preparation, a layer of geogrid (Tensar BX1200 or equivalent) be placed on the subgrade prior to the placement of the well graded sandy gravel (CA-6) of the pavement section.

Additional Subgrade Improvement Considerations

Initially, the following subgrade improvement methods were considered in reducing settlement caused by the compressibility of very soft silty clay and organic soils for the original roadway profile (**up to 6 feet** of fill may be placed):

- Geopier subgrade improvement;
- Preloading with wick drain installation;
- Expanded polystyrene (EPS) block;
- Excavation of soft soil and organic clay and replacement with structural fill.

Upon reviewing the preliminary geotechnical recommendations provided by MPI, SEC has revised the roadway profile to that presented in Figure 2 and only **up to 3 feet** of fill will be placed in Section C-2. Since only up to 3 feet of fill may be placed in Section C-2, the settlement generated due to the compressibility of soft soils is within an acceptable range for roadway construction, other than the concern for long term subsidence due to decay of organic clay. With up to 3 feet of fill surcharge, the following three subgrade improvement methods: Geopier, preloading with wick drain and EPS block are not cost effective and are not warranted. Following is a brief discussion of the engineering evaluation results.

For Geopier subgrade improvement, Geopier elements are installed by drilling 30-inch diameter holes and ramming thin lifts of well graded aggregate within the holes to form very stiff, high-density aggregate piers. The drilled holes will extend below the bottom of the weak soils. However,

to prevent a puncture failure of the pavement section, a minimum 4 feet of structural fill should be placed over the Geopier improved area. This makes the Geopier rather costly and is not recommended for Section C-2.

As an alternative, the subgrade with weak soils within the road alignment may be improved by preloading, provided that additional surcharge materials are available and construction schedule is allowed. Due to the low permeability of the very soft silty clay, wick drains may be installed at a spacing of 5 feet and extend beyond the bottom of the weak soil zone to accelerate the dissipation of excess pore water pressure and aid the development of settlements. Preloading will increase the supporting capacity of the weak soils and reduce the settlement development after pavement construction. However, the high organic soil layer may continue to deteriorate and settle over time, even after preloading is complete on the very soft silty clay. The pavement may require more frequent maintenance than the pavement section founded on the competent native soils. This remediation method does not significantly improve the subgrade conditions due to the needs to compensate for only 3 feet of additional fill.

EPS blocks may be installed to avoid adding excessive surcharge over the weak soils. A portion of the on-site soils will be excavated and replaced with lightweight EPS blocks then the pavement section to reach the proposed finished grade. However, to prevent excessive icing on the pavement during winter, it is common to construct a 2-foot composite section of asphalt pavement, soil matrix and concrete slab over the EPS blocks. This makes the EPS block improvement rather costly for Section C-2.

To reduce the need for more frequent maintenance of the pavement section due to the decay of organic soils, the Village may elect to remove all organic soils and replace them with structure fill. Since the excavation will be extended to an approximate depth of 12 feet and there is no structure nearby, the excavation may be performed by maintaining a proper side slope. Due to the low supporting capacity of the very soft silty clay, it is recommended that at least 2 feet of free draining gravel meeting IDOT materials specifications CA-7, CA-11 or CA-1 be placed at the bottom of the excavation prior to the placement of on-site soils as structural fill. To prevent migration of fines into the voids of the free draining gravels, a layer of geotextile or at least 6-inch well graded sandy gravel (meeting IDOT material specification CA-6) should be placed over the gravel layer as a separation layer prior to the placement of the on-site or imported soils. Please note that the on-site silty sand is difficult to control its moisture content to achieve the compaction requirements during fill placement.

As a conservative measure, the Village may elect to remove all soft silty clay and organic clay located within the footprint of the proposed roadway and replace with structural fill. Since the weak soils were encountered up to an approximate depth of 22 feet below grade in Section C-2, a shoring system has to be installed for the soil excavation. With structural bracing across the excavation, it will be difficult to compact the structural fill. It is anticipated that this alternative will be very costly.

5.6 SUBGRADE IMPROVEMENT RECOMMENDATIONS FOR SECTIONS B, C-1 AND C-2

The subgrade improvement method selected for Sections B, C-1 and C-2 will depend on the acceptable level of future pavement settlement and available budget for roadway construction and maintenance. If the Village is willing to perform more frequent pavement maintenance, geogrid reinforcement will be the most cost effective subgrade improvement.

The Village may elect to remove all organic soils and replace with structural fill to eliminate the concern for future pavement distress due to decay of organic soils. Since we estimate up to 1 inch of consolidation settlement may be developed due to the surcharge over the very soft silty clay after the completion of roadway construction for Section C-2, it is not warranted to remove all very soft silty clay.

If the Village prefers to minimize the needs for more frequent pavement maintenance and considers removing all organic soils and very soft silty clay, as an alternative, Malcolm Pirnie recommends that the subgrade be improved by using Geopier. The cost of installing a shoring system for 22 feet excavation will be higher than that of the Geopier subgrade improvement.

5.7 PAVEMENT SECTION

The proposed paved roadway is shown on Figure 2. A soil bulk sample was collected for the modified Proctor density and Illinois Bearing Ratio (IBR) test to determine the relative bearing value of subgrade materials. An IBR value of 3.2 (taken at 0.1 inches penetration) was obtained. However, considering the variation on the subsoil conditions, an IBR value of 3 will be used for pavement design. Provided that pavement subgrade are improved or prepared in accordance with Sections 5.2 through 5.4 and prepared in the manner outlined in the "SITE PREPARATON AND EARTHWORK" section of this report, the natural soils or improved subgrade may be assumed to have a modulus of subgrade reaction value equal to 150 pounds per cubic inch and/or IBR of 3. Prior to placement of the pavement section (i.e., the base course and surface course), any topsoil and soil containing topsoil and organic matter, if encountered, should be stripped. Following are the pavement recommendations for the proposed 156th Street Extension, based on the assumptions that proper subgrade preparation and improvement will be performed for the roadway:

Bituminous Surface Course Super pave, Mixture D, N50	2"
Bituminous Binder Course Super pave, IL 19.0, N50	7"
Crushed Stone Base Course CA-6, Type B, or Grade 8	8"

Adequate drainage facilities should be provided under the roadway to prevent saturation of the pavement subgrade and to allow natural surface water runoff. The surface of the soil subgrade

should be likewise crowned before placement of the base course fill to provide drainage away from the roadway.

5.8 SITE PREPARATION AND EARTHWORK

Site preparation and earthwork will include stripping, excavating, proof-rolling, filling, and backfilling operations.

5.8.1 Stripping

All vegetation, topsoil, debris, and other deleterious materials should be stripped from areas to be occupied by proposed construction. The stripped topsoil or organic soils should then be stockpiled for later onsite use or off-site disposal.

5.8.2 Excavating

Excavations will be required during subgrade preparation and improvement, and underground utility installation. For excavations shallower than 4 feet, the excavation may be cut no steeper than 1 horizontal to 1 vertical under normal conditions. If open-cut excavations are made deeper than 4 feet, we recommend that the side slopes of the excavation be cut no steeper than 2 horizontal to 1 vertical in the very stiff silty clay under normal conditions. Within the very soft silty clay layer, the slopes of the excavation should be cut no steeper than 4 horizontal to 1 vertical under normal conditions. As an alternative, temporary-retaining systems may be utilized during excavation in lieu of open cutting with proper sloping, especially for excavation within the very soft silty clay. If a temporary shoring system is selected, pressure distribution that is dependent on the scheme selected to support the excavation walls should be reviewed by a qualified geotechnical engineer for proper use of the soil parameters.

Under heavy precipitation, wet weather conditions, and/or winter construction, including snow and/or rain, temporary open cuts must be protected. Further, it is recommended that provisions be maintained so that no surface drainage is allowed to enter the excavation or onto the open-cut faces. Prior to placement of structural fill, the base of all excavations should be protected from possible deterioration and softening caused by frost, ponding of water, and construction activities. Disturbed materials will require additional excavation and replacement. It is important that a qualified soil engineer be present at the site prior to the backfilling operations.

Since groundwater was encountered during the site investigation at depths lower than 12 feet below grade, we anticipate that dewatering operations may not be required during the subgrade improvement or utility trench excavation. However, if surface water or perched water enters the excavations, these may be dewatered during construction using sump pumps, unless heavy rainfall occurs during construction. Soils exposed to standing water may become soft and difficult to work with when exposed to excessive moisture.

5.8.3 Proof-Rolling

It is recommended that proof-rolling operations be performed in all areas to be occupied by the pavement areas **outside the subgrade improvement areas**. The purpose of the proof-rolling is to detect possible localized zones of soft or loose soils. Where localized zones of soft soils are detected and cannot readily be compacted, they should be removed and replaced with compacted fill. Proof-rolling may be accomplished with heavy pneumatic-tired compaction equipment or a loaded dump truck. Any localized soft/loose zones within the fill materials as revealed by proof-rolling, should be recompacted. If the materials cannot be recompacted, the materials should be removed and replaced with structural fill.

5.8.4 Filling and Backfilling

The placement of structural fill will be necessary to attain the required grade underlying the proposed pavement sections. The on-site fill materials or natural soils free of topsoil and debris may be utilized as fill and as backfill material for the pavement sections, provided that the materials can be satisfactorily moisture-treated in order to meet the project compaction requirements. Granular soils meeting the IDOT material specifications CA-6 or CA-7 may be used as backfill material for the structural fill beneath the pavement.

Materials being proposed for use as fill should be submitted to the geotechnical engineer for approval and to establish compaction criteria. The structural backfill materials should be placed in lifts no greater than 9 inches thick, and each lift should be compacted to at least 95 percent of the maximum dry density, as determined by the ASTM D-1557 Method of Compaction.

Clean sand and/or sand and gravel should be used as fill material around piping. The backfill materials should be placed as a controlled compacted fill. All water, debris, and loose or soft soils should be removed from areas to be backfilled prior to placing the fill. The fill materials should be placed in lifts no greater than 9 inches thick, and each lift should be compacted to at least 95 percent of the maximum dry density, as determined by the ASTM D-1557 Method of Compaction. The filling and compaction operations should be performed under the direct full-time supervision of a qualified geotechnical engineer.

6.0 LIMITATIONS

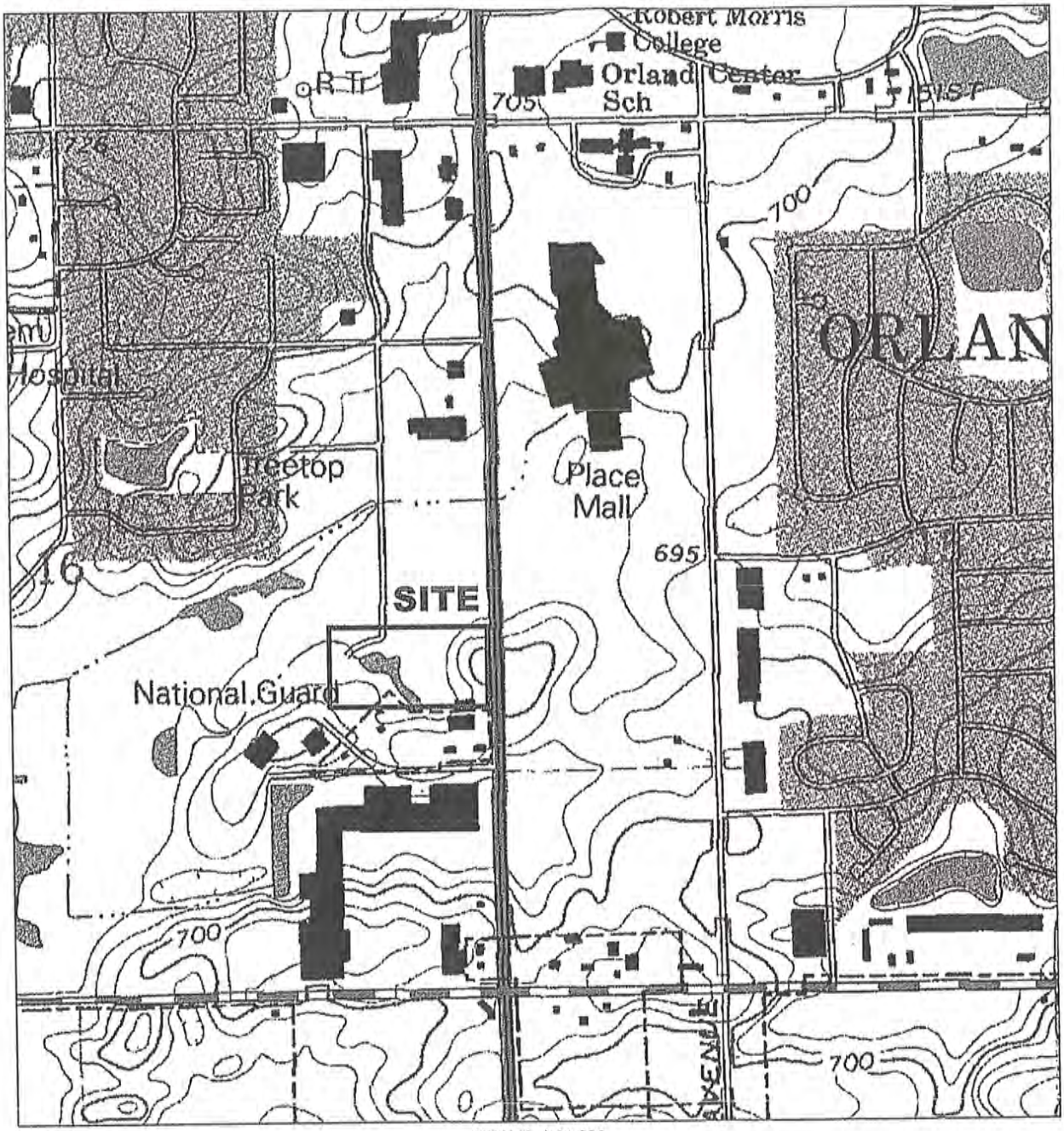
The study reported herein has been conducted in accordance with generally accepted standards in the geotechnical engineering profession. No other warranty, expressed or implied, is made. The log of borings included represents the conditions encountered only in each boring. Varying degrees of non-uniformity of the horizontal and vertical soil conditions are likely to exist between boring locations.

Table 1
BORING AND WEAK SOIL INFORMATION
PROPOSED 156TH STREET EXTENSION, ORLAND PARK, ILLINOIS

BORING NUMBER	STATION LOCATION	DRILLING DEPTH (ft)	WEAK SOIL Depth Range (ft)			THICKNESS OF WEAK SOIL (ft)	GROUNDWATER DEPTH (ft)
SBR-1	299+20	10.5	-	-	-	-	DRY
SBR-2	297+50	10.5	-	-	-	-	DRY
SBR-3	295+75	30.0	6	-	30	24	29.0
SBR-4	294+45	25.0	6	-	18	12	12.5
SBR-5	292+30	10.5	2	-	4	2	DRY
SBR-6	291+30	11.0	-	-	-	-	DRY
SBR-7	290+10	13.0	-	-	-	-	12.0
SBR-8	296+75	31.0	6	-	29	23	24.0
SBR-9	293+40	31.0	2	-	9	7	15.0

Note:

1. Weak soil may consist of very soft to soft silty clay, organic clay, or very loose to loose granular soil.
2. Groundwater level was recorded during drilling.



SCALE: 1:24,000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

QUADRANGLE LOCATION

MAP REFERENCE

1. PORTION OF USGS TINLEY PARK QUADRANGLE, ILLINOIS - COOK CO., 7.5 MINUTE SERIES (TOPOGRAPHIC).

MALCOLM PIRNIE

MALCOLM PIRNIE, INC. CHICAGO, ILLINOIS

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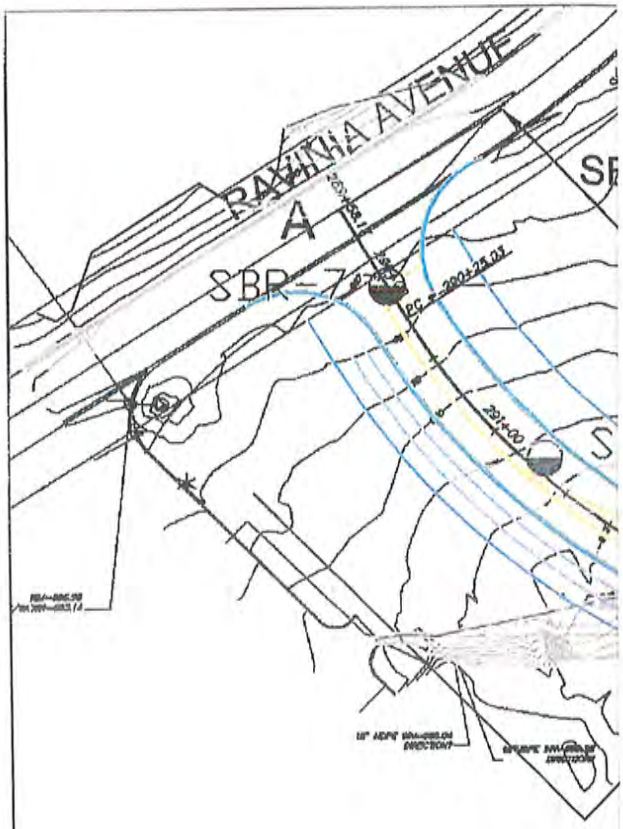
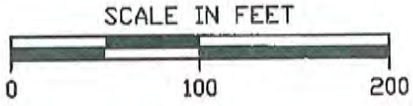
DATE: OCTOBER 2003 PATH/FILENAME: I:\Lowes\orland park\156th\dwg\156THfig1.dwg

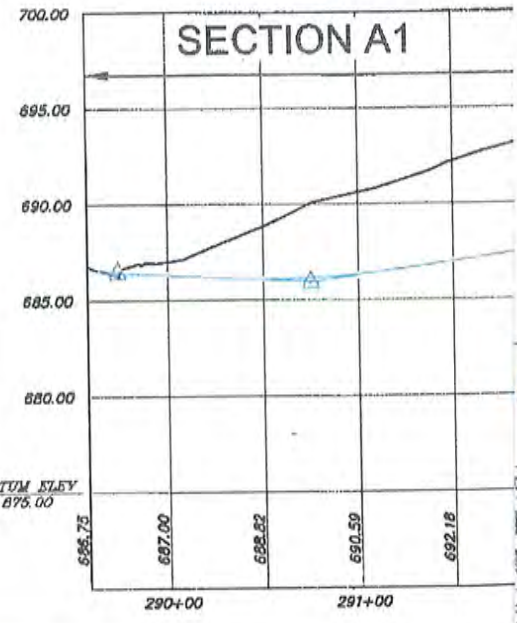
SITE LOCATION MAP

156TH STREET EXTENSION
ORLAND PARK, ILLINOIS

FIGURE 1







NOTES

1. DRAWING ADAPTED FROM SMITH ENGINEERING CONCEPTUAL DRAWING PROVIDED ON 11-4-2005.

MALCOLM PIRNIE

MALCOLM PIRNIE, INC. CHICAGO, ILLINOIS

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DATE: OCTOBER 2005 PATH/FILENAME:\DWG\WBLOCK\1117h(NOPATH).dwg

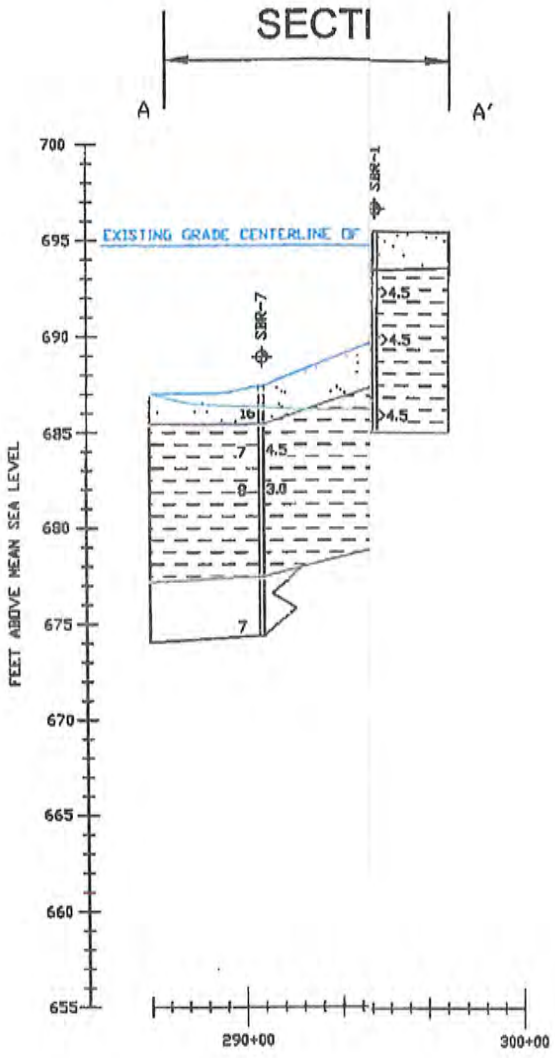
BORING LOCATION MAP AND ROADWAY PROFILE

56th STREET EXTENSION
RLAND PARK, ILLINOIS

FIGURE 2

User:GRONCKI Spec:PIRNIE STANDARD File:I:\SmithEng\156th\dwg\new dwg\156THFIG2.DWG Scale:1:50 Date:01/12/2006 Time:07:56 Layout:MPI

User:GRONCKI Spec:PIRNIE STANDARD File:I:\SmithEng\156th\dwg\new dwg\156THFIG3.DWG Scale:1:1 Date:01/11/2006 Time:17:28 Layout:Layout1



Medium Dense to

Medium Stiff to

Loose to Medium

Very Soft to So

Soft to Medium S

Hard Organic Cla

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OCTOBER 2005 PATH/FILENAME1\DWG\WBLOCK\1117hGNDPATH2.dwg

PLIFIED SOIL PROFILE

H STREET EXTENSION
ND PARK, ILLINOIS

FIGURE 3

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING PROGRAM
PROPOSED 156TH STREET EXTENSION, ORLAND PARK, ILLINOIS

FIELD EXPLORATION

GENERAL

The field exploration program was conducted on August 29, 2005 and December 9, 2005. Seven soil borings (SBR-1 through SBR-7) were drilled on August 29th and two soil borings (SBR-8 and SBR-9) were drilled on December 9th at the approximate locations shown on Figure 2. The soil borings were drilled to an approximate depth of 10.5 to 31 feet bgs. Boring information is summarized in Table 1.

BORINGS

Smith Engineering laid out the center line of the roadway alignment to be used as reference for locating the borings SBR-1 through SBR-9 during the drilling operation. However, due to site conditions (i.e. tree growth) the soil borings were moved to accommodate the clearance required for the drilling rig. C.S. Drilling, Inc. of Addison, Illinois, performed the drilling using a truck-mounted drill rig. An MPI engineer/geologist conducted and monitored all drilling activities, maintained a continuous log of the materials and conditions encountered in the borings, classified the soils and directed the extraction of soil samples for visual examination and laboratory testing. Graphical representations of the boring logs are presented in Appendix A.

The borings were extended from the existing ground surface to depths ranging from 10.5 to 31 feet using hollow stem augers (3¼ inches inside diameter). The borings were advanced incrementally to permit intermittent sampling; generally, samples were taken continuously in the upper 10-feet of each boring and at 5-foot intervals thereafter. Disturbed soil samples were obtained with a 2-inch O.D., 1.4-inch I.D. split-spoon sampler while performing the standard penetration testing in general accordance with ASTM designation D-1586. Relatively undisturbed soil samples were obtained using a Shelby Tube sampler. The split-spoon sampler was driven with a 140-pound hammer falling 30 inches. Sampling resistance, measured in blows per foot of sampler penetration, is shown on the Log of Borings adjacent to the appropriate samples. This blow count, in conjunction with visual examination, was used in evaluating the relative density and approximating the strength of overburden soils. Supplemental data to approximate the soil's strength were measured from "pocket" penetrometer testing, the results of which are included on boring logs at the corresponding sample depth.

WATER LEVEL MEASUREMENTS

The depth to groundwater was measured during the drilling operations at each of the boring locations by lowering a water level indicator in the borehole. Measured depths to groundwater varied from 12 feet bgs to 29 feet bgs across the site. Groundwater was not detected in borings SBR-1, SBR-2, SBR-5 and SBR-6. Water level measurements are included in Table 1.

LOCATION CONTROL

Boring locations were laid out by an MPI field geologist utilizing standard taping technique referencing the center line stakes of roadway laid out by Smith Engineering. The boring locations are shown on Figure 2.

LABORATORY TESTING

GENERAL

Soil samples recovered during the field exploration were visually examined and classified in the field, and reviewed in our Schaumburg, Illinois office for confirmation of field classification; testing was performed on representative soil samples. The geotechnical laboratory testing program was developed to provide data for evaluating the physical properties and engineering characteristics of the subsurface soils and included determinations of classification indices as well as strength. The types of tests performed are described in the following paragraphs. Details of the laboratory test results are presented in Appendix B. In addition, consolidation test results of the very soft silty clay obtained for the proposed Lowe's store site are included in Appendix B and were also included in the engineering evaluation.

MOISTURE-DENSITY DETERMINATIONS

Moisture contents and dry densities were determined on selected, relatively undisturbed soil samples. Moisture determinations were performed in accordance with ASTM Test Designation D-2216. Test results are presented in Table A-1, Summary of Geotechnical Laboratory Test Results.

ORGANIC CONTENT DETERMINATION

Organic contents were determined on thirteen soil samples. Organic content determinations were performed in accordance with ASTM Test Designation D-2974. Test result is presented in Table A-1, Summary of Geotechnical Laboratory Test Results.

UNCONFINED COMPRESSION TESTS

Unconfined compression testing was performed on four selected soil samples to evaluate the strength characteristics of the cohesive soils encountered. The samples were sheared at a constant rate of strain. Load versus deflection curves were plotted for each compression test performed, and the shear strength of the soils was determined from the curves as the peak shear strength. The results of the unconfined compression tests performed on the soil samples are presented in Table A-1, Summary of Geotechnical Laboratory Test Results.

ATTERBERG LIMITS TESTS

Atterberg Limits tests were performed on selected soil samples. The Atterberg Limits, consisting of the liquid limit and the plastic limit, and the resulting Plasticity Index, were determined to facilitate

classification of the soils according to the Unified Soil Classification System and for correlation purposes. The results of the Atterberg Limit tests and the plasticity indices are presented in Table A-1.

GRAIN-SIZE ANALYSIS

Two soil samples were tested for grain-size analysis or for the percentage by weight passing the No. 200 sieve. The test was performed in accordance with ASTM Test Designation D-422. These results are presented in Table A-1, Summary of Laboratory Test Results. The gradation curves for the selected samples are shown in Appendix B.

COMPACTION TEST AND IBR TEST

A compaction test was performed on a representative bulk sample of the on-site soils. The compaction test was performed in order to establish criteria for the placement and compaction of possible fill materials. The compaction test was performed in accordance with the ASTM D-1557 Method of Compaction. The results of the compaction test are presented in Appendix B. In addition, an Illinois Bearing Ratio (IBR) test was conducted to determine the relative bearing value of subgrade materials. The IBR test results are presented in Appendix B.

The following table and plates are attached and complete this Appendix:

Table A-1	Summary of Geotechnical Laboratory Test Results
Plates A-1 thru A-9	Boring Logs

APPENDIX B
LABORATORY TEST RESULTS

TABLE A-1

SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS
PROPOSED 156TH STREET EXTENSION
ORLAND PARK, ILLINOIS

SAMPLE ID.	SAMPLE DEPTH (feet)	ORGANIC CONTENT (%)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	FINER NO. 200 SIEVE (%)	SHEAR STRENGTH (psf)		ATTERBERG LIMITS		
						POCKET PENETROMETER READING	UNCONFINED COMPRESSION TEST	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX
SBR-1	2-4	--	15.4	--	--	>4500	--	--	--	--
SBR-2	2-4	3.3	15.1	--	--	>4500	--	--	--	--
SBR-3	4-6	--	26.9	--	--	500	--	--	--	--
	6-8.5	5.7	19.9/42.3	74.3	--	--	1200	--	--	--
	8.5-10.5	15.1	41.1	--	--	750	--	--	--	--
	13-15	--	67.5	--	--	250	--	61	28	33
	18-20	--	47.2	--	--	<250	--	--	--	--
SBR-4	2-4	5.2	19.7	--	--	--	--	--	--	--
	6-8.5	6.6	53.0/56.5	64.9	--	--	700	--	--	--
	8.5-10.5	38.5	54.7	--	--	--	--	--	--	--
	18-20	--	35.0	--	--	1500	--	--	--	--
SBR-5	2-4	11.4	24.6	--	--	>4500	--	--	--	--
SBR-7	0-2	--	--	--	26.8	--	--	--	--	--
	4-6	6.7	26.3	--	--	3000	--	--	--	--
SBR-8	4-6	--	15.7	--	--	2250	--	--	--	--
	6-8.5	25.7	60.8	75.5	--	--	2410	--	--	--
	8.5-10.5	--	63.2	--	--	<250	--	--	--	--
	10.5-13	--	60.3	64.3	--	--	170	--	--	--
	14-16	--	39.8	--	--	<250	--	--	--	--
SBR-9	2-4	9.3	19.6	--	--	>4500	--	--	--	--
	4-6	18.3	30.4	--	--	>4500	--	--	--	--
	6-8.5	20.9	39.2	--	--	--	--	--	--	--
	8.5-10.5	10.7	32.7	--	--	1000	--	--	--	--
	10.5-12.5	--	50.7	--	--	--	--	--	--	--
BULK-1*	2-7	--	16.7	--	80.3	--	--	44	19	25

* BULK comprises of samples from the cuttings of SBR-2 taken from 2 to 7' bgl.

Modified Proctor Test Results: Maximum Dry Density, 114.0 pcf, and Optimum Moisture Content, 15.3%.

IBR = Illinois Bearing Ratio taken at 0.1 inches penetration, 3.2.

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-1	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS

BORING START: 08/29/05 END: 08/29/05
WELL START: NA END: NA
WATER FIRST: NA AT COMPLETION: NA
SCREEN LOCATION: NA TO: NA
SCREEN TYPE: NA SIZE: NA
CASING TYPE: NA DIAMETER: NA
WEATHER:
Measurements in ft bgl.

LOCATION SKETCH (not to scale)

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1	15		Brown silty sand with little clay and fine gravel (slightly moist, medium dense)	SM		
2-4'	2	SS	1	20		Brown silty clay with trace coarse sand (slighlty moist, hard)	CL	>4.5	
4-6'	3	SS	1.5	20	5	Grades with increasing silt content		>4.5	
6-8.5'		Shelby	2.5						
8.5-10.5'	4	SS	1.5	13	10			>4.5	
						Boring was completed @ 10.5 ft. bgl on 8/29/05. Groundwater was not encountered during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-2	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS
BORING START: 08/29/05	END: 08/29/05	LOCATION SKETCH (not to scale)
WELL START: NA	END: NA	
WATER FIRST: NA	AT COMPLETION: NA	
SCREEN LOCATION: NA	TO: NA	
SCREEN TYPE: NA	SIZE: NA	
CASING TYPE: NA	DIAMETER: NA	
WEATHER:		
Measurements in ft bgl.		

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	0.75	12		Brown silty sand with some clay (slightly moist, medium dense)	SM		
2-4'	2	SS	1.5	14		Brown silty clay with trace to few coarse sand and fine gravel (slighlty moist, hard)	CL	>4.5	
4-6.5'		Shelby	2.5		5				
6.5-8.5	3	SS	1.5	14		Grades to olive gray silty clay with trace to few coarse sand and fine gravel (slightly moist, hard)		>4.5	
8.5-10.5'	4	SS	2.0	10		Grades to gray		3.5	
					10	Boring was completed @ 10.5 ft. bgl on 8/29/05. Groundwater was not encountered during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-3	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS
BORING START: 08/29/05	END: 08/29/05	LOCATION SKETCH (not to scale)
WELL START: NA	END: NA	
WATER FIRST: 29'	AT COMPLETION: 29'	
SCREEN LOCATION: NA	TO: NA	
SCREEN TYPE: NA	SIZE: NA	
CASING TYPE: NA	DIAMETER: NA	
WEATHER:		
Measurements in ft bgl.		

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1	24		Brown silty sand with some fine gravel and some clay (slightly moist, dense)	SM/SC		
2-4'	2	SS	0	18					
4-6'	3	SS	1.0	8	5	Olive gray silty clay (moist, medium stiff)	CH	0.50	
6-8.5'		Shelby	2.5			Black organic clay	OL		
8.5-10.5'	4	SS	1.0	7	10	Olive gray silty clay (moist, soft)	CH	0.75	
13-15'	5	SS	2.0	1	15			0.25	
18-20'	6	SS	2.0	0	20	Grades to (very soft)		<0.25	
23-25'	7	SS	2.0	1	25			<0.25	
28-30'	8	SS	2.0	4	30	Gray silty fine to medium sand (wet, loose)	SM	<0.25	
						Boring was completed @ 30 ft. bgl on 8/29/05. Groundwater was encountered @ 29' bgl during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-4	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS
BORING START: 08/29/05	END: 08/29/05	LOCATION SKETCH (not to scale)
WELL START: NA	END: NA	
WATER FIRST: 12.5'	AT COMPLETION: 12.5'	
SCREEN LOCATION: NA	TO: NA	
SCREEN TYPE: NA	SIZE: NA	
CASING TYPE: NA	DIAMETER: NA	
WEATHER:		
Measurements in ft bgl.		

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1.5	9		Brown silty sand with some clay and trace fine gravel (slightly moist, loose)	SM/SC		
2-4'	2	SS	0.5	7		Brown silty clay with trace coarse sand and fine gravel (slightly moist, stiff)	CL		
4-6'	3	SS	1.0	9	5	Grades to (very stiff)		3.50	
6-8.5'		Shelby	2.5			Black organic clay (moist, medium stiff)	OL		
8.5-10.5'	4	SS	0.25	3	10				
						Brown clayey fine to medium sand with some fine gravel (wet, very loose)	SC		
13-15'	5	SS	1.5	3	15	Olive gray silty clay with trace coarse sand (moist, very soft)	CH	<0.25	
18-20'	6	SS	1.0	10	20	Grades to (slightly moist, stiff)		1.50	
						Brown fine to medium sand with some silt and clay with trace to few coarse sand and fine gravel (wet, medium dense)	SM/SC		
23-25'	7	SS	2.0	10	25				
						Boring was completed @ 25 ft. bgl on 8/29/05. Groundwater was encountered @ 12.5' bgl during driling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-5	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS

BORING START: 08/29/05 END: 08/29/05	LOCATION SKETCH (not to scale)
WELL START: NA END: NA	
WATER FIRST: NA AT COMPLETION: NA	
SCREEN LOCATION: NA TO: NA	
SCREEN TYPE: NA SIZE: NA	
CASING TYPE: NA DIAMETER: NA	
WEATHER:	
Measurements in ft bgl.	

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1	8		Dark brown organic silty sand with some clay (slightly moist, loose)	SM		
2-4'	2	SS	0.5	10		Dark brown silty clay with trace medium to coarse sand (slighlty moist, hard) (Organic)	OL	>4.5	
4-6'	3	SS	0.5	14	5	Grades to some fine sand	CL	>4.5	
6-8.5'		Shelby	2.5						
8.5-10.5'	4	SS	2.0	16	10	Grades with trace to few medium and coarse sand (slightly moist, hard)		4.5	
						Boring was completed @ 10.5 ft. bgl on 8/29/05. Groundwater was not encountered during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-6	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS

BORING START: 08/29/05 END: 08/29/05
WELL START: NA END: NA
WATER FIRST: NA AT COMPLETION: NA
SCREEN LOCATION: NA TO: NA
SCREEN TYPE: NA SIZE: NA
CASING TYPE: NA DIAMETER: NA
WEATHER:
Measurements in ft bgl.

LOCATION SKETCH (not to scale)

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1	12		Brown silty sand with trace clay (slightly moist, medium dense) (FILL)	SM		
2-4'	2	SS	1.5	9		Brown silty clay with few fine to medium sand (slightly moist, hard) (FILL)	CL	4.25	
4.5-7'	3	Shelby	0.0		5				
7-9'	4	SS	1.5	10		Olive gray silty clay with trace medium sand (slightly moist, very stiff) (Native)	CL	2.25	
9-11'	5	SS	2.0	8	10			2.5	
						Boring was completed @ 11 ft. bgl on 8/29/05. Groundwater was not encountered during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-7	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Jamie Favela	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS

BORING START: 08/29/05	END: 08/29/05
WELL START: NA	END: NA
WATER FIRST: 12'	AT COMPLETION: 12'
SCREEN LOCATION: NA	TO: NA
SCREEN TYPE: NA	SIZE: NA
CASING TYPE: NA	DIAMETER: NA
WEATHER:	
Measurements in ft bgl.	

LOCATION SKETCH (not to scale)

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	2	16		Brown silty sand (slightly moist, medium dense)	SM		
2-4'	2	SS	1.5	7		Brown silty clay with few fine gravel (slightly moist, hard)	CL	4.5	
4-6'	3	SS	2.0	8	5	Grades to olive gray (very stiff)		3.0	
6-8.5'		Shelby	0.0						
8.5-11'		Shelby	2.5		10	Olive gray clayey sand with some silt (moist to wet, loose)	SC		
11-13'	5	SS	2.0	7		Boring was completed @ 13 ft. bgl on 8/29/05. Groundwater was encountered @ 12' bgs during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-8	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Adam S.	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS
BORING START: 12/09/05	END: 12/09/05	LOCATION SKETCH (not to scale)
WELL START: NA	END: NA	
WATER FIRST: 24'	AT COMPLETION: 27'	
SCREEN LOCATION: NA	TO: NA	
SCREEN TYPE: NA	SIZE: NA	
CASING TYPE: NA	DIAMETER: NA	
WEATHER: 15°F mostly cloudy		
Measurements in ft bgl.		

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1	12		Dark brown silty clay with some fine sand and gravel (med. dense)	SM/SC		
2-4'	2	SS	0.66	8		Brown and olive gray silty clay with trace fine sand and gravel (sl. moist, hard)	CH	>4.5	
4-6'	3	SS	1.0	4	5	Grades to very stiff		2.25	
6-8.5'		Shelby	1.3			Black organic clay (moist, very stiff)	OL		
8.5-10.5'	4	SS	2.0	2	10	Olive gray silty clay (moist, very soft)	CH	<0.25	
10.5-13'		Shelby	2.5			Grades with stiff layers			
14-16'	5	SS	2.0	0	15			<0.25	
19-21'	6	SS	2.0	1	20			<0.25	
24-26'	7	SS	1.3	9	25	Olive gray clayey fine sand with silt and fine gravel (wet, loose)	SC		
29-31'	8	SS	1.8	13	30	Gray silty fine to medium sand (wet, med. dense)	SM		
						Olive gray silty clay (moist, stiff)	CL	1.25	
						Boring was completed @ 31 ft. bgl on 12/09/05. Groundwater was encountered @ 24' bgl during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

MALCOLM PIRNIE

BORING LOG

BORING #: SBR-9	SITE NAME: 156th Street Extension	PROJECT #: 5498001
GROUND ELEV.:	TOC ELEV.: x	LOGGED BY: Groncki, Jeff
COUNTY: Cook	TWP: Orland Park	SECTION: T: R: 1/4: 1/4:
DRILL CO.: CS Drilling	DRILLER: Adam S.	DRILLING RIG: Diedrich D-120 DRILL TYPE: 3-1/4" HAS
BORING START: 12/09/05	END: 12/09/05	LOCATION SKETCH (not to scale)
WELL START: NA	END: NA	
WATER FIRST: 15'	AT COMPLETION: DRY	
SCREEN LOCATION: NA	TO: NA	
SCREEN TYPE: NA	SIZE: NA	
CASING TYPE: NA	DIAMETER: NA	
WEATHER: 20°F sunny		
Measurements in ft bgl.		

SAMPLE INTERVAL	SAMP NO.	SAMP TYPE	RECOVERY (feet)	N-VALUE	DEPTH (bgl)	STRATIGRAPHIC DESCRIPTION	USCS	PSS	REMARKS ODOR, FLUID LOSS, ...
0-2'	1	SS	1.33	11		Brown silty sand with some fine gravel and some clay (medium dense)	SM/SC		
2-4'	2	SS	1.2	8		Black to dark brown silty clay with trace coarse sand and fine gravel (sl. moist, hard) (Organic)	OL	>4.5	
					5	Grades w/ more silt and sand (med. dense)			
4-6'	3	SS	0.5	9		Grades to black organic clay (sl. moist, hard)		>4.5	
6-8.5'		Shelby	2.5			Grades to (stiff)			
8.5-10.5'	4	SS	1.3	5	10	Olive gray silty clay with brown mottling (moist, stiff)	CH	1.00	
10.5-12.5'	5	SS	1.5	13				1.50	
12.5-15'		Shelby	2.5		15	Grades with brown fine to coarse sand with some silt (wet, loose)			
						Grades to olive gray silty clay with trace coarse sand and fine gravel (slightly moist, stiff)			
18-20'	6	SS	1.5	5	20			1.00	
23-25'	7	SS	2.0	5	25			1.25	
28-30'	8	SS	1.7	8	30			1.75	
						Boring was completed @ 31 ft. bgl on 12/09/05. Groundwater was encountered @ 15' bgl during drilling.			

NOTES: bgl - below ground level
PSS - Pocket Penetrometer Shear Strength (ksf)
SS - Split Spoon
Shelby - Shelby Tube

APPENDIX E

ABV	ABOVE
A/C	ACCESS CONTROL
AC	ACRE
ADJ	ADJUST
AS	AERIAL SURVEYS
AGG	AGGREGATE
AH	AHEAD
APT	APARTMENT
ASPH	ASPHALT
AUX	AUXILIARY
AGS	AUXILIARY GAS VALVE (SERVICE)
AVE	AVENUE
AX	AXIS OF ROTATION
BK	BACK
B-B	BACK TO BACK
BKPL	BACKPLATE
B	BARN
BARR	BARRICADE
BGN	BEGIN
BM	BENCHMARK
BIND	BINDER
BIT	BITUMINOUS
BTM	BOTTOM
BLVD	BOULEVARD
BRK	BRICK
BBOX	BUFFALO BOX
BLDG	BUILDING
CIP	CAST IRON PIPE
CB	CATCH BASIN
C-C	CENTER TO CENTER
CL	CENTERLINE OR CLEARANCE
CL-E	CENTERLINE TO EDGE
CL-F	CENTERLINE TO FACE
CTS	CENTERS
CERT	CERTIFIED
CHSLD	CHISELED
CS	CITY STREET
CP	CLAY PIPE
CLSD	CLOSED
CLID	CLOSED LID
CT	COAT OR COURT
COMB	COMBINATION
C	COMMERCIAL BUILDING
CE	COMMERCIAL ENTRANCE
CONC	CONCRETE
CONST	CONSTRUCT
CONTD	CONTINUED
CONT	CONTINUOUS
COR	CORNER
CORR	CORRUGATED
CMP	CORRUGATED METAL PIPE
CNTY	COUNTY
CH	COUNTY HIGHWAY
CSE	COURSE
XSECT	CROSS SECTION
m^3	CUBIC METER
mm^3	CUBIC MILLIMETER
CU YD	CUBIC YARD
CULV	CULVERT
C&G	CURB & GUTTER
D	DEGREE OF CURVE
DC	DEPRESSED CURVE
DET	DETECTOR
DIA	DIAMETER
DIST	DISTRICT
DOM	DOMESTIC
DBL	DOUBLE
DSEL	DOWNSTREAM ELEVATION
DSFL	DOWNSTREAM FLOWLINE
DR	DRAINAGE OR DRIVE
DI	DRAINAGE INLET OR DROP INLET
DRV	DRIVEWAY
DCT	DUCT
EA	EACH
EB	EASTBOUND
EOP	EDGE OF PAVEMENT
E-CL	EDGE TO CENTERLINE
E-E	EDGE TO EDGE
EL	ELEVATION
ENTR	ENTRANCE
EXC	EXCAVATION
EX	EXISTING
EXPWAY	EXPRESSWAY
E	EXTERNAL DISTANCE OF HORIZONTAL CURVE
E	OFFSET DISTANCE TO VERTICAL CURVE
F-F	FACE TO FACE
FA	FEDERAL AID
FAI	FEDERAL AID INTERSTATE
FAP	FEDERAL AID PRIMARY
FAS	FEDERAL AID SECONDARY
FAUS	FEDERAL AID URBAN SECONDARY
FP	FENCE POST
FE	FIELD ENTRANCE
FH	FIRE HYDRANT
FL	FLOW LINE
FB	FOOT BRIDGE
FDN	FOUNDATION
FR	FRAME
F&G	FRAME & GRATE
FRWAY	FREEWAY
GAL	GALLON
GALV	GALVANIZED
G	GARAGE
GM	GAS METER
GV	GAS VALVE
GRAN	GRANULAR
GR	GRATE
GRVL	GRAVEL
GND	GROUND
GUT	GUTTER
GP	GUY POLE
GW	GUY WIRE
HH	HANDHOLE
HATCH	HATCHING
HD	HEAD
HDW	HEADWALL
HDUTY	HEAVY DUTY
ha	HECTARE
HMA	HOT MIX ASPHALT
HWY	HIGHWAY
HORIZ	HORIZONTAL
HSE	HOUSE
IL	ILLINOIS
IMP	IMPROVEMENT
IN DIA	INCH DIAMETER
INL	INLET
INST	INSTALLATION
IDS	INTERSECTION DESIGN STUDY
INV	INVERT
IP	IRON PIPE
IR	IRON ROD
JT	JOINT
kg	KILOGRAM
km	KILOMETER
LS	LANDSCAPING
LN	LANE
LT	LEFT
LP	LIGHT POLE
LGT	LIGHTING
LF	LINEAL FEET OR LINEAR FEET
L	LITER OR CURVE LENGTH
LC	LONG CHORD
LNG	LONGITUDINAL
L SUM	LUMP SUM
MACH	MACHINE
MB	MAIL BOX
MH	MANHOLE
MATL	MATERIAL
MED	MEDIAN
m	METER
METH	METHOD
M	MID-ORDINATE
mm	MILLIMETER
mm DIA	MILLIMETER DIAMETER
MIX	MIXTURE
MBH	MOBILE HOME
MOD	MODIFIED
MFT	MOTOR FUEL TAX
N & BC	NAIL & BOTTLE CAP
N & C	NAIL & CAP
N & W	NAIL & WASHER
NOAA	NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION
NC	NORMAL CROWN
NB	NORTHBOUND
NE	NORTHEAST
NW	NORTHWEST
OLID	OPEN LID
PAT	PATTERN
PVD	PAVED
PVMT	PAVEMENT
PM	PAVEMENT MARKING
PED	PEDESTAL
PNT	POINT
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION OF HORIZONTAL CURVE
PRC	POINT OF REVERSE CURVE
PT	POINT OF TANGENCY
POT	POINT ON TANGENT
POLYETH	POLYETHYLENE
PCC	PORTLAND CEMENT CONCRETE
PP	POWER POLE OR PRINCIPAL POINT
PRM	PRIME
PE	PRIVATE ENTRANCE
PROF	PROFILE
PGL	PROFILE GRADELINE
PROJ	PROJECT
P.C.	PROPERTY CORNER
PL	PROPERTY LINE
PR	PROPOSED
R	RADIUS
RR	RAILROAD
RRS	RAILROAD SPIKE
RPS	REFERENCE POINT STAKE
REF	REFLECTIVE
RCCP	REINFORCED CONCRETE CULVERT PIPE
REINF	REINFORCEMENT
REM	REMOVAL
RC	REMOVE CROWN
REP	REPLACEMENT
REST	RESTAURANT
RESURF	RESURFACING
RET	RETAINING
RT	RIGHT
ROW	RIGHT-OF-WAY
RD	ROAD
RDWY	ROADWAY
RTE	ROUTE
SAN	SANITARY
SANS	SANITARY SEWER
SEC	SECTION
SEED	SEEDING
SHAP	SHAPING
S	SHED
SH	SHEET
SHLD	SHOULDER
SW	SIDEWALK OR SOUTHWEST
SIG	SIGNAL
SOD	SODDING
SM	SOLID MEDIAN
SB	SOUTHBOUND
SE	SOUTHEAST
SPL	SPECIAL
SD	SPECIAL DITCH
SQ FT	SQUARE FEET
m^2	SQUARE METER
mm^2	SQUARE MILLIMETER
SQ YD	SQUARE YARD
STB	STABILIZED
STD	STANDARD
SBI	STATE BOND ISSUE
SR	STATE ROUTE
STA	STATION
SPBGR	STEEL PLATE BEAM GUARDRAIL
SS	STORM SEWER
STY	STORY
ST	STREET
STR	STRUCTURE
e	SUPERELEVATION RATE
S.E. RUN.	SUPERELEVATION RUNOFF LENGTH
SURF	SURFACE
SMK	SURVEY MARKER
T	TANGENT DISTANCE
T.R.	TANGENT RUNOUT DISTANCE
TEL	TELEPHONE
TB	TELEPHONE BOX
TP	TELEPHONE POLE
TEMP	TEMPORARY
TBM	TEMPORARY BENCH MARK
TD	TILE DRAIN
TBE	TO BE EXTENDED
TBR	TO BE REMOVED
TBS	TO BE SAVED
TWP	TOWNSHIP
TR	TOWNSHIP ROAD
TS	TRAFFIC SIGNAL
TSCB	TRAFFIC SIGNAL CONTROL BOX
TSC	TRAFFIC SYSTEMS CENTER
TRVS	TRANSVERSE
TRVL	TRAVEL
TRN	TURN
TY	TYPE
T-A	TYPE A
TYP	TYPICAL
UNDGND	UNDERGROUND
USGS	U.S. GEOLOGICAL SURVEY
USEL	UPSTREAM ELEVATION
USFL	UPSTREAM FLOWLINE
UTIL	UTILITY
VBOX	VALVE BOX
VV	VALVE VAULT
VLT	VAULT
VEH	VEHICLE
VP	VENT PIPE
VERT	VERTICAL
VC	VERTICAL CURVE
VPC	VERTICAL POINT OF CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
WM	WATER METER
WV	WATER VALVE
WMAIN	WATER MAIN
WB	WESTBOUND
WILDFL	WILDFLOWERS
W	WITH
WO	WITHOUT

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DATE	REVISIONS
1-1-11	Updated abbreviations
	and symbols.
1-1-08	Updated abbreviations
	and symbols.

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

(Sheet 1 of 8)

STANDARD 000001-06

ADJUSTMENT ITEMS

	EX	PR
Structure To Be Adjusted		ADJ
Structure To Be Cleaned		C
Main Structure To Be Filled		FM
Structure To Be Filled		F
Structure To Be Filled Special		FSP
Structure To Be Removed		R
Structure To Be Reconstructed		REC
Structure To Be Reconstructed Special		RSP
Frame and Grate To Be Adjusted		A
Frame and Lid To Be Adjusted		A
Domestic Service Box To Be Adjusted		A
Valve Vault To Be Adjusted		A
Special Adjustment		SP
Item To Be Abandoned		AB
Item To Be Moved		M
Item To Be Relocated		REL
Pavement Removal and Replacement		

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ALIGNMENT ITEMS

	EX	PR
Baseline		
Centerline		
Centerline Break Circle		
Baseline Symbol		
Centerline Symbol		
PI Indicator		
Point Indicator		
Horizontal Curve Data (Half Size)	CURVE P.I. STA= Δ= D= R= T= L= E= e= T.R.= S.E. RUN= P.C. STA= P.T. STA=	CURVE P.I. STA= Δ= D= R= T= L= E= e= T.R.= S.E. RUN= P.C. STA= P.T. STA=

BOUNDARIES ITEMS

	EX	PR
Dashed Property Line		
Solid Property/Lot Line		
Section/Grant Line		
Quarter Section Line		
Quarter/Quarter Section Line		
County/Township Line		
State Line		
Iron Pipe Found		
Iron Pipe Set		
Survey Marker		
Property Line Symbol		
Same Ownership Symbol (Half Size)		
Northwest Quarter Corner (Half Size)		
Section Corner (Half Size)		
Southeast Quarter Corner (Half Size)		

CONTOUR ITEMS

	EX	PR
Approx. Index Line		
Approx. Intermediate Line		
Index Contour		
Intermediate Contour		

DRAINAGE ITEMS

	EX	PR
Channel or Stream Line		
Culvert Line		
Grading & Shaping Ditches		
Drainage Boundary Line		
Paved Ditch		
Aggregate Ditch		
Pipe Underdrain		
Storm Sewer		
Flowline		
Ditch Check		
Headwall		
Inlet		
Manhole		
Summit		
Roadway Ditch Flow		
Swale		
Catch Basin		
Culvert End Section		
Water Surface Indicator		
Riprap		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-06

EROSION & SEDIMENT CONTROL ITEMS

	EX	PR
Cleaning & Grading Limits		
Dike		
Erosion Control Fence		
Perimeter Erosion Barrier		
Temporary Fence		
Ditch Check Temporary		
Ditch Check Permanent		
Inlet & Pipe Protection		
Sediment Basin		
Erosion Control Blanket		
Fabric Formed Concrete Revetment Mat		
Turf Reinforcement Mat		
Mulch Temporary		
Mulch Method 1		
Mulch Method 2 Stabilized		
Mulch Method 3 Hydraulic		

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NON-HIGHWAY IMPROVEMENT ITEMS

	EX	PR
Noise Attn./Levee		
Field Line	E	
Fence		
Base of Levee		
Mailbox		
Multiple Mailboxes		
Pay Telephone		
Advertising Sign		

LANDSCAPING ITEMS

	EX	PR
Contour Mounding Line		
Fence		
Fence Post		
Shrubs		
Mowline		
Perennial Plants		
Seeding Class 2		
Seeding Class 2A		
Seeding Class 4		
Seeding Class 4 & 5 Combined		

EXISTING LANDSCAPING ITEMS (contd.)

	EX	PR
Seeding Class 5		
Seeding Class 7		
Seedlings Type 1		
Seedlings Type 2		
Sodding		
Mowstake w/Sign		
Tree Trunk Protection		
Evergreen Tree	E	
Shade Tree	E	+

LIGHTING

	EX	PR
Duct		
Conduit		
Electrical Aerial Cable	A	A
Electrical Buried Cable	L	L
Controller		
Underpass Luminaire		
Power Pole		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-06

LIGHTING (contd.)

	EX	PR
Pull Point		
Handhole		
Heavy Duty Handhole		
Junction Box		
Light Unit Comb.		
Electrical Ground		
Traffic Flow Arrow		
High Mast Pole (Half Size)		
Light Unit-1		

PAVEMENT (MISC.)

	EX	PR
Keyed Long. Joint		
Keyed Long. Joint w/Tie Bars		
Sawed Long. Joint w/Tie Bars		
Bituminous Shoulder		
Bituminous Taper		
Stabilized Driveway		
Widening		

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PAVEMENT MARKINGS

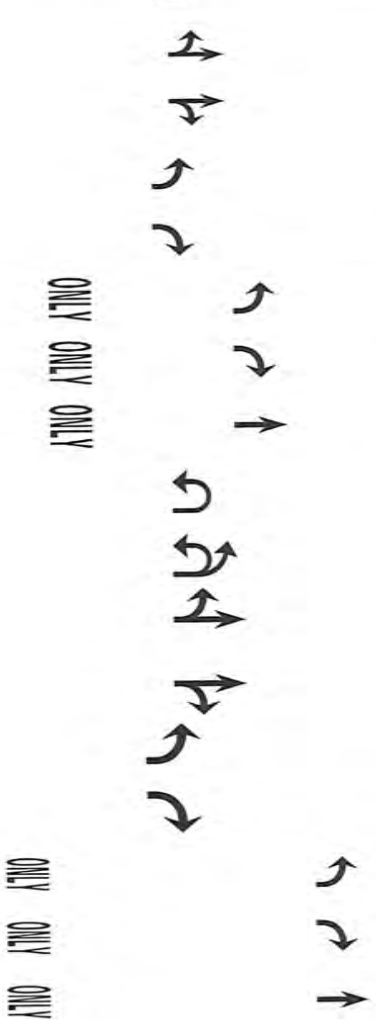
	EX	PR
Bike Lane Symbol		
Bike Lane Text		
Handicap Symbol		
RR Crossing		
Raised Marker Amber 1 Way		
Raised Marker Amber 2 Way		
Raised Marker Crystal 1 Way		
Two Way Turn Left		
Shoulder Diag. Pattern		
Skip-Dash White		
Skip-Dash Yellow		
Stop Line		
Solid Line		
Double Centerline		
Dotted Lines		
CL 2Ln 2Way RRPM 12.2 m (40') o.c.		
CL 2Ln 2Way RRPM 80' (24.4 m) o.c.		
CL Multilane Div. RRPM 40' (12.2 m) o.c.		
CL Multilane Div. RRPM 80' (24.4 m) o.c.		
CL Multilane Div. Dbl. RRPM 80' (24.4 m) o.c.		
CL Multilane Undiv.		
Two Way Turn Left Line		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-06

PAVEMENT MARKINGS (contd.)

	EX	PR
Urban Combination Left		
Urban Combination Right		
Urban Left Turn Arrow		
Urban Right Turn Arrow		
Urban Left Turn Only		
Urban Right Turn Only		
Urban Thru Only		
Urban U-Turn		
Urban Combined U-Turn		
Rural Combination Left		
Rural Combination Right		
Rural Left Turn Arrow		
Rural Right Turn Arrow		
Rural Left Turn Only		
Rural Right Turn Only		
Rural Thru Only		



RAILROAD ITEMS	EX	PR
Abandoned Railroad		
Railroad		
Railroad Point		
Control Box		
Crossing Gate		
Flashing Signal		
Railroad Cant. Mast Arm		
Crossbuck		

REMOVAL ITEMS	EX	PR
Removal Tic		
Bituminous Removal		
Hatch Pattern		
Tree Removal Single		

RIGHT OF WAY ITEMS	EX	PR
Future ROW Corner Monument		
ROW Marker		
ROW Line		
Easement		
Temporary Easement		

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STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-06

RIGHT OF WAY ITEMS (contd.)

	EX	PR
Access Control Line	—AC—	—AC—
Access Control Line & ROW	– —AC—	—AC– –
Access Control Line & ROW with Fence	—:—AC—:—	—:—AC—:—
Excess ROW Line		—XS—

ROADWAY PLAN ITEMS

	EX	PR
Cable Barrier		
Concrete Barrier		
Edge of Pavement		
Bit Shoulders, Medians and C&G Line		
Aggregate Shoulder		
Sidewalks, Driveways		
Guardrail		
Guardrail Post		
Traffic Sign		
Corrugated Median		
Impact Attenuator		
North Arrow with District Office (Half Size)	N	
Match Line		STA. 45+00
Slope Limit Line		
Typical Cross-Section Line		

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ROADWAY PROFILES

	EX	PR
P.I. Indicator		
Point Indicator		
Earthworks Balance Point		
Begin Point		
Vert. Curve Data	VPI = ELEV= L = E =	VPI = ELEV= L = E =
Ditch Profile Left Side		
Ditch Profile Right Side		
Roadway Profile Line		
Storm Sewer Profile Left Side		
Storm Sewer Profile Right Side		

SIGNING ITEMS

	EX	PR
Cone, Drum or Barricade		
Barricade Type II		
Barricade Type III		
Barricade With Edge Line		
Flashing Light Sign		
Panels I		
Panels II		
Direction of Traffic		
Sign Flag (Half Size)		

SIGNING ITEMS (contd.)

	EX	PR
Reverse Left W1-4L (Half Size)		
Reverse Right W1-4R (Half Size)		
Two Way Traffic Sign W6-3 (Half Size)		
Detour Ahead W20-2(D) (Half Size)		DETOUR AHEAD
Left Lane Closed Ahead W20-5L(D) (Half Size)		LEFT LANE CLOSED AHEAD
Right Lane Closed Ahead W20-5R(D) (Half Size)		RIGHT LANE CLOSED AHEAD
Road Closed Ahead W20-3(D) (Half Size)		ROAD CLOSED AHEAD
Road Construction Ahead W20-1-(D) (Half Size)		ROAD CONSTRUCTION AHEAD
Single Lane Ahead (Half Size)		SINGLE LANE AHEAD
Transition Left W4-2L (Half Size)		
Transition Right W4-2R (Half Size)		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

(Sheet 6 of 8)

STANDARD 000001-06

SIGNING ITEMS (contd.)

	EX	PR
One Way Arrow Lrg. W1-6-(0) (Half Size)		
Two Way Arrow Large W1-7-(0) (Half Size)		
Detour M4-10L-(0) (Half Size)		DETOUR
Detour M4-10R-(0) (Half Size)		DETOUR
One Way Left R6-1L (Half Size)		ONE WAY
One Way Right R6-1R (Half Size)		ONE WAY
Left Turn Lane R3-11OOL (Half Size)		LEFT TURN LANE
Keep Left R4-7AL (Half Size)		KEEP LEFT
Keep Left R4-7BL (Half Size)		KEEP LEFT
Keep Right R4-7AR (Half Size)		KEEP RIGHT
Keep Right R4-7BR (Half Size)		KEEP RIGHT
Stop Here On Red R10-6-AL (Half Size)		STOP HERE ON RED
Stop Here On Red R10-6-AR (Half Size)		STOP HERE ON RED
No Left Turn R3-2 (Half Size)		
No Right Turn R3-1 (Half Size)		
Road Closed R11-2 (Half Size)		ROAD CLOSED
Road Closed Thru Traffic R11-2 (Half Size)		ROAD CLOSED TO THRU TRAFFIC

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STRUCTURES ITEMS

	EX	PR
Box Culvert Barrel		
Box Culvert Headwall		
Bridge Pier		
Bridge		
Retaining Wall		
Temporary Sheet Piling		

TRAFFIC SHEET ITEMS

	EX	PR
Cable Number		
Left Turn Green	G	G
Left Turn Yellow	Y	Y
Signal Backplate		
Signal Section 8" (200 mm)		
Signal Section 12" (300 mm)		
Walk/Don't Walk Letters	DW W	DW W
Walk/Don't Walk Symbols		

TRAFFIC SIGNAL ITEMS

	EX	PR
Galv. Steel Conduit		
Underground Cable		
Detector Loop Line		
Detector Loop Large		
Detector Loop Small		
Detector Loop Quadrapole		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

(Sheet 7 of 8)

STANDARD 000001-06

TRAFFIC SIGNAL ITEMS (contd.)

	EX	PR
Detector Raceway		
Aluminum Mast Arm		
Steel Mast Arm		
Veh. Detector Magnetic		
Conduit Splice		
Controller		
Gulfbox Junction		
Wood Pole		
Temp. Signal Head		
Handhole		
Double Handhole		
Heavy Duty Handhole		
Junction Box		
Ped. Pushbutton Detector		
Ped. Signal Head		
Power Pole Service		
Priority Veh. Detector		
Signal Head		
Signal Head w/Backplate		
Signal Post		
Closed Circuit TV		
Video Detector System		

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UNDERGROUND UTILITY ITEMS

	EX	PR	ABANDONED
Cable TV	CTV	CTV	CTV
Electric Cable	E	E	E
Fiber Optic	FO	FO	FO
Gas Pipe	G	G	G
Oil Pipe	O	O	O
Sanitary Sewer			
Telephone Cable	T	T	T
Water Pipe	W	W	W

UTILITIES ITEMS

	EX	PR
Controller		
Double Handhole		
Fire Hydrant		
Guy Wire or Deadman Anchor		
Handhole		
Heavy Duty Handhole		
Junction Box		
Light Pole		
Manhole		
Pipeline Warning Sign		
Power Pole		
Power Pole with Light		
Sanitary Sewer Cleanout		
Splice Box Above Ground		
Telephone Splice Box Above Ground		
Telephone Pole		

UTILITY ITEMS (contd.)

	EX	PR
Traffic Signal		
Traffic Signal Control Box		
Water Meter		
Water Meter Valve Box		
Profile Line		
Aerial Power Line	A	A

VEGETATION ITEMS

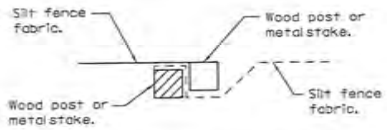
	EX	PR
Deciduous Tree		
Bush or Shrub		
Evergreen Tree		
Stump		
Orchard/Nursery Line		
Vegetation Line		
Woods & Bush Line		

WATER FEATURE ITEMS

	EX	PR
Stream or Drainage Ditch		
Waters Edge		
Water Surface Indicator		
Water Point		
Disappearing Ditch		
Marsh		
Marsh/Swamp Boundary		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-06



Place end-post (stake) of first silt fence adjacent to end-post (stake) of second silt fence with fabric positioned as shown.

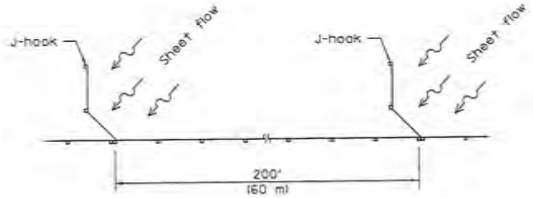
STEP 1

Rotate posts (stakes) together 180° clockwise and drive both posts (stakes) 18 (450) into ground.

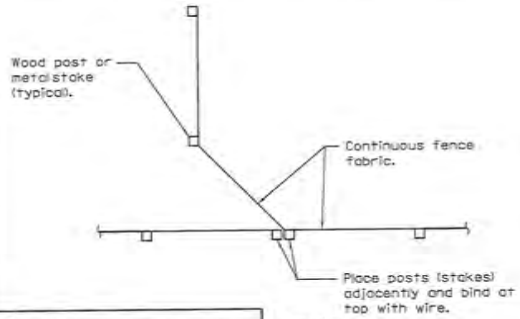
STEP 2

ATTACHING TWO SILT FILTER FENCES

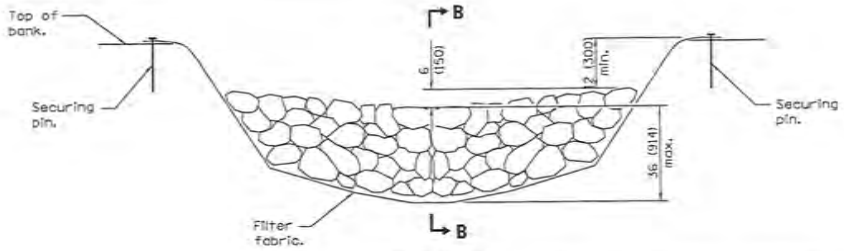
(Not applicable for J-hooks)



SILT FILTER J-HOOK PLACEMENT

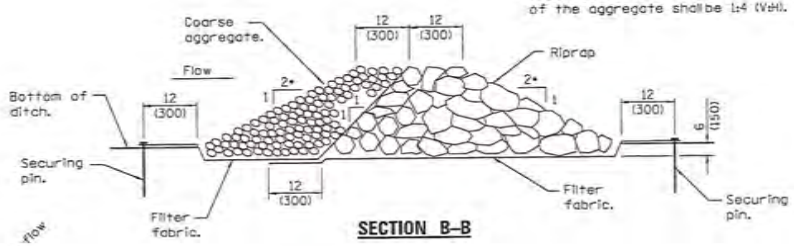


J-HOOK



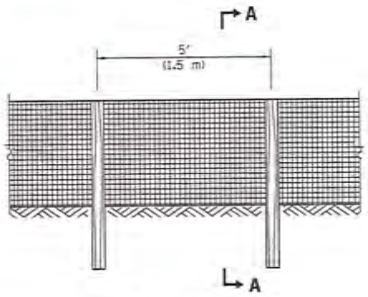
ELEVATION

- When the ditch check is within the clear zone and the road is open to traffic, the traffic approach slope of the aggregate shall be 1:4 (V:H).



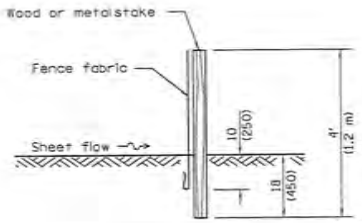
SECTION B–B

AGGREGATE DITCH CHECK

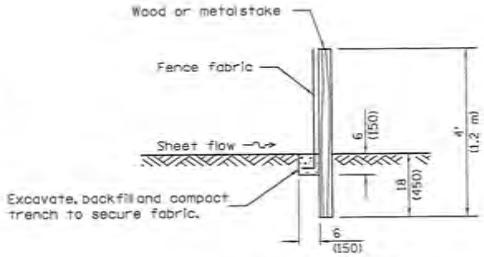


ELEVATION

SILT FILTER FENCE AS A PERIMETER EROSION BARRIER



SLICE METHOD



TRENCH METHOD

SECTION A–A

GENERAL NOTES

The installation details and dimensions shown for perimeter erosion barriers shall also apply for inlet and pipe protection.

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

Illinois Department of Transportation

PASSED January 1, 2012
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

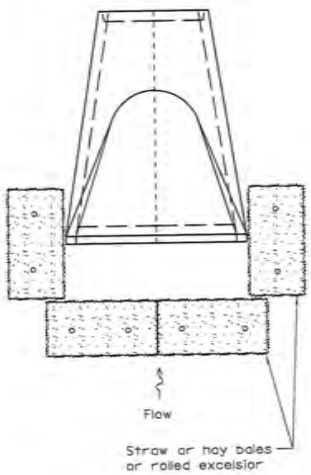
ISSUED 1-1-97

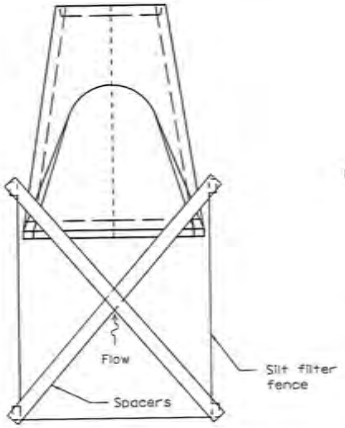
DATE	REVISIONS
1-1-12	Omitted hay/straw perimeter barrier. Added SLICE METHOD to SECTION A-A.
1-1-10	Added J-hooks, added Two Fence attachment detail, mod. ditch check.

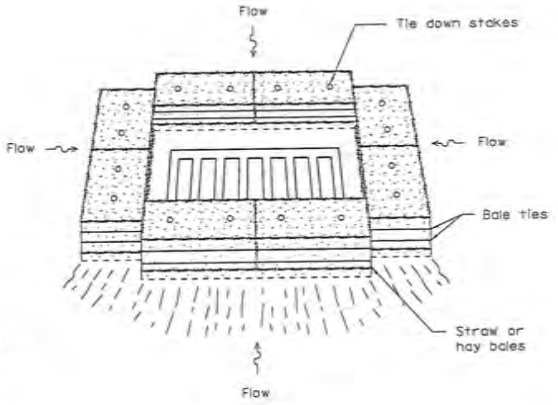
TEMPORARY EROSION CONTROL SYSTEMS

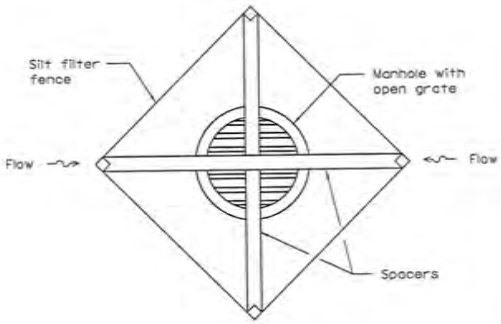
(Sheet 1 of 2)

STANDARD 280001–06

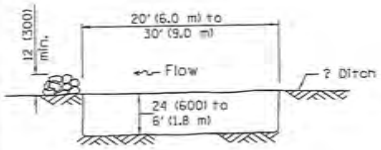






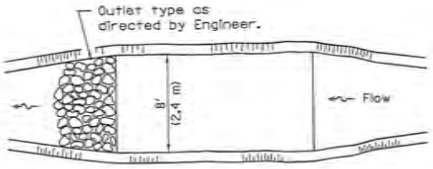


INLET AND PIPE PROTECTION



The performance of the basin will improve if put into a series.

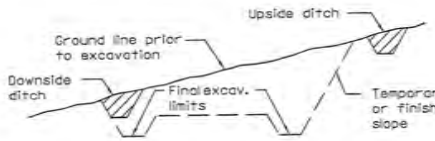
ELEVATION



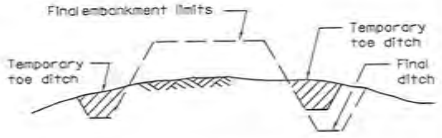
The long dimension should be parallel with the direction of the flow. Accumulated silt shall be removed anytime the basins become 75% filled.

PLAN

SEDIMENT BASIN



TYPICAL CUT CROSS-SECTION



TYPICAL FILL CROSS-SECTION

TEMPORARY DITCHES FOR CUT & FILL SECTIONS

Illinois Department of Transportation

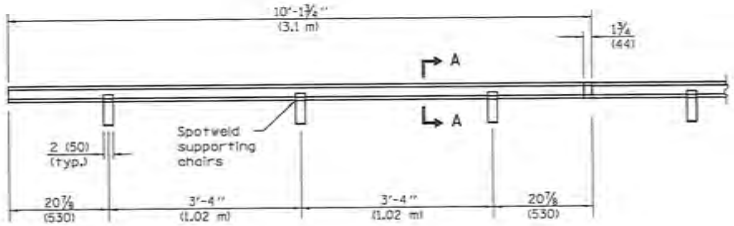
PASSED January 1, 2012
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

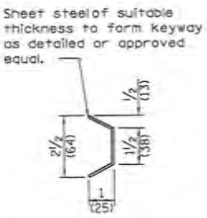
TEMPORARY EROSION CONTROL SYSTEMS

(Sheet 2 of 2)

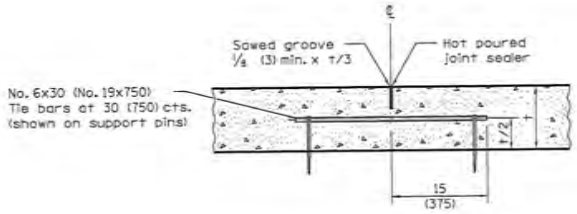
STANDARD 280001-06



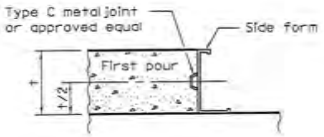
TYPE C METAL JOINT



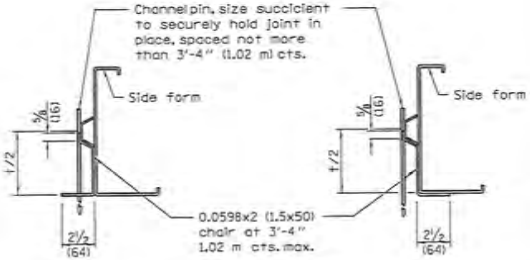
SECTION A–A



LONGITUDINAL SAWED JOINT

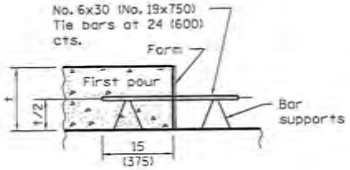


LONGITUDINAL KEYED JOINT

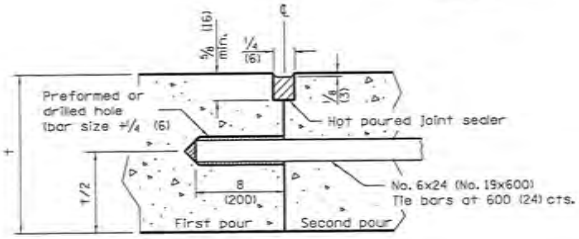


SUPPORTING CHAIR ALTERNATE

SUPPORTING CHAIR ALTERNATE



LONGITUDINAL CONSTRUCTION JOINT
(TIE BAR FORMED IN PLACE)



LONGITUDINAL CONSTRUCTION JOINT
(TIE BAR GROUTED IN PLACE)

GENERAL NOTES

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

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

Illinois Department of Transportation

PASSED January 1, 2008
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2008
ENGINEER OF DESIGN AND ENVIRONMENT

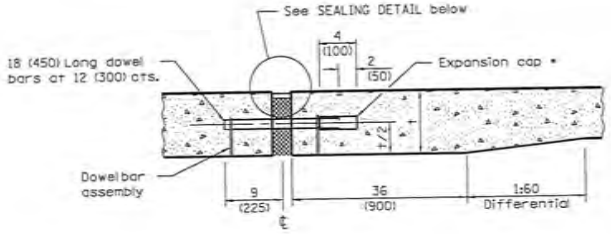
ISSUED 1-1-08

DATE	REVISIONS
1-1-08	Switched units to
	English (metric).
8-1-05	Added supports to long.
	constr. jt. and revised
	note for trans. exp. jt.

PAVEMENT JOINTS

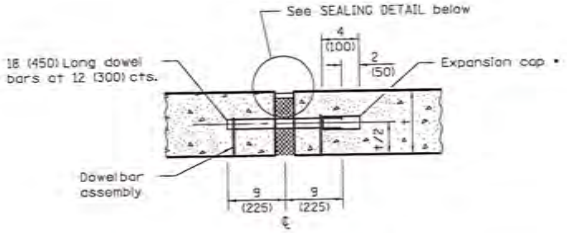
(Sheet 1 of 2)

STANDARD 420001–07

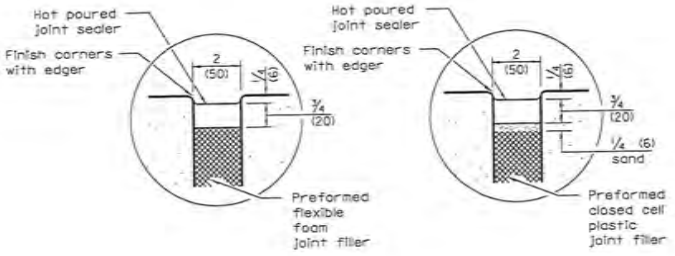


TRANSVERSE EXPANSION JOINT
(FOR PAVEMENTS WITH UNEQUAL THICKNESS)

• Expansion caps shall be installed on the exposed end of each dowel bar once the header has been removed and the joint filler material has been installed.

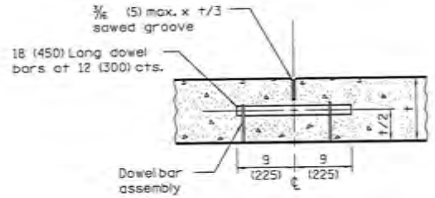


TRANSVERSE EXPANSION JOINT
(FOR PAVEMENTS WITH EQUAL THICKNESS)

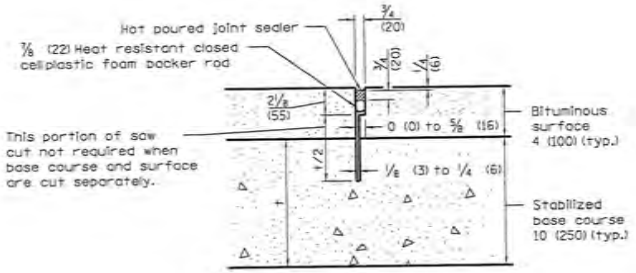


SEALING DETAIL

DOWEL BAR TABLE	
PAVEMENT THICKNESS	DOWEL BAR DIAMETER
8 (200) or greater	1½ (38)
7 (175) thru 7.99 (199)	1¼ (32)
Less than 7 (175)	1 (25)



TRANSVERSE CONTRACTION JOINT



TRANSVERSE CONTRACTION JOINT
(FOR CAM, CFA AND LFA BASE COURSE MIXTURES)

Illinois Department of Transportation

PASSED January 1, 2008
ENGINEER OF POLICY AND PROCEDURES

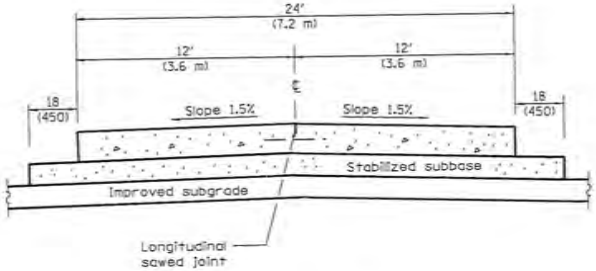
APPROVED January 1, 2008
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

PAVEMENT JOINTS

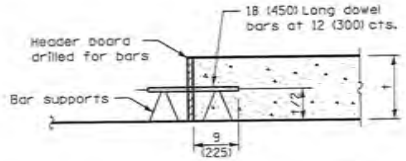
(Sheet 2 of 2)

STANDARD 420001–07



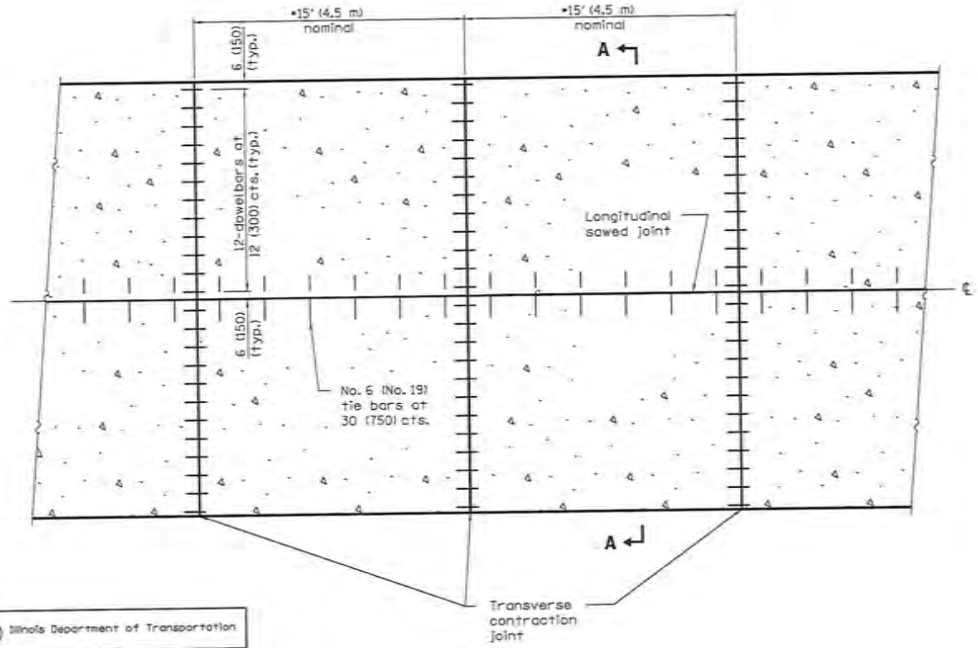
SECTION A–A

(TYPICAL 2-LANE WITH SHOULDERS)

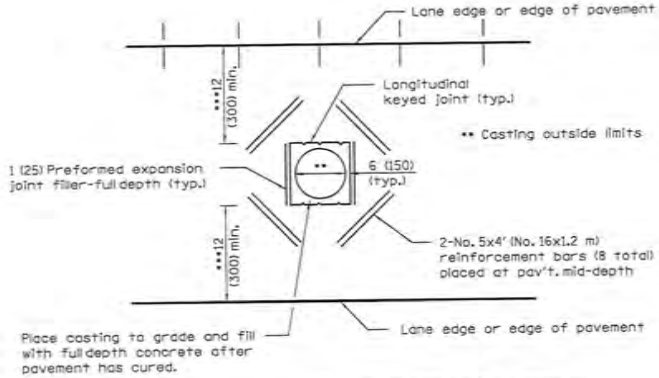


TRANSVERSE CONSTRUCTION JOINT

* The 15' (4.5 m) dimension shall be adjusted to 12' (3.6 m) min. to 18' (5.5 m) max. when placed adjacent to existing pcc pavement structure so that the joints are in prolongation.



PLAN



*** When the 12 (300) minimum cannot be achieved, the transverse joints shall be extended to either the longitudinal joint or edge of pavement.

DETAIL OF ADDED REINFORCEMENT FOR PAVEMENT BLOCKS–OUTS

GENERAL NOTES

See Standard 420001 for details of joints not shown.

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

Illinois Department of Transportation

PASSED January 1, 2008
ENGINEER OF POLICY AND PROCEDURES

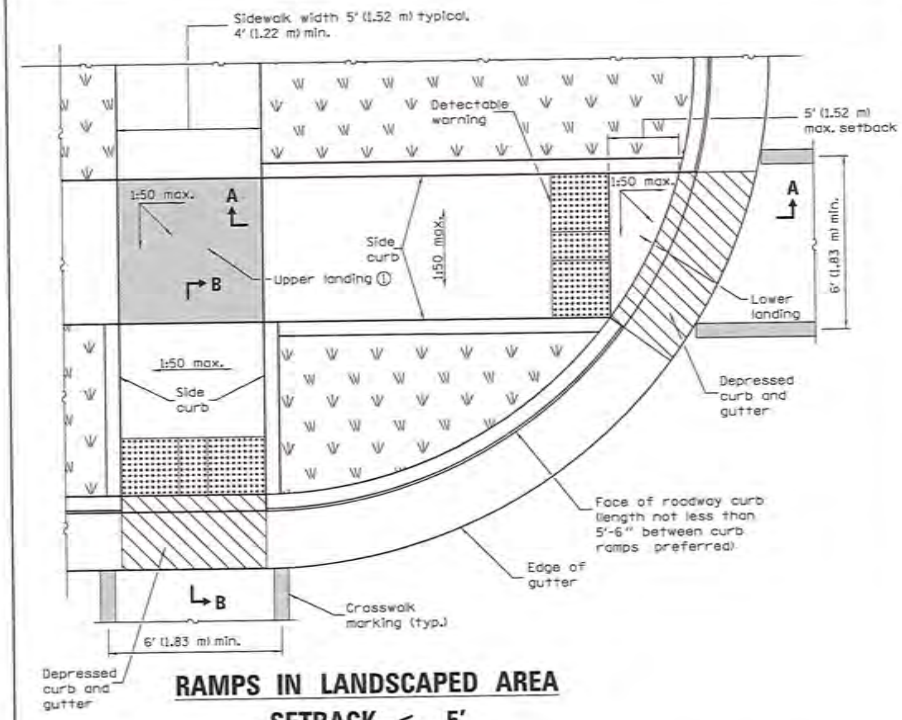
APPROVED January 1, 2008
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

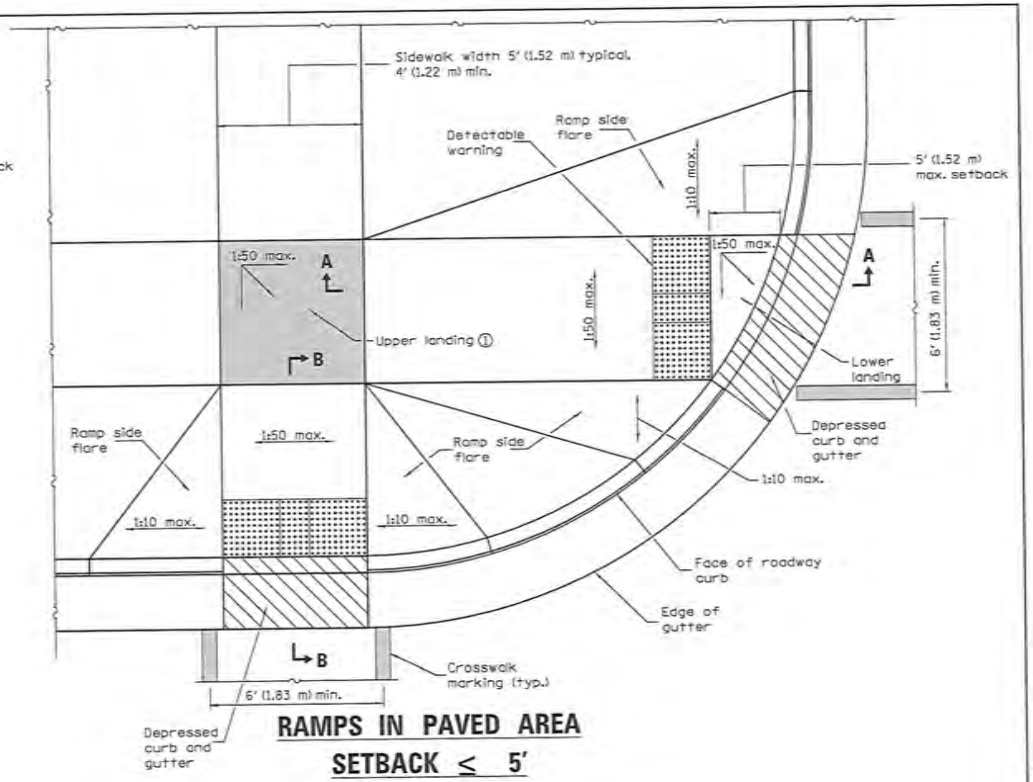
DATE	REVISIONS
1-1-08	Switched units to
	English (metric).
8-1-05	Added "Stabilized" to
	subbase and bar
	supports to constr. jt.

24' (7.2 m) JOINTED PCC PAVEMENT

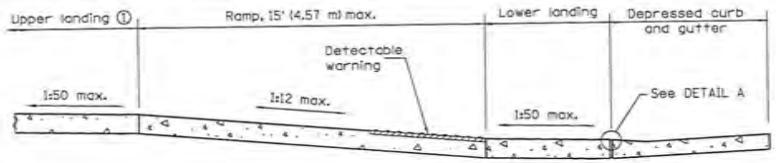
STANDARD 420101–04



RAMPS IN LANDSCAPED AREA
SETBACK ≤ 5'

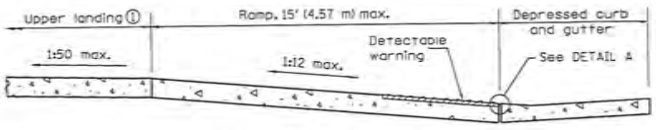


RAMPS IN PAVED AREA
SETBACK ≤ 5'



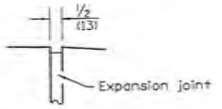
SECTION A–A

① Upper landing not required for ramp slopes flatter than 1:20.

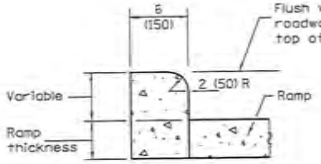


SECTION B–B

① Upper landing not required for ramp slopes flatter than 1:20.



DETAIL A



SIDE CURB DETAIL

GENERAL NOTES

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

See Standard 606001 for details of depressed curb adjacent to curb ramp.

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

Illinois Department of Transportation

PASSED January 1, 2012
Michael Brand
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2012
Scott Schaffer
ENGINEER OF DESIGN AND ENVIRONMENT

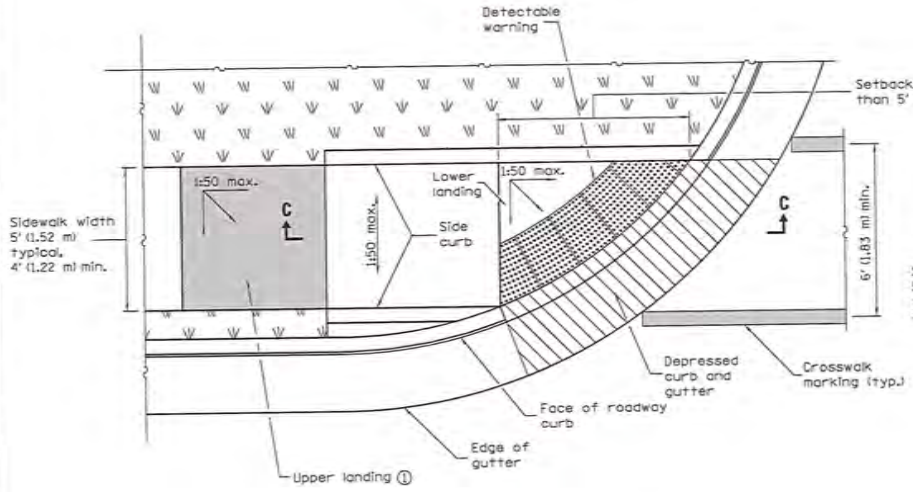
ISSUED 1-1-97

DATE	REVISIONS
1-1-12	Completely revised and renamed standard.
1-1-08	Switched units to English (metric).

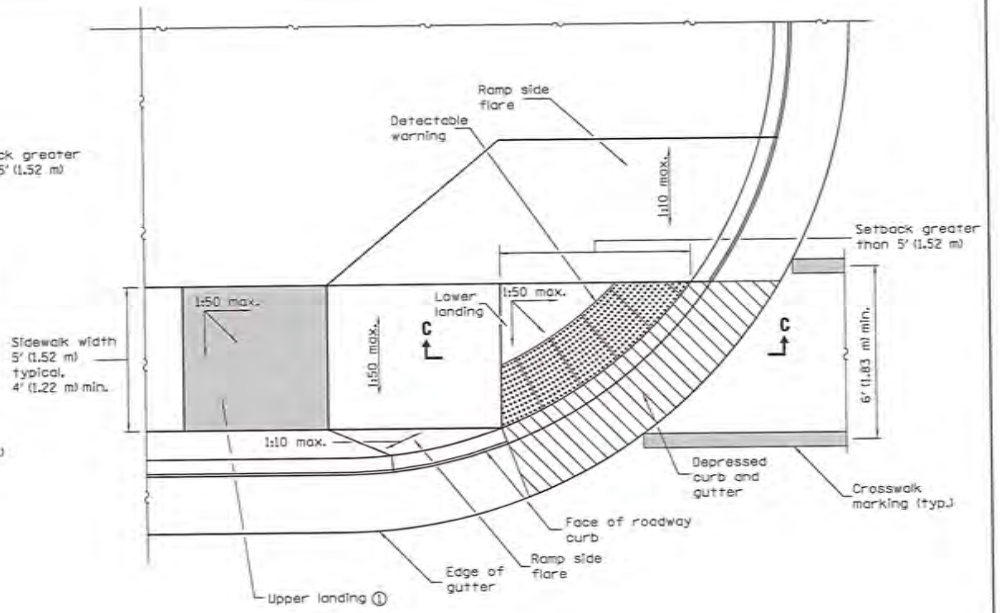
PERPENDICULAR CURB RAMPS FOR SIDEWALKS

(Sheet 1 of 2)

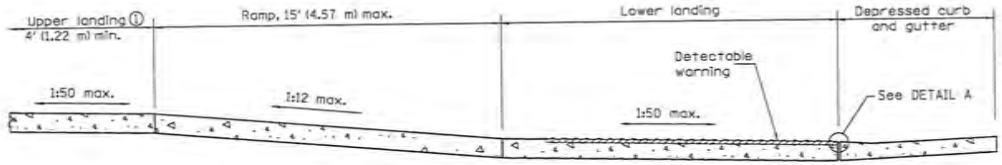
STANDARD 424001–06



RAMP IN LANDSCAPED AREA
SETBACK > 5'



RAMP IN PAVED AREA
SETBACK > 5'



SECTION C–C

① Upper landing not required for ramp slopes flatter than 1:20.

Illinois Department of Transportation

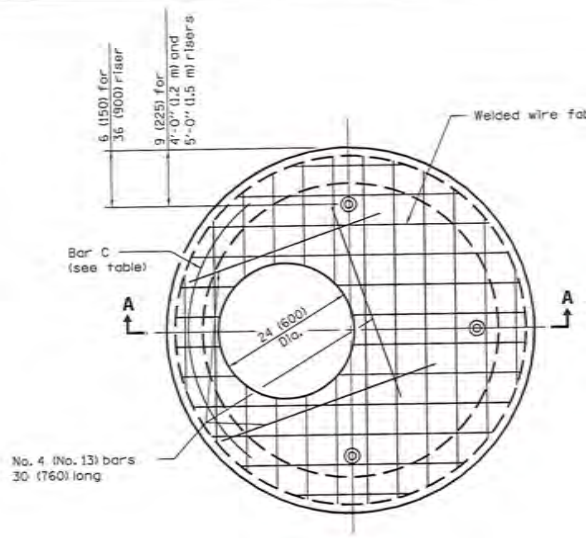
PASSED January 1, 2012
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

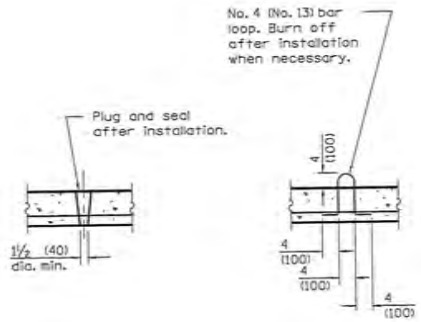
PERPENDICULAR CURB RAMPS FOR SIDEWALKS

(Sheet 2 of 2)

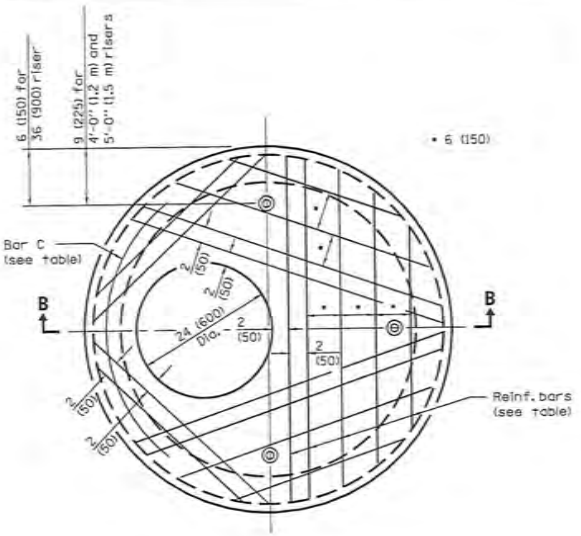
STANDARD 424001–06



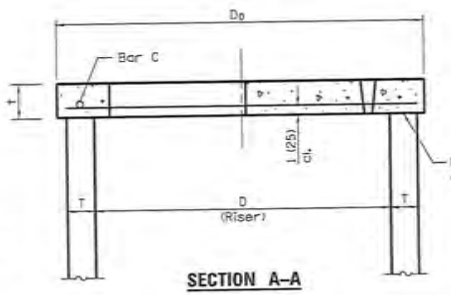
PLAN
(WELDED WIRE FABRIC)



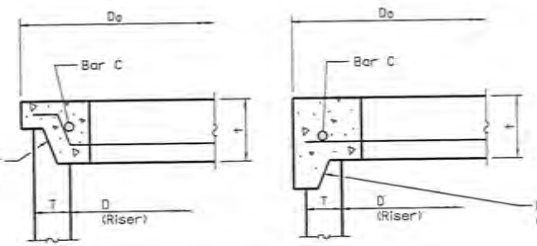
LIFTING HOLE OR LIFTING LOOP
TYPICAL
(3 required per slab)



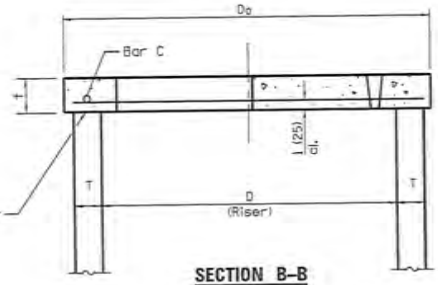
PLAN
(REINFORCEMENT BARS)



SECTION A–A



ALTERNATE JOINT CONFIGURATIONS



SECTION B–B

BAR C

TABLE

D	T	Do (min.)	t	Reinforcement "As" W.W.F. each direction	OR Bar size	No. 4 (No. 13) Bar C Length	Radius
36 (900)	See applicable Standards	D + 2T	6 (150)	0.20 sq. in./ft. (425 sq. mm/m)	No. 4 (No. 13)	4'-0" (1.2 m)	19 (480)
4'-0" (1.2 m)			6 (150)	0.35 sq. in./ft. (740 sq. mm/m)	No. 5 (No. 16)	4'-6" (1.35 m)	26 (660)
5'-0" (1.5 m)			8 (200)	0.35 sq. in./ft. (740 sq. mm/m)	No. 5 (No. 16)	5'-0" (1.5 m)	32 (810)

GENERAL NOTES

The flat slab top may be used in lieu of the tapered tops shown on Standards 602001, 602011, 602016, 602306, 602401, or 602501 at the option of the Contractor or when field conditions prohibit the use of tapered tops.

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

Illinois Department of Transportation

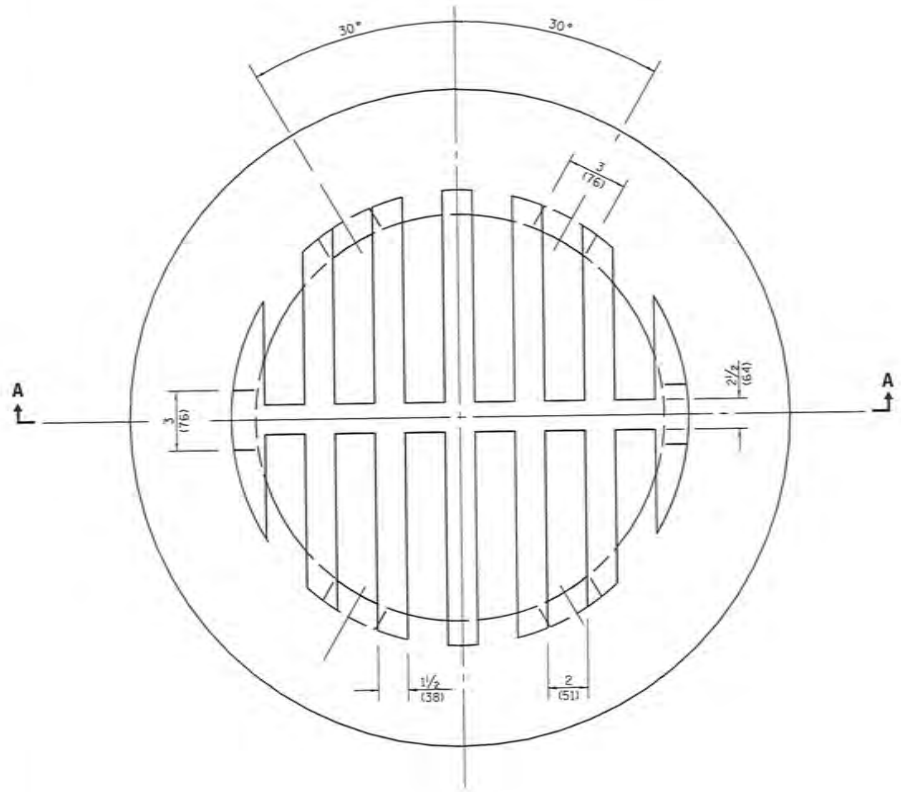
PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-09

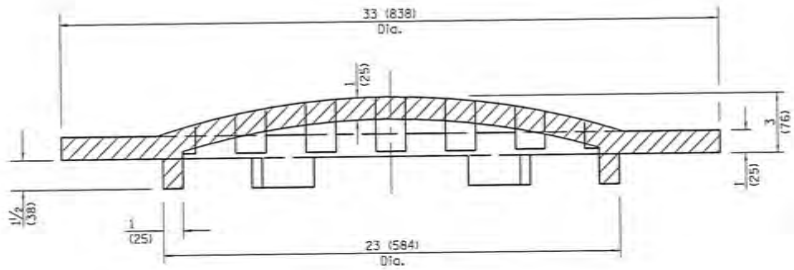
DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-07	Soft converted metric reinforcement bars.

PRECAST REINFORCED CONCRETE FLAT SLAB TOP

STANDARD 602601–02



CAST GRATE



SECTION A–A

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

DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-04	Removed weights.

GRATE TYPE 8

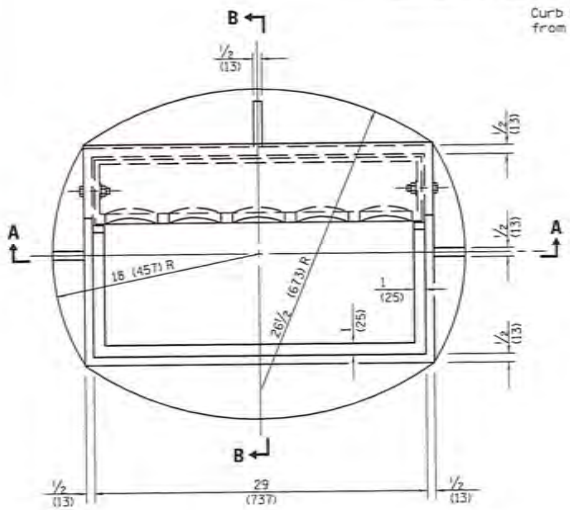
STANDARD 604036–02

Illinois Department of Transportation

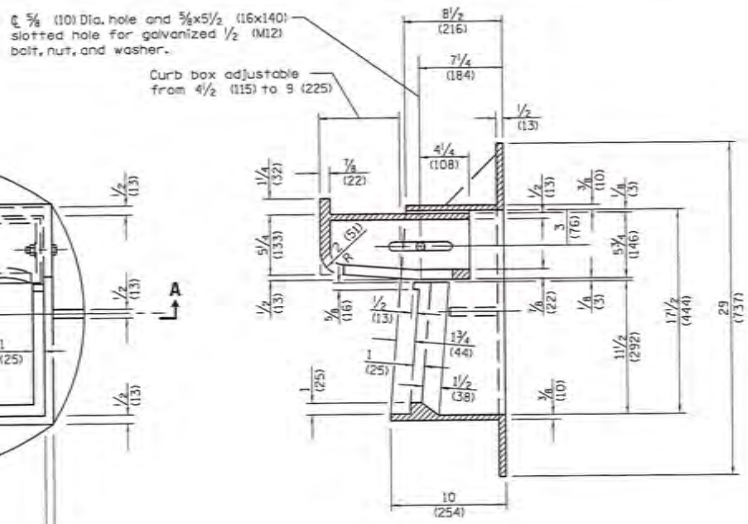
PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

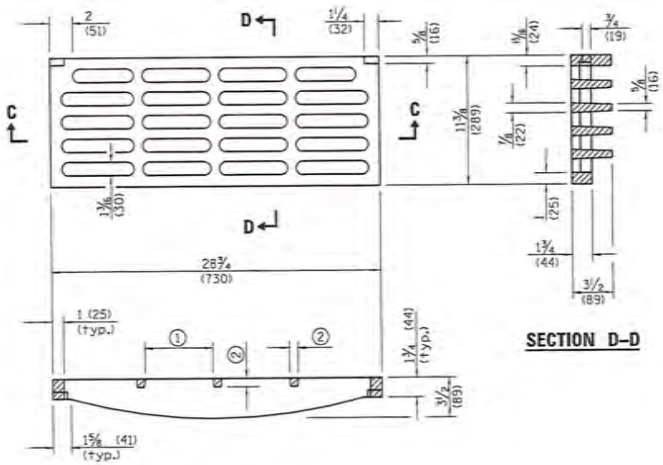
BSSLRD 1-1-97



CAST FRAME



SECTION B–B

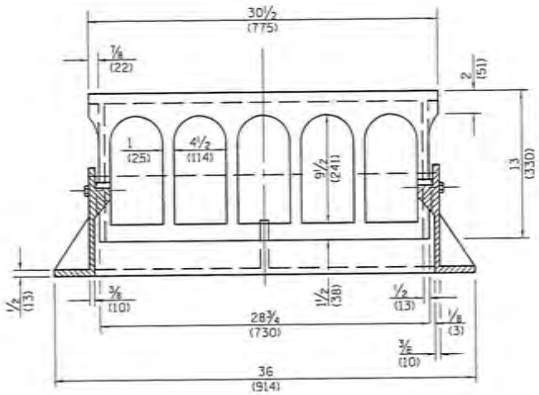


SECTION C–C

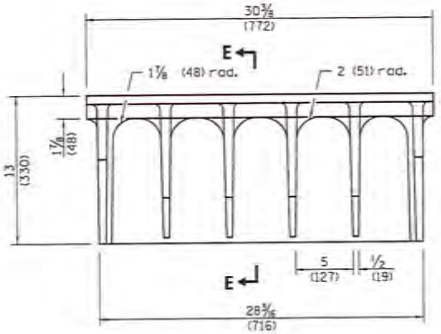
① = 6¼ (159) max. (typ.)

② = ¾ (19) min. (typ.)

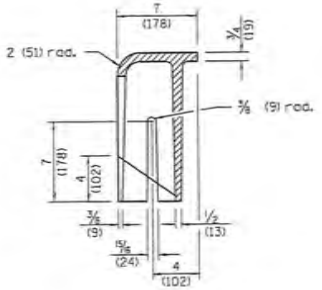
CAST GRATE



SECTION A–A



ALTERNATE CURB BOX



SECTION E–E

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

DATE	REVISIONS
4-1-09	Switched units to English (metric).
4-1-06	Added alternate curb box.

FRAME AND GRATE TYPE 11

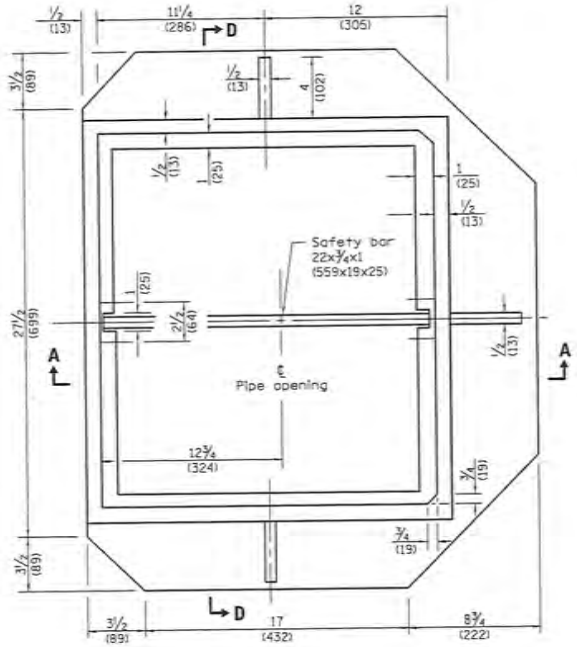
STANDARD 604051–03

Illinois Department of Transportation

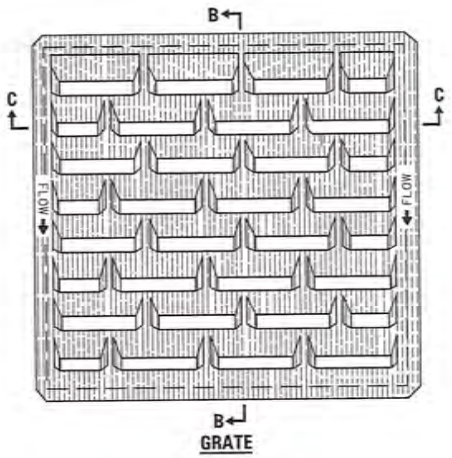
PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

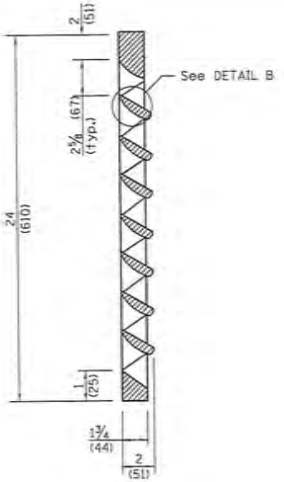
ISSUED 1-1-97



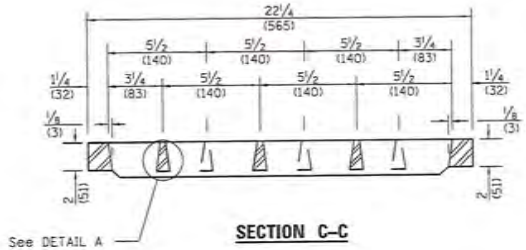
PLAN – FRAME



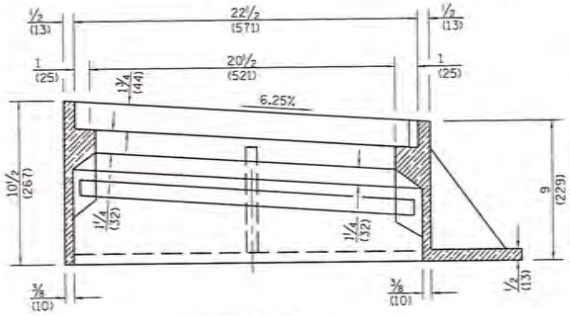
GRATE



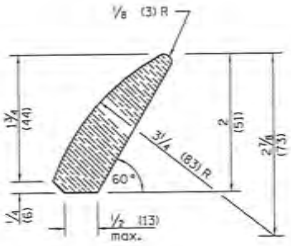
SECTION B–B



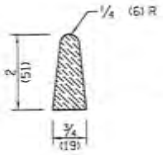
SECTION C–C



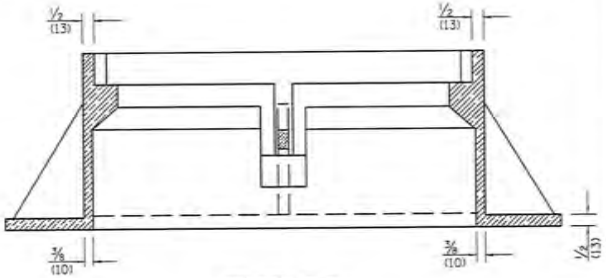
SECTION A–A



DETAIL B



DETAIL A



SECTION D–D

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

DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-04	Revised frame and removed weights.

FRAME AND GRATE TYPE 24

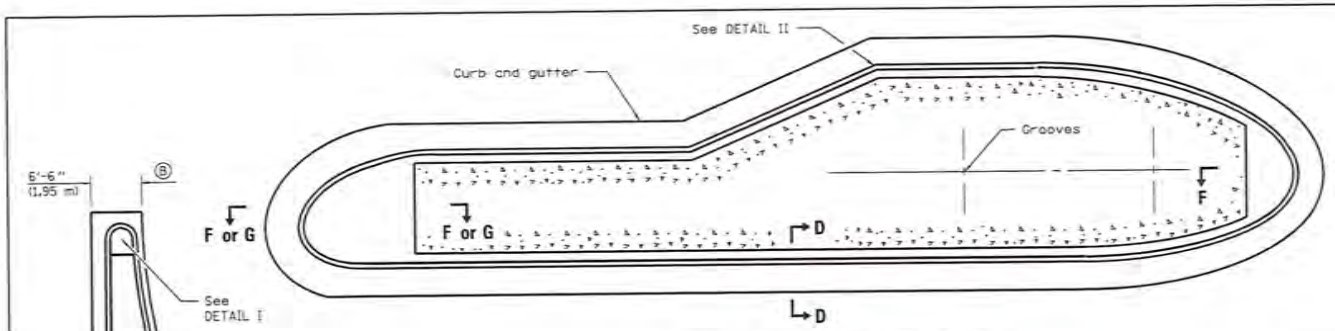
STANDARD 604091–02

Illinois Department of Transportation

PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES

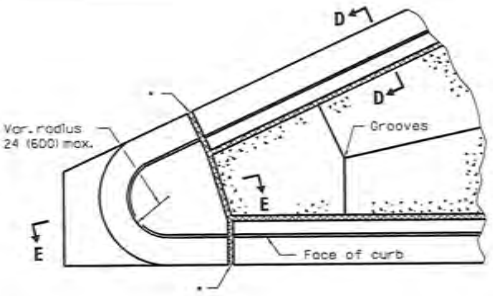
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

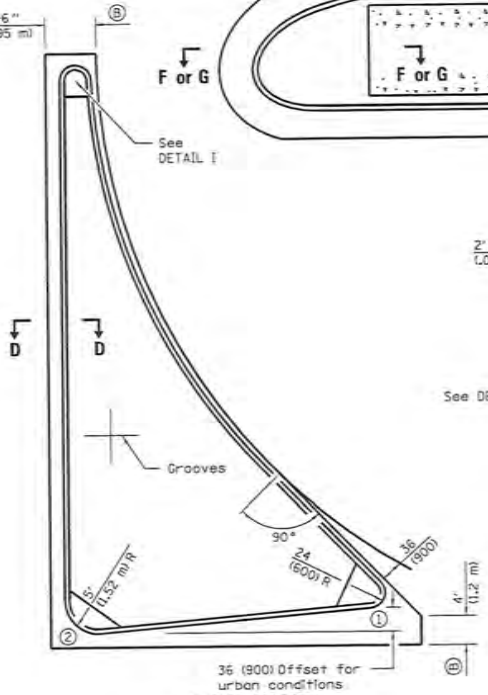


TYPICAL PLAN OF MEDIAN ISLAND

(SEE SHEET 2 FOR DETAILS OF RAMPED NOSES)

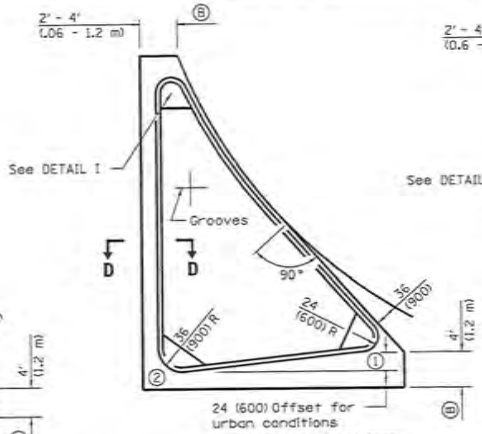


DETAIL I



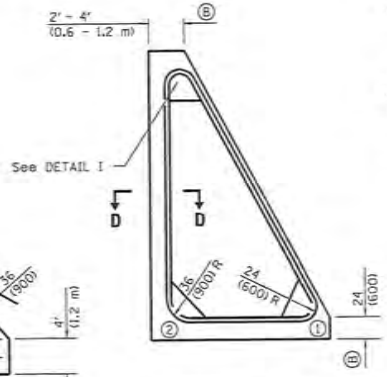
LARGE ISLAND

(FREE FLOW DESIGN)



INTERMEDIATE ISLAND

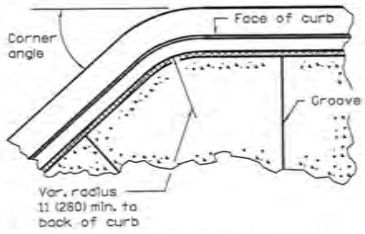
(FOR RIGHT TURN LANE DESIGN)



SMALL ISLAND

TYPICAL PLANS OF CORNER ISLANDS

(SEE SHEET 2 FOR DETAILS OF RAMPED NOSES)

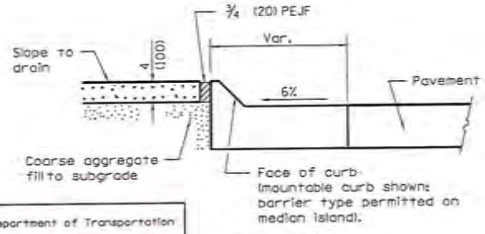


DETAIL II

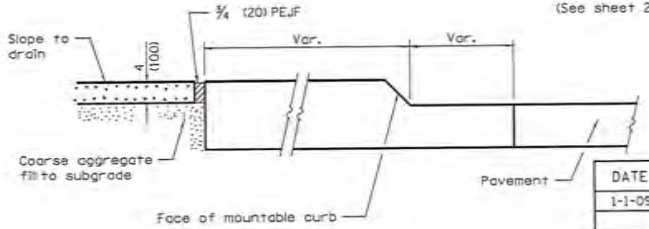
Typical detail when corner angle is less than 90° and for other corners with radius greater than 24 (600).

NOTE:
The blockouts (B) for the islands shall be extended so that the termination will line up with proposed or existing pavement joint.

Noses (1) and (2) shall be ramped unless noted otherwise on the plans. (See sheet 2 for length)



SECTION D–D



SECTION E–E

GENERAL NOTES

PEJF = Preformed expansion joint filler.

Median layout and radii shall be as shown on the plans.

Keyed longitudinal construction joints shall be constructed without tie bars.

See Standard 420001 and 606001 for details not shown.

* ¾ (20) PEJF conforming to the full cross section of the curb, gutter and median surface.

X = PCC base course plus HMA thickness.

+ = Pavement or pcc base course thickness.

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

Illinois Department of Transportation

PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

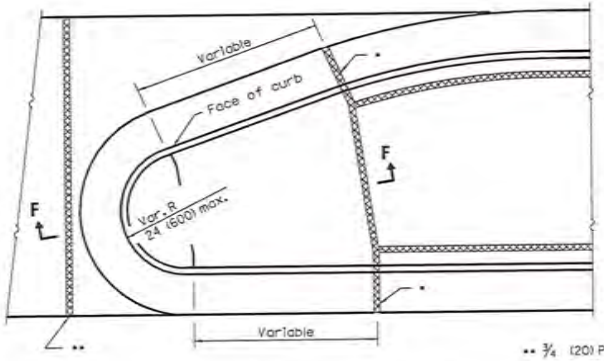
BDE 606301 1-1-09

DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
1-1-07	Switched to Hot-Mix
	Asphalt (HMA)
	terminology.

PC CONCRETE ISLANDS AND MEDIANS

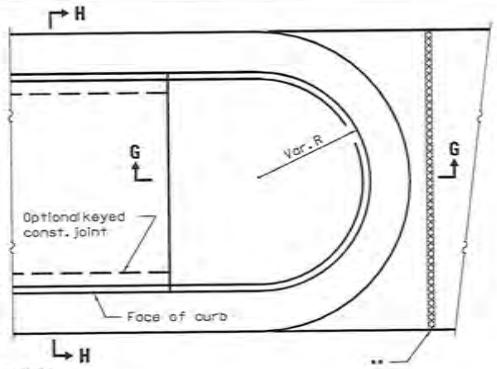
(Sheet 1 of 2)

STANDARD 606301–04



TYPE P MEDIAN SURFACE

•• ¾ (20) PEJF between rigid pavement and median end. Align with joint in adjacent pavement.

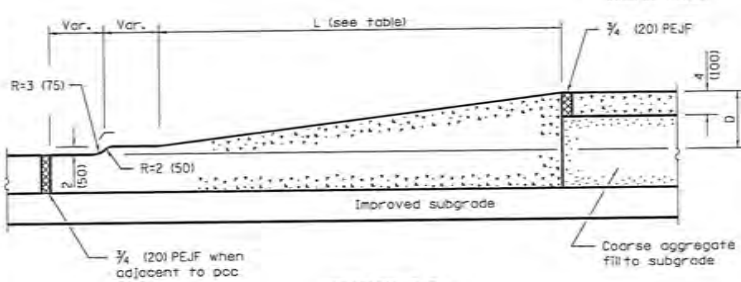


SOLID MEDIAN

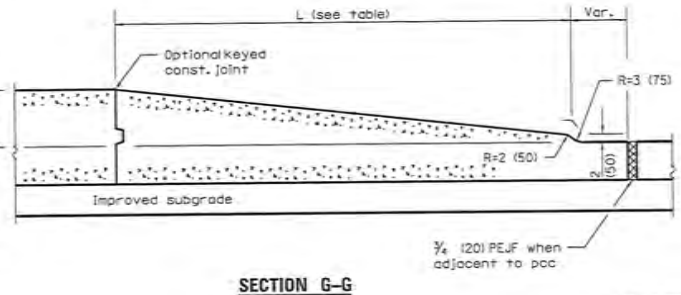
TABLE OF DIMENSIONS					
TYPE SB MEDIANS					
TYPE	A	B	C	D	R_1
SB-6.06 (SB-15.15)	6 (150)	1 (25)	6 (150)	6 (150)	1 (25)
SB-6.12 (SB-15.30)	12 (300)	1 (25)	6 (150)	6 (150)	1 (25)
SB-6.18 (SB-15.45)	18 (450)	1 (25)	6 (150)	6 (150)	1 (25)
SB-6.24 (SB-15.60)	24 (600)	1 (25)	6 (150)	6 (150)	1 (25)
SB-9.06 (SB-22.15)	6 (150)	2 (50)	5 (125)	9 (225)	1 (25)
SB-9.12 (SB-22.30)	12 (300)	2 (50)	5 (125)	9 (225)	1 (25)
SB-9.18 (SB-22.45)	18 (450)	2 (50)	5 (125)	9 (225)	1 (25)
SB-9.24 (SB-22.60)	24 (600)	2 (50)	5 (125)	9 (225)	1 (25)

TABLE OF DIMENSIONS					
TYPE M AND SM MEDIANS					
TYPE	A	B	C	D	R_1
M-2.06 (M-5.15)	6 (150)	2 (50)	4 (100)	2 (50)	2 (50)
M-2.12 (M-5.30)	12 (300)	2 (50)	4 (100)	2 (50)	2 (50)
SM-4.06 (SM-10.15)	6 (150)	4 (100)	3 (75)	4 (100)	3 (75)
SM-4.12 (SM-10.30)	12 (300)	4 (100)	3 (75)	4 (100)	3 (75)
SM-4.18 (SM-10.45)	18 (450)	4 (100)	3 (75)	4 (100)	3 (75)
SM-4.24 (SM-10.60)	24 (600)	4 (100)	3 (75)	4 (100)	3 (75)
SM-6.06 (SM-15.15)	6 (150)	6 (150)	2 (50)	6 (150)	2 (50)
SM-6.12 (SM-15.30)	12 (300)	6 (150)	2 (50)	6 (150)	2 (50)
SM-6.18 (SM-15.45)	18 (450)	6 (150)	2 (50)	6 (150)	2 (50)
SM-6.24 (SM-15.60)	24 (600)	6 (150)	2 (50)	6 (150)	2 (50)

PLAN
(RAMPED NOSES)

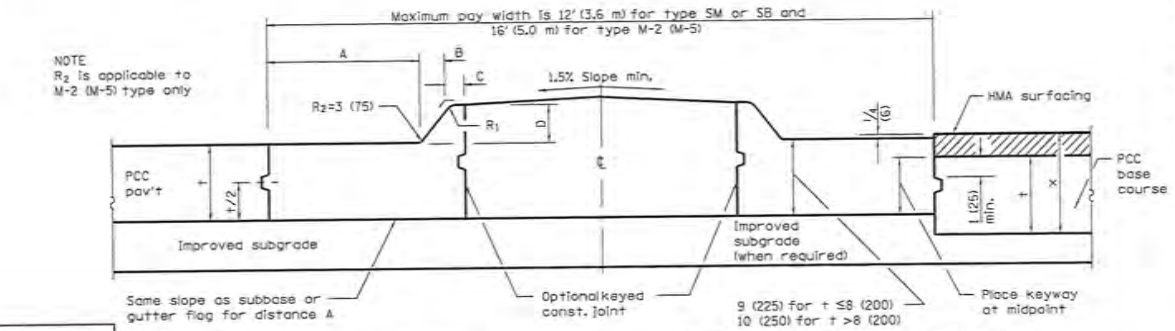


SECTION F–F



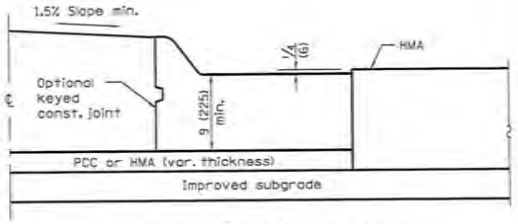
SECTION G–G

TABLE OF RAMPED NOSE LENGTHS	
TYPE OF NOSE	L
Median	6' (1.8 m)
Small Island	24 (600)
Intermediate Island	4' (1.2 m)
Large Island	6' (1.8 m)



HALF SECTION FOR PCC PAVEMENT

HALF SECTION FOR PCC BASE COURSE



HALF SECTION FOR FLEXIBLE PAVEMENT

SECTION H–H
(TYPE SM, SB & M-5 (M-2) MEDIANS)

Illinois Department of Transportation

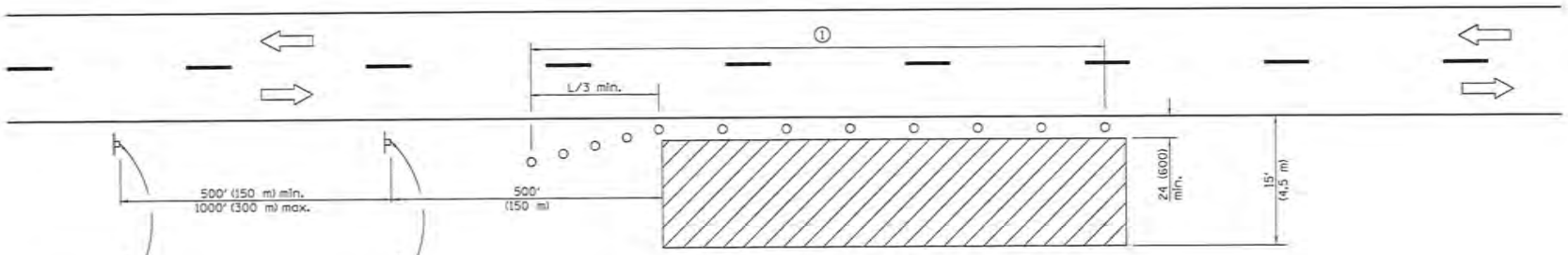
PASSED January 1, 2009
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-09

PC CONCRETE ISLANDS AND MEDIANS

(Sheet 2 of 2)

STANDARD 606301–04



For contract construction projects

W20-1103(0)-48

W21-1a(0)-48
OR

For maintenance and utility projects

W20-1(0)-48

W21-1110(0)-48

TYPICAL APPLICATIONS

Utility operations
Culvert extensions
Side slope changes
Guardrail installation and maintenance
Delineator installation
Landscaping operations
Shoulder repair
Sign installation and maintenance

SYMBOLS

Work area

Sign

Cone, drum or barricade

① When the work operation exceeds one hour, cones, drums or barricades shall be placed at 25' (8 m) centers for L/3 distance, and at 50' (15 m) centers through the remainder of the work area.

GENERAL NOTES

This Standard is used where any vehicles, equipment, workers or their activities will encroach in the area 15' (4.5 m) to 24 (600) from the edge of pavement.

Calculate L as follows:

SPEED LIMIT	FORMULAS	
	English	(Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(WXS)

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 January 1, 2009
ENGINEER OF OPERATIONS

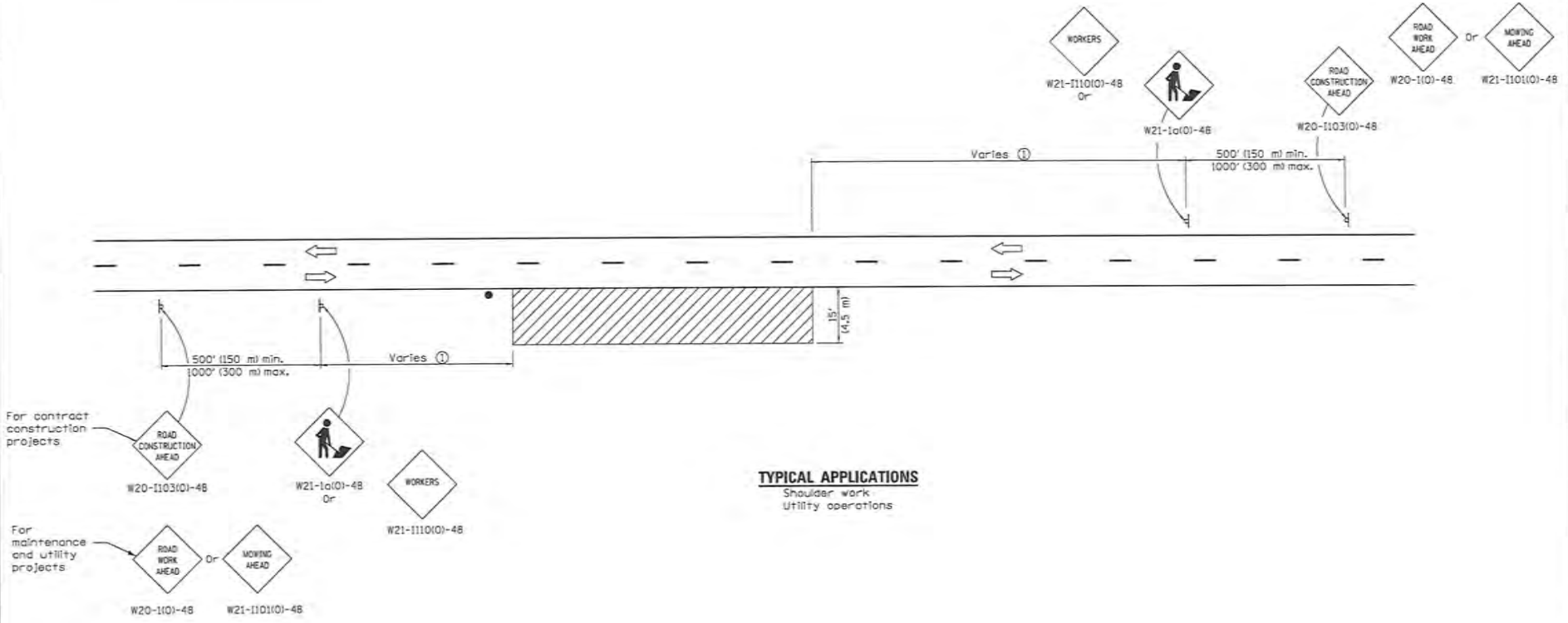
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.
1-1-05	Revised title, notes,
	and sign spacing.

OFF-RD OPERATIONS, 2L, 2W, 15' (4.5 m) TO 24" (600 mm) FROM PAVEMENT EDGE

STANDARD 701006-03



TYPICAL APPLICATIONS

Shoulder work
Utility operations

① Minimum distance is 200' (60 m). Maximum distance to be determined by the Engineer but should not exceed ½ the length required for one normal working day's operation, or 4 miles (6.4 km) whichever is less.

SYMBOLS

Work area

Sign

Flagger with traffic control sign when required

GENERAL NOTES

This Standard is used where at any time, any vehicle, equipment, workers or their activities require an intermittent or continuous moving operation on the shoulder, where the average speed is 1 mph (2 km/h) or less.

When the work operation does not exceed 60 minutes, traffic control may be according to Standard 701301.

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

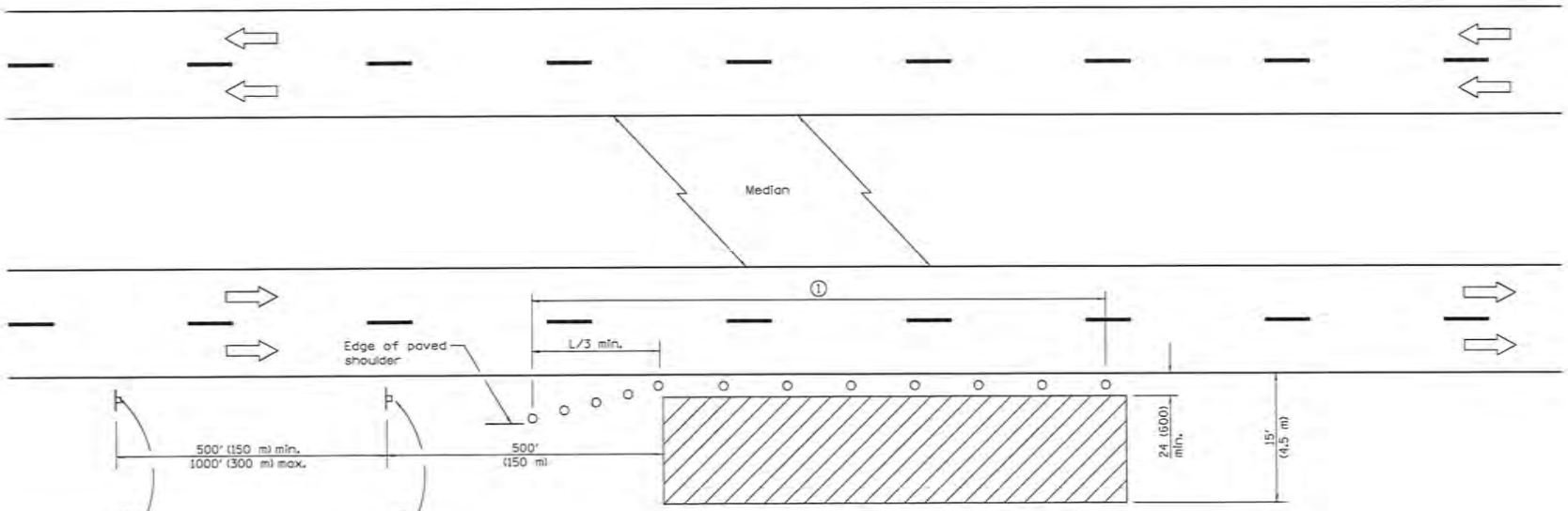
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.
1-1-05	Revised title, notes,
	and sign spacing.

OFF-RD MOVING OPERATIONS, 2L, 2W, DAY ONLY

STANDARD 701011-02



For contract construction projects

W20-I103(0)-48

W21-1a(0)-48
Or

For maintenance and utility projects

W20-I(0)-48

W21-I110(0)-48

TYPICAL APPLICATIONS

Utility operations
Culvert extensions
Side slope changes
Guardrail installation and maintenance
Delineator installation
Landscaping operations
Shoulder repair
Sign installation and maintenance

① When the work operation exceeds one hour, cones, drums or barricades shall be placed at 8 m (25') centers for L/3 distance, and at 15 m (50') centers through the remainder of the work area.

GENERAL NOTES

This Standard is used where any vehicles, equipment, workers or their activities will encroach in the area 15' (4.5 m) to 24 (600) from the edge of pavement.

Calculate L as follows:

SPEED LIMIT	FORMULAS English	(Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

W = Width of offset in feet (meters).

S = Normal posted speed mph (km/h).

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

SYMBOLS

Work area

Sign

Cone, drum or barricade

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

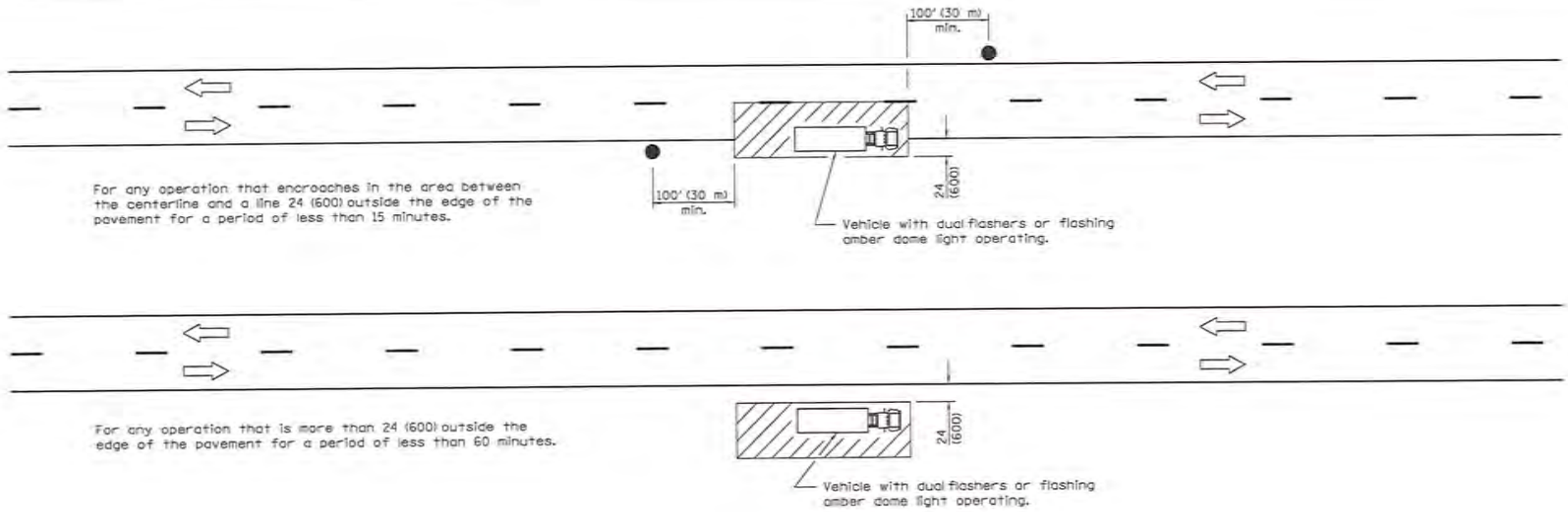
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.
1-1-05	Revised title, notes,
	and sign spacing.

OFF–RD OPERATIONS, MULTILANE, 15' (4.5 m) TO 24 " (600 mm) FROM PAVEMENT EDGE

STANDARD 701101–02



For any operation that encroaches in the area between the centerline and a line 24 (600) outside the edge of the pavement for a period of less than 15 minutes.

For any operation that is more than 24 (600) outside the edge of the pavement for a period of less than 60 minutes.

For any operation that encroaches in the area between the centerline and a line 24 (600) outside the edge of the pavement for a period in excess of 15 minutes but less than 60 minutes.

SIGN SPACING	
Posted Speed	Sign Spacing
55	500' (150 m)
50-45	350' (100 m)
<45	200' (60 m)

(1) = Refer to SIGN SPACING table for distances.

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

TYPICAL APPLICATIONS

Marking patches
Field survey
String line
Utility operations
Cleaning up debris on pavement

SYMBOLS

Work area
Sign on portable or permanent support
Flagger with traffic control sign

Illinois Department of Transportation

APPROVED January 6, 2011
ENGINEER OF SAFETY ENGINEERING

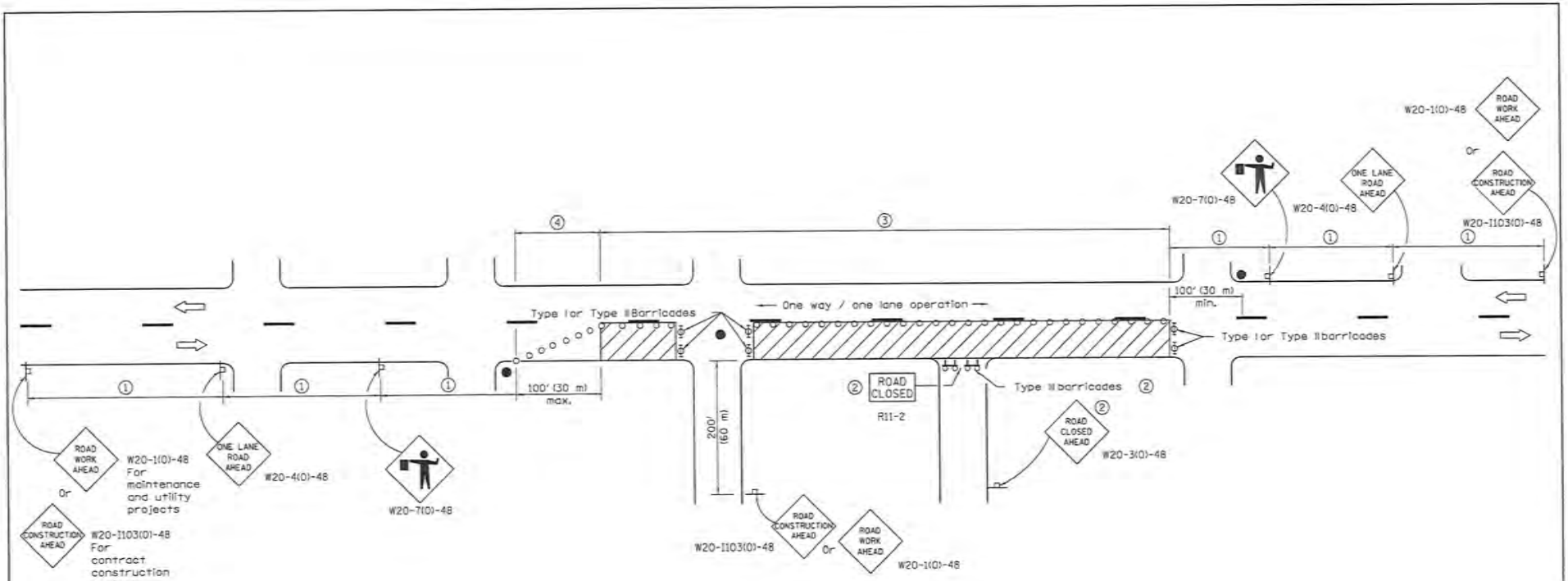
APPROVED January 6, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-11	Revised flagger sign.
1-1-09	Switched units to
	English (metric).

LANE CLOSURE, 2L, 2W, SHORT TIME OPERATIONS

STANDARD 701301-04



SIGN SPACING	
Posted Speed	Sign Spacing
55	500' (150 m)
50-45	350' (100 m)
≤45	200' (60 m)

SYMBOLS

- Work area
- Cone, drum or barricade (not required for moving operations)
- Sign on portable or permanent support
- Flagger with traffic control sign
- Barricade or drum with flashing light
- Type III barricade with flashing lights

(1) Refer to SIGN SPACING TABLE for distances.

(2) For approved sideroad closures.

(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) Cones, drums or barricades at 20' (6 m) centers.

GENERAL NOTES

This Standard is used where at any time, day or night, any vehicle, equipment, workers or their activities encroach on the pavement requiring the closure of one traffic lane in an urban area.

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

Illinois Department of Transportation

APPROVED January 1, 2011
ENGINEER OF SAFETY ENGINEERING

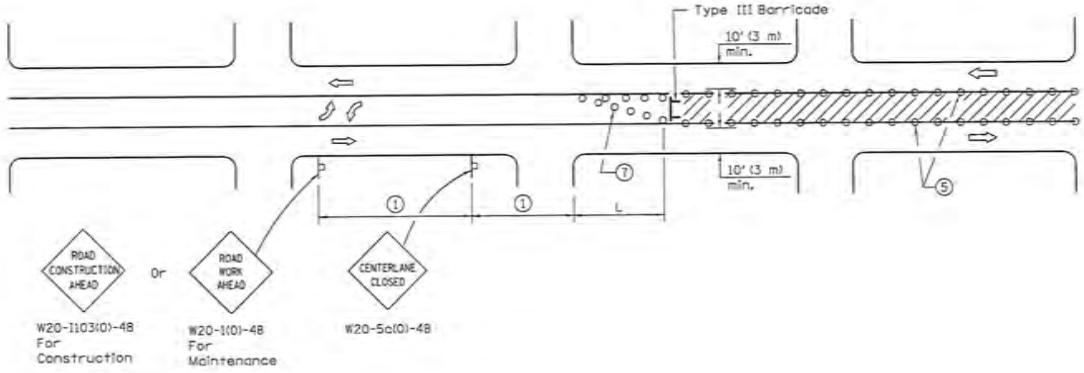
APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

BLR 09010 (1-1-11)

DATE	REVISIONS
1-1-11	Revised flagger sign.
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.

URBAN LANE CLOSURE, 2L, 2W, UNDIVIDED

STANDARD 701501-06



CASE I

(Signs required for both directions)

SIGN SPACING	
Posted Speed	Sign Spacing
55 (4)	500' (150 m)
50-45 (4)	350' (100 m)
<45	200' (60 m)

SYMBOLS

- Work area
- Barricade or drum with flashing light
- Flagger with traffic control sign
- Cone, drum or barricade (Cones for daytime use only)
- Sign on portable or permanent support

1. Refer to SIGN SPACING TABLE for distances.
2. Required for speeds > 40 mph (70 km/h).
3. Required if work exceeds 500' (164 m) or 1 block.
4. For speeds exceeding 45 mph (80 km/h) contact the District Operations Office for approval of sign spacing.
5. Cones at 25' (8 m) centers for 250' (75 m). Additional cones may be placed at 15 m (50') centers. When drums or type I or II barricades are used, the interval between devices may be doubled.
6. For approved sideroad closures.
7. Cones, drums or barricades at 20' (6 m) centers in taper.
8. Use flagger sign only when flagger is present.

GENERAL NOTES

This Standard is used to close one lane of an urban, two lane, two way roadway with a bidirectional turn lane.

Case I applies when no workers are present. When workers are present, two lanes shall be closed and traffic control shall be according to Standard 701501.

Calculate L as follows:

SPEED LIMIT	FORMULAS English	(Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

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 January 1, 2011
ENGINEER OF SAFETY ENGINEERING

APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

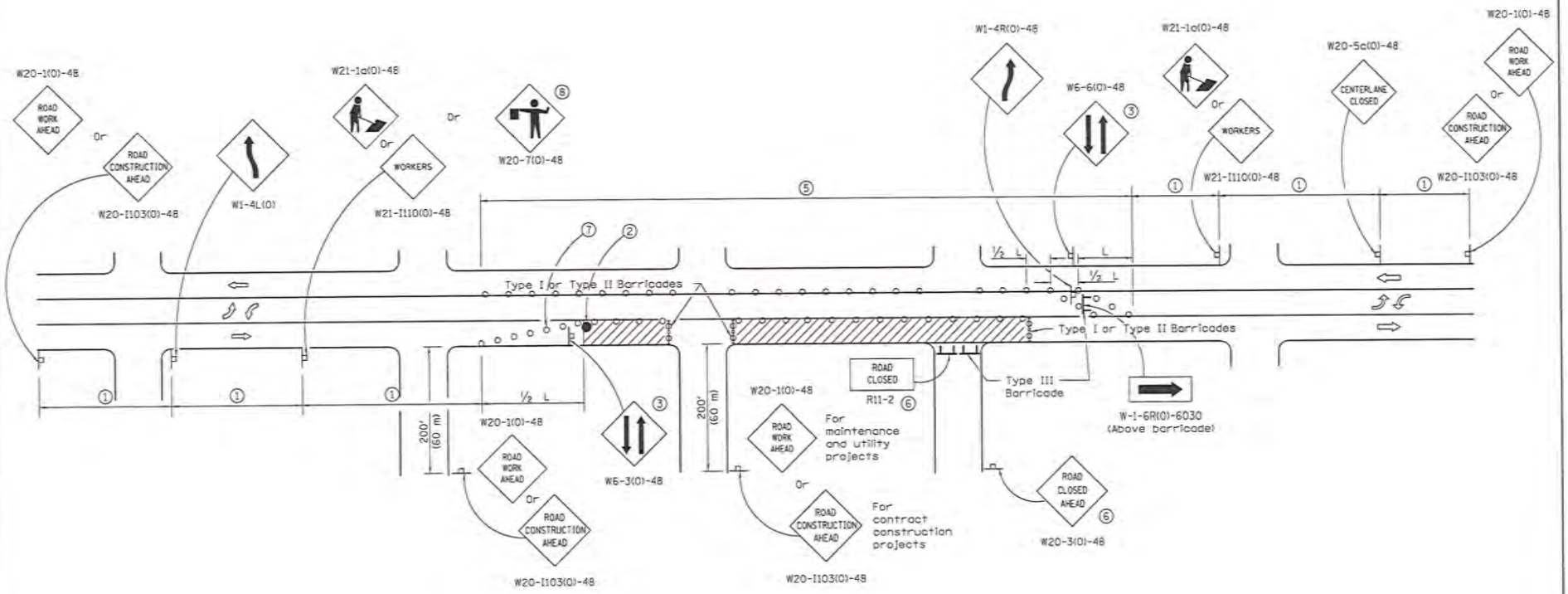
ISSUED 1-1-11

DATE	REVISIONS
1-1-11	Omitted arrow board from
	SYMBOL legend. Revised
	flagger sign. Added note (8).
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.

URBAN LANE CLOSURE, 2L, 2W, WITH BIDIRECTIONAL LEFT TURN LANE

(Sheet 1 of 2)

STANDARD 701502-04



CASE II

Illinois Department of Transportation

APPROVED January 1, 2001
ENGINEER OF SAFETY ENGINEERING

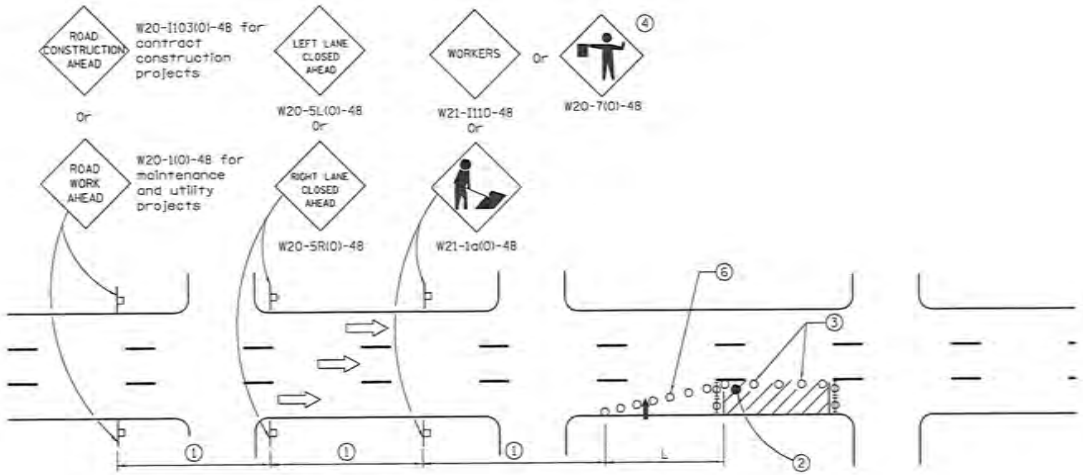
APPROVED January 1, 2001
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-01

URBAN LANE CLOSURE, 2L, 2W, WITH BIDIRECTIONAL LEFT TURN LANE

(Sheet 2 of 2)

STANDARD 701502–04



SIGN SPACING	
Posted Speed	Sign Spacing
55	500' (150 m)
50-45	350' (100 m)
<45	200' (60 m)

SYMBOLS

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

① Refer to SIGN SPACING TABLE for distances.

② Required for speeds > 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 For approved sideroad closures.

⑥ Cones, drums or barricades at 20' (6 m) in taper.

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 urban areas.

Calculate L as follows:

SPEED LIMIT	FORMULAS English	FORMULAS (Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

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 January 1, 2011
ENGINEER OF SAFETY ENGINEERING

APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

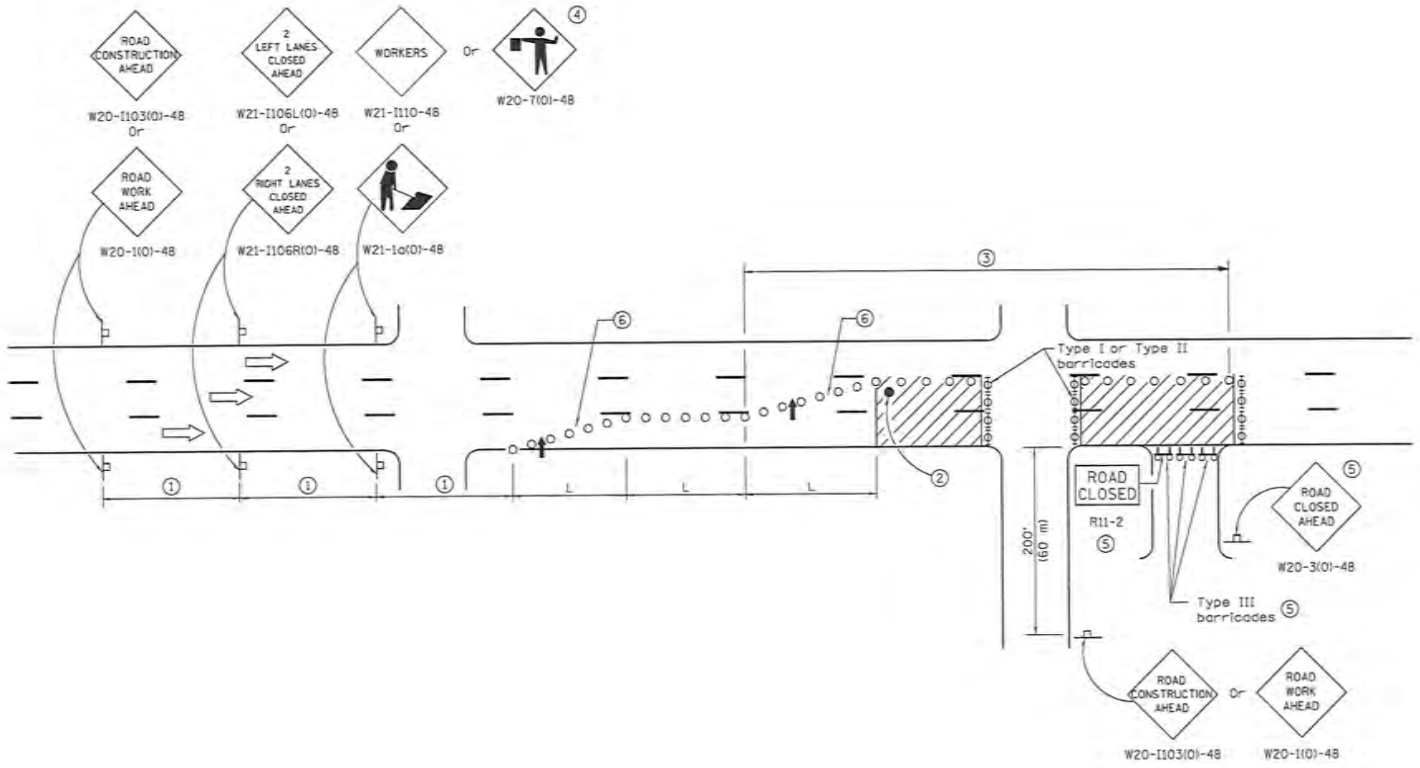
ISSUED 1-1-07

DATE	REVISIONS
1-1-11	Revised flagger sign.
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.

URBAN LANE CLOSURE, MULTILANE, 1W OR 2W WITH NONTRAVERSABLE MEDIAN

(Sheet 1 of 2)

STANDARD 701601-07



Illinois Department of Transportation

APPROVED January 6, 2011
ENGINEER OF SAFETY ENGINEERING

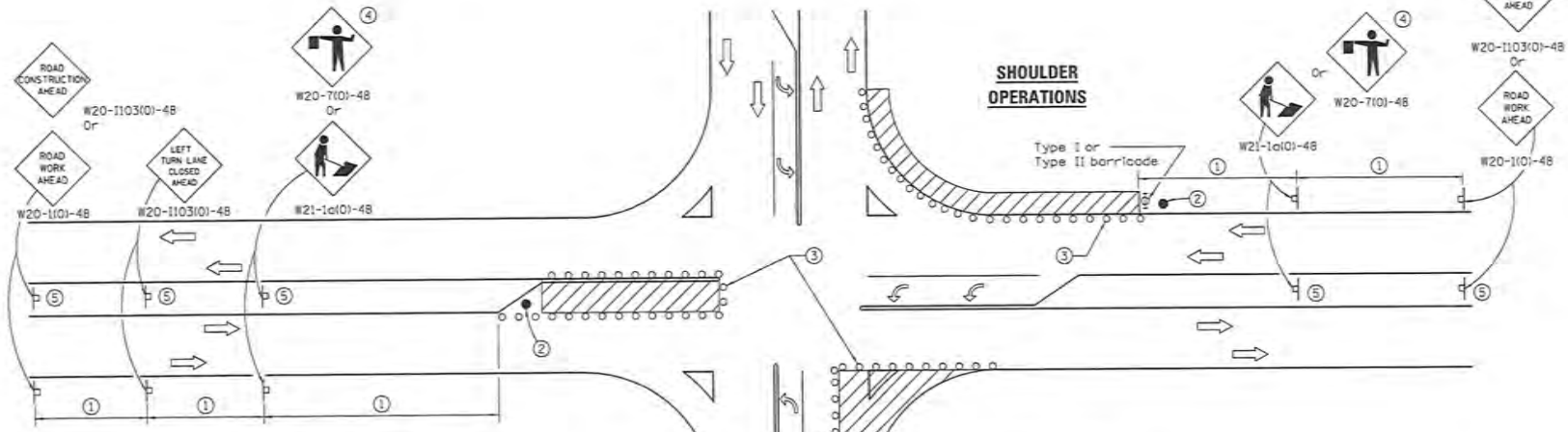
APPROVED January 6, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

URBAN LANE CLOSURE, MULTILANE, 1W OR 2W WITH NONTRAVERSABLE MEDIAN

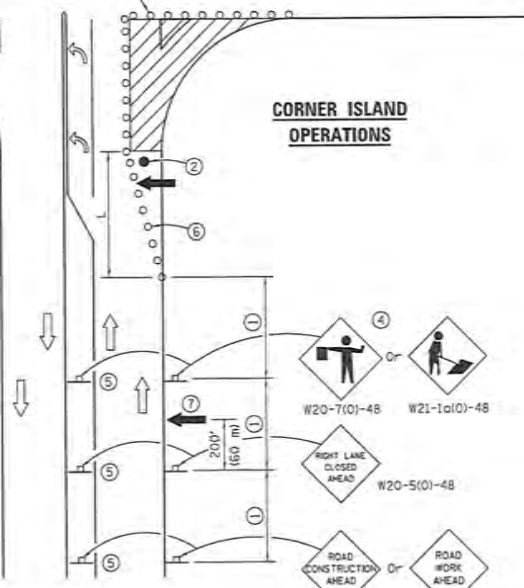
(Sheet 2 of 2)

STANDARD 701601-07



LEFT TURN LANE OR CENTER MEDIAN OPERATIONS

CORNER ISLAND OPERATIONS



SIGN SPACING	
Posted Speed	Sign Spacing
55	500' (150 m)
50-45	350' (100 m)
<45	200' (60 m)

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.

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

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:

SPEED LIMIT	FORMULAS English	(Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

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 January 1, 2012
ENGINEER OF SAFETY ENGINEERING

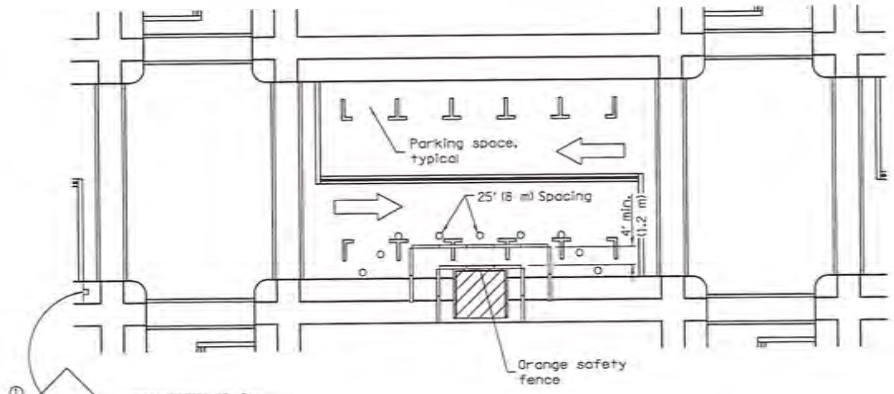
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-12	Revised flagger sign.
	Omitted W21-1110 sign.
1-1-11	Added advanced arrow
	board and note (7).

URBAN LANE CLOSURE, MULTILANE INTERSECTION

STANDARD 701701-08



① ROAD CONSTRUCTION AHEAD — W20-1103(0)-48 for contract construction projects

Or

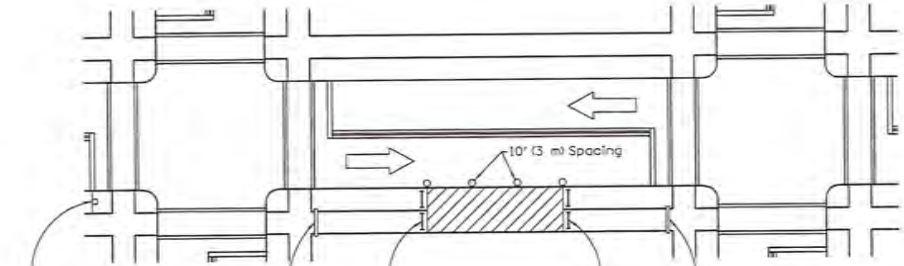
① ROAD WORK AHEAD — W20-1(0)-48 for maintenance and utility projects

SIDEWALK DIVERSION

① Omit whenever duplicated by road work traffic control.

SYMBOLS

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



① ROAD CONSTRUCTION AHEAD — W20-1103(0)-48 for contract construction projects

Or

① ROAD WORK AHEAD — W20-1(0)-48 for maintenance and utility projects

SIDEWALK CLOSURE

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 side of the closed facilities whenever possible.

The SIDEWALK CLOSED / 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 on the corners across the street from the closure. The SIDEWALK CLOSED signs shall be used at the ends of the actual closures.

Type III barricades and R11-2-4830 signs shall be positioned as shown in "ROAD CLOSED TO ALL TRAFFIC" detail on Standard 701901.

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

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF SAFETY ENGINEERING

APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

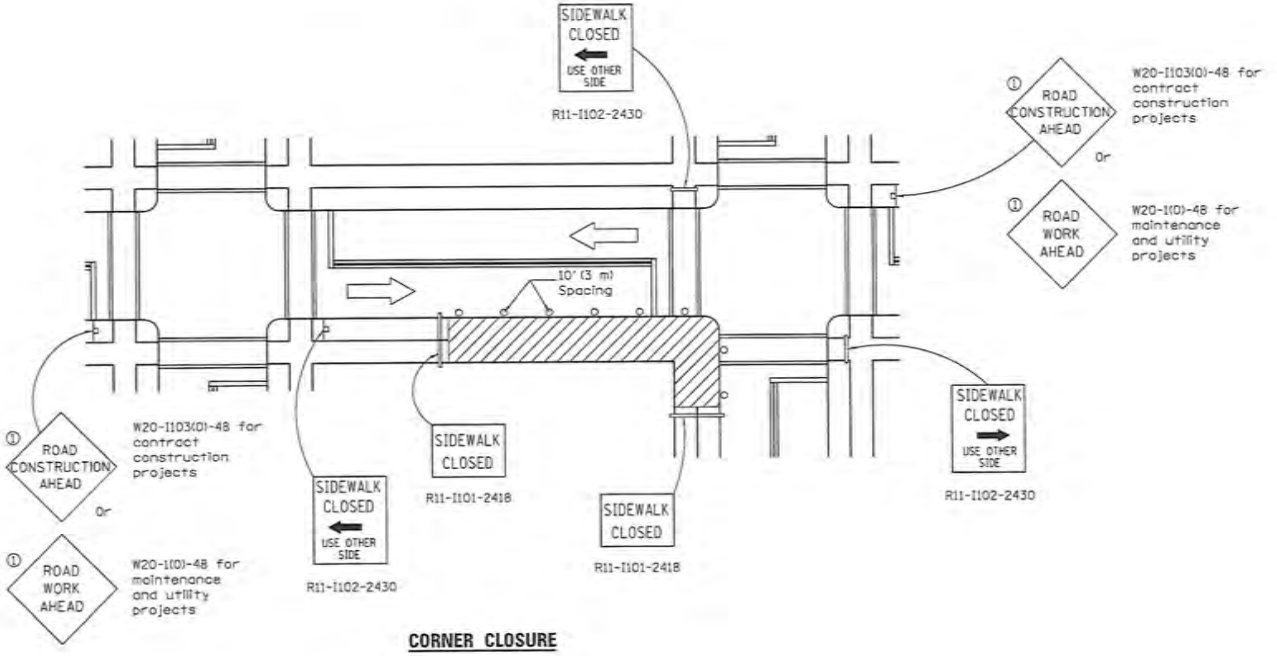
ISSUED 1-1-97

DATE	REVISIONS
1-1-12	Added SIDEWALK DIVERSION.
	Modified appearance of
	plan views. Renamed Std.
1-1-09	Switched units to
	English (metric).
	702001 to 701901.

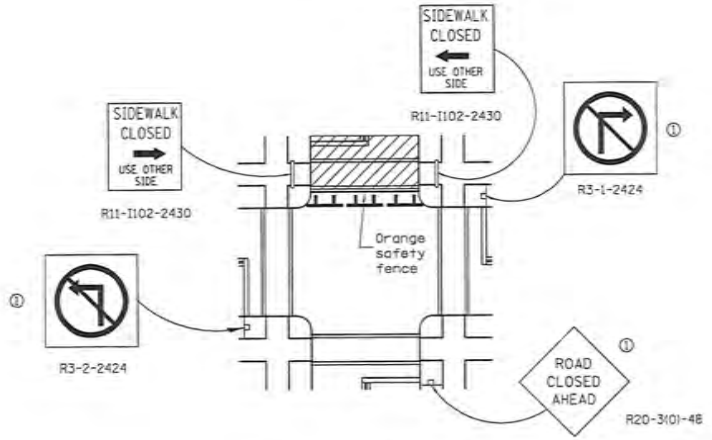
SIDEWALK, CORNER OR CROSSWALK CLOSURE

(Sheet 1 of 2)

STANDARD 701801-05



CORNER CLOSURE



CROSSWALK CLOSURE

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF SAFETY ENGINEERING

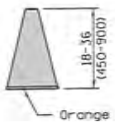
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISTSD 1-1-97

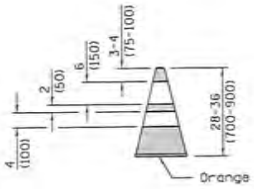
SIDEWALK, CORNER OR CROSSWALK CLOSURE

(Sheet 2 of 2)

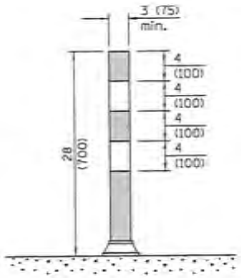
STANDARD 701801–05



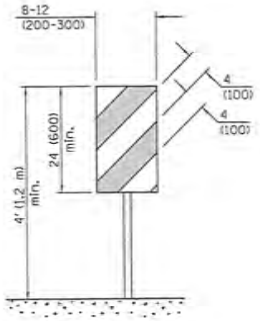
CONE



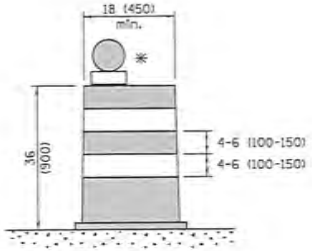
REFLECTORIZED CONE



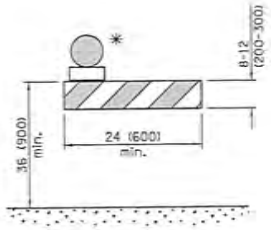
FLEXIBLE DELINEATOR



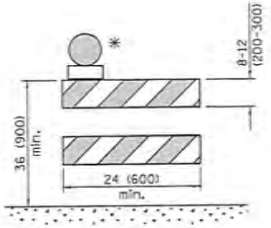
VERTICAL PANEL
POST MOUNTED



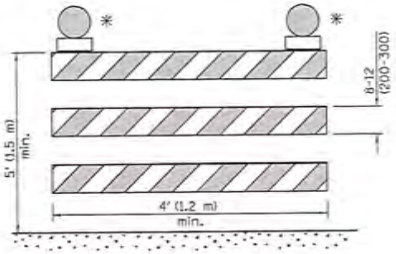
DRUM



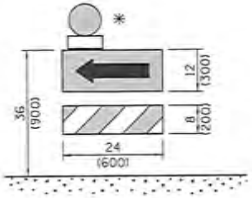
TYPE I BARRICADE



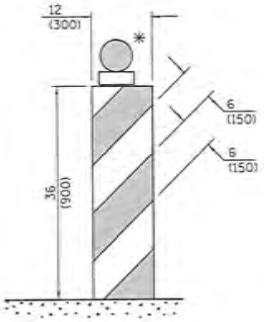
TYPE II BARRICADE



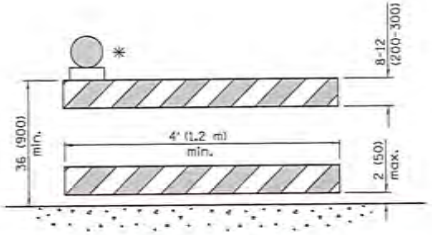
TYPE III BARRICADE



DIRECTION INDICATOR BARRICADE



VERTICAL BARRICADE



DETECTABLE PEDESTRIAN CHANNELIZING BARRICADE

* Warning lights (if required)

GENERAL NOTES

All heights shown shall be measured above the pavement surface.

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

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF OPERATIONS

APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

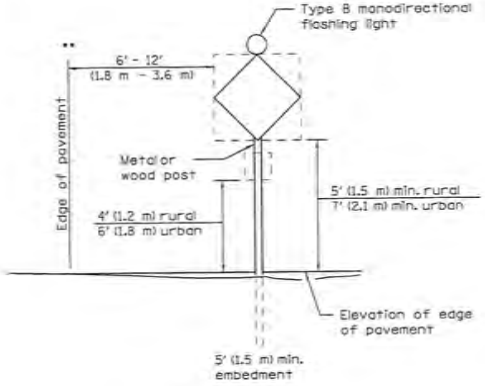
ISSUED 1-1-97

DATE	REVISIONS
1-1-12	Added DETECTABLE PEDESTRIAN CHANNELIZING BARRICADE.
1-1-09	Switched units to English (metric). Omitted light on vertical panel.

TRAFFIC CONTROL DEVICES

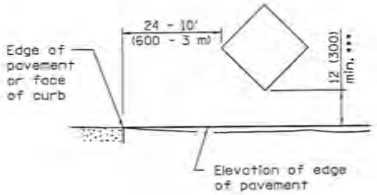
(Sheet 1 of 3)

STANDARD 701901-02



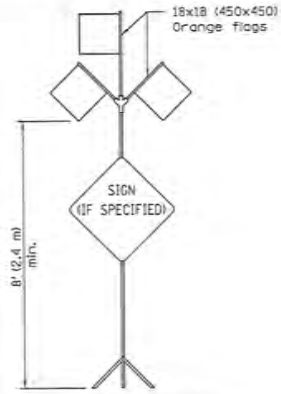
POST MOUNTED SIGNS

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

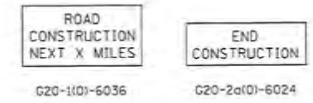


SIGNS ON TEMPORARY SUPPORTS

*** 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 by motorists.



HIGH LEVEL WARNING DEVICE



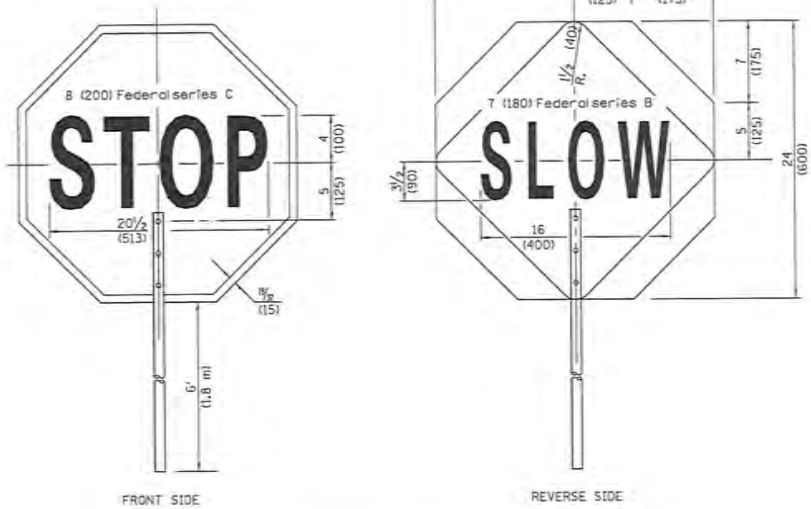
This signing is required for all projects 2 miles (3200 m) or more in length.

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



FLAGGER TRAFFIC CONTROL SIGN

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

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF OPERATIONS

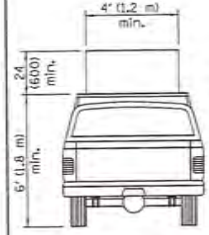
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

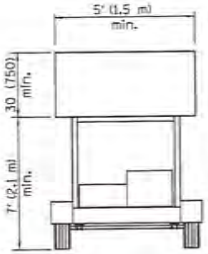
TRAFFIC CONTROL DEVICES

(Sheet 2 of 3)

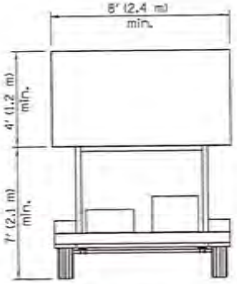
STANDARD 701901-02



TYPE A ROOF MOUNTED

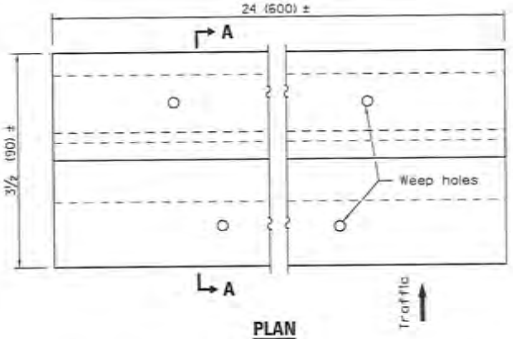


TYPE B ROOF OR TRAILER MOUNTED

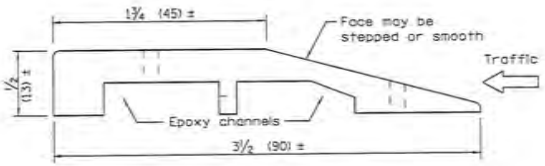


TYPE C TRAILER MOUNTED

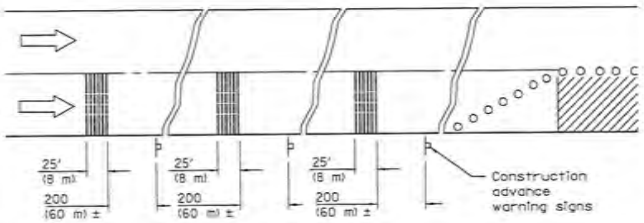
ARROW BOARDS

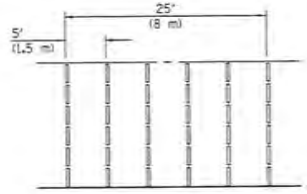


PLAN



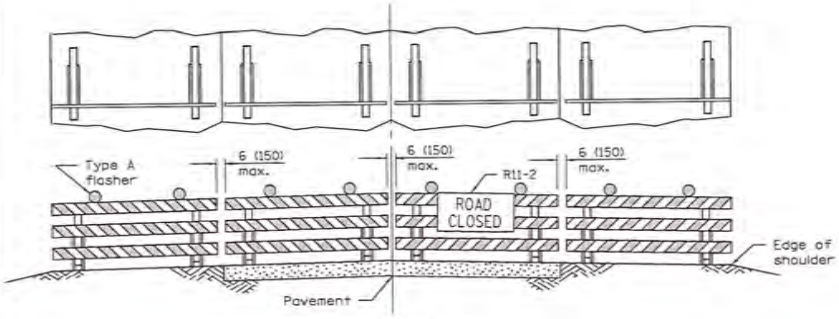
SECTION A–A





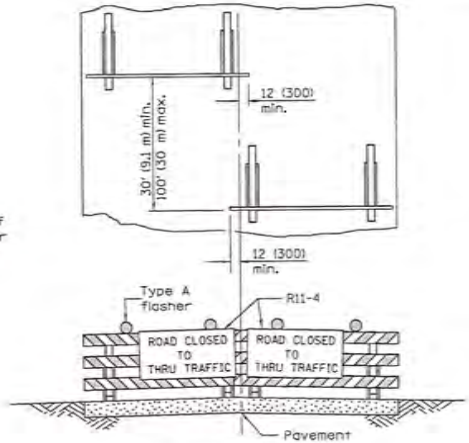
TYPICAL INSTALLATION

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 support 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 an NCHRP 350 temporary sign supports directly in front of the barricade.

TYPICAL APPLICATIONS OF TYPE III BARRICADES CLOSING A ROAD

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

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF OPERATIONS

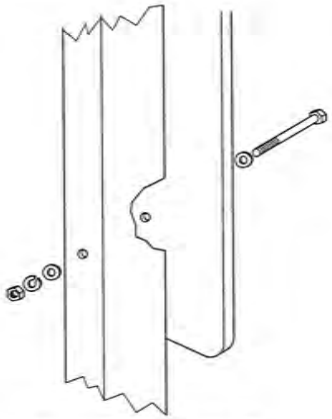
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-12

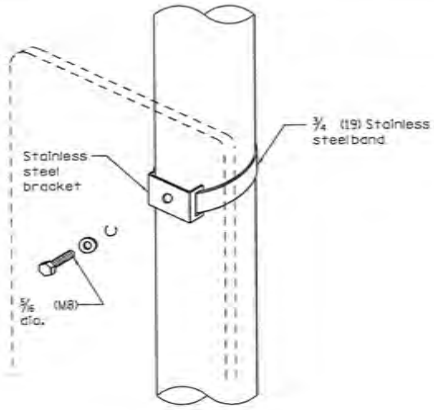
TRAFFIC CONTROL DEVICES

(Sheet 3 of 3)

STANDARD 701901-02

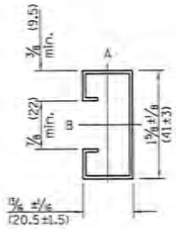


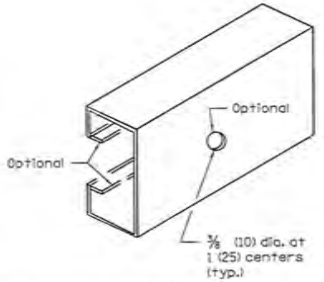
Sign panel 36 (900) wide or less



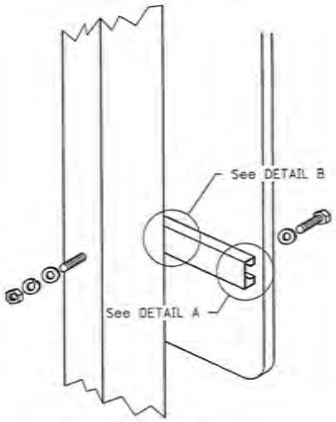
Sign panel 36 (900) wide or less

Section modulus (minimum)	Axis A	Axis B
Steel	0.050 in.³ (819 mm ³	0.105 in.³ (1720 mm ³
Aluminum	0.150 in.³ (2458 mm ³	0.315 in.³ (5162 mm ³



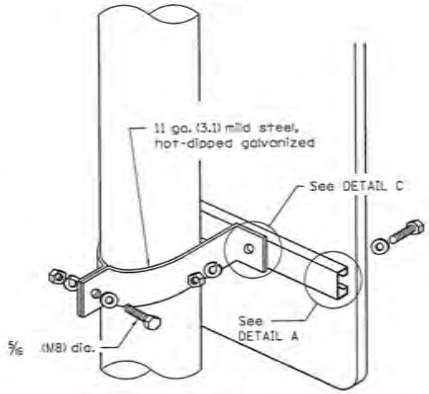


SUPPORTING CHANNEL DETAILS



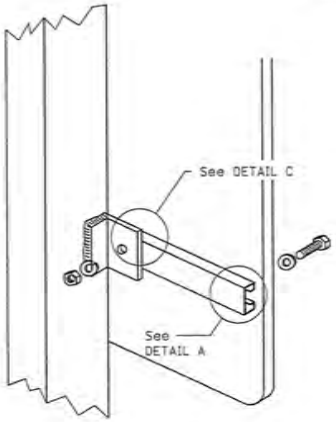
Sign panel over 36 (900) wide

WOOD OR TELESCOPING STEEL POSTS

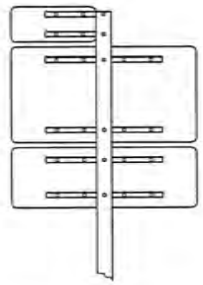


Sign panel over 36 (900) wide

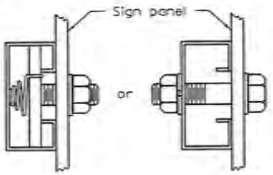
LIGHT OR SIGNAL STANDARDS



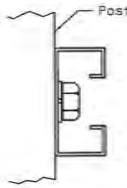
BREAKAWAY STEEL TUBING POSTS
(All sign panel sizes)



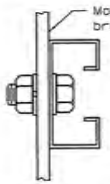
ROUTE MARKER ASSEMBLY



DETAIL A



DETAIL B



DETAIL C

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

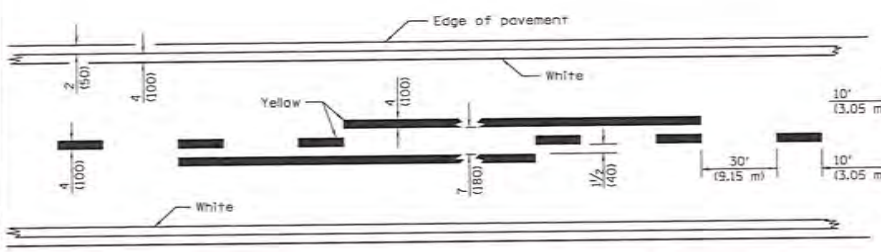
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

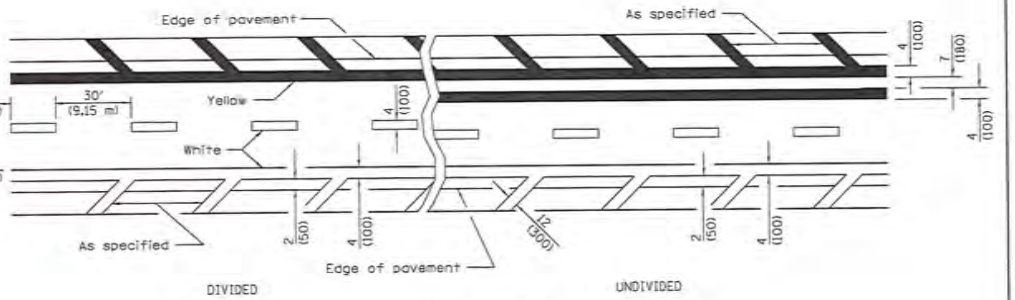
ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-97	Renum. Standard 2319-6.

SIGN PANEL MOUNTING DETAILS

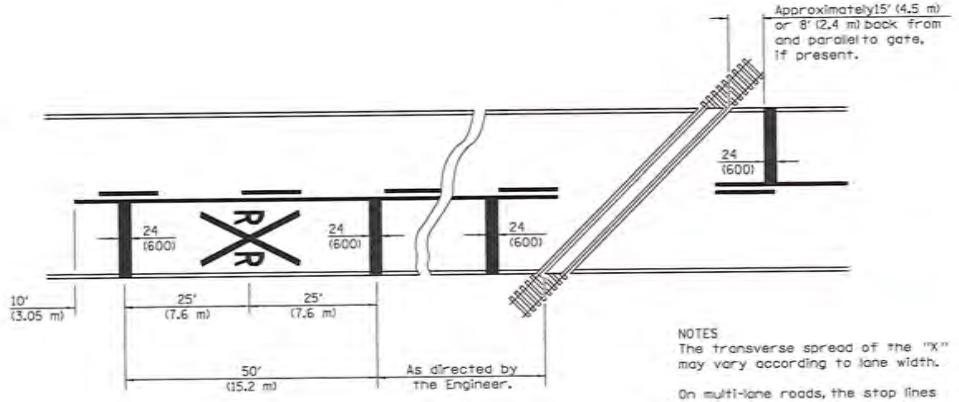
STANDARD 720001-01

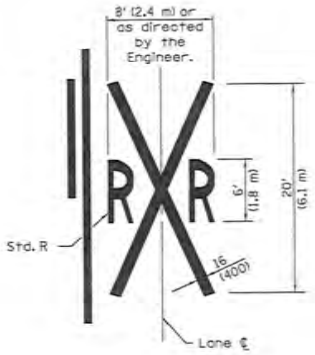




2 LANE **MULTI LANE**

LANE AND EDGE LINES





NOTES
The transverse spread of the "X" may vary according to lane width.

On multi-lane roads, the stop lines shall extend across all approach lanes and separate RXR symbols shall be placed adjacent to each other in each lane.

When the pavement marking symbol is used, a portion of the symbol should be located directly adjacent to the Advance Warning Sign (W10-1) as placed by Table 2C-4, Condition B of the MUTCD.

PAVEMENT MARKINGS AT RAILROAD–HIGHWAY GRADE CROSSING

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

DATE	REVISIONS
1-1-12	Updated reference to current MUTCD table in notes.
1-1-09	Switched units to English (metric).

TYPICAL PAVEMENT MARKINGS

(Sheet 1 of 2)

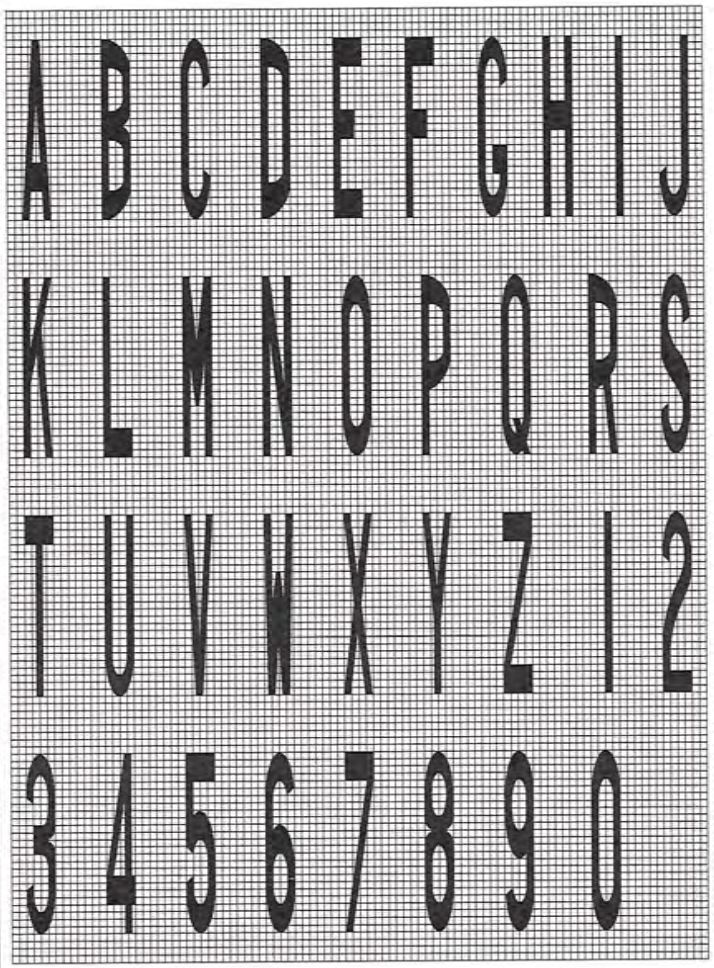
STANDARD 780001–03

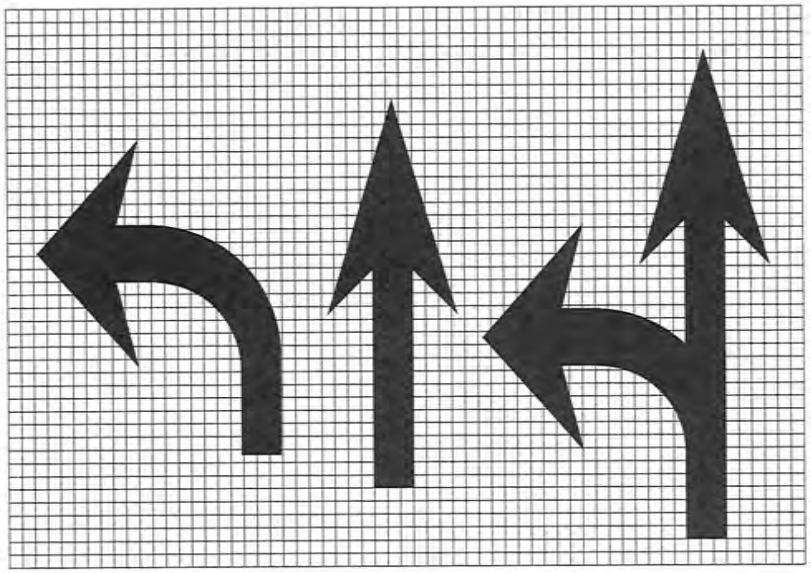
Illinois Department of Transportation

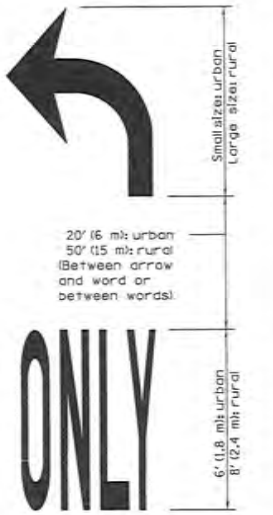
APPROVED January 1, 2012
ENGINEER OF OPERATIONS

APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

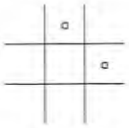
ISSUED 1-1-97







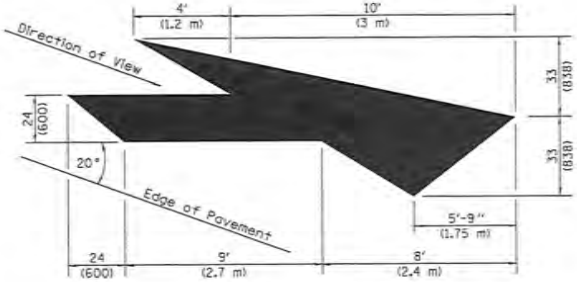
WORD AND ARROW LAYOUT



Legend Height	Arrow Size	a
6' (1.8 m)	Small	2.9 (74)
8' (2.4 m)	Large	3.8 (96)

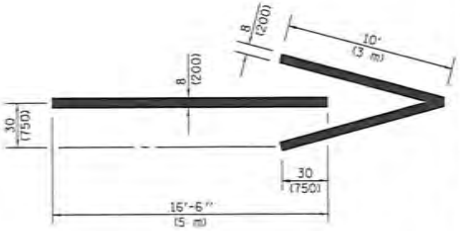
The space between adjacent letters or numerals should be approximately 3 (75) for 6' (1.8 m) legend and 4 (100) for 8' (2.4 m) legend.

LETTER AND ARROW GRID SCALE



LANE DROP ARROW

Right lane drop arrow shown.
Use mirror image for left lane.



WRONG WAY ARROW

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF OPERATIONS

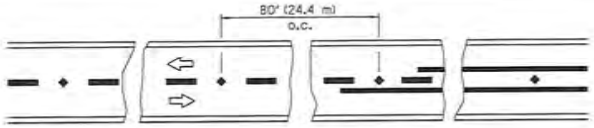
APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

TYPICAL PAVEMENT MARKINGS

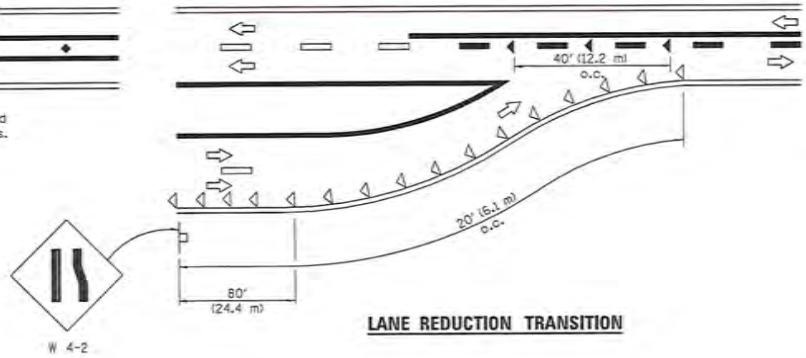
(Sheet 2 of 2)

STANDARD 780001-03

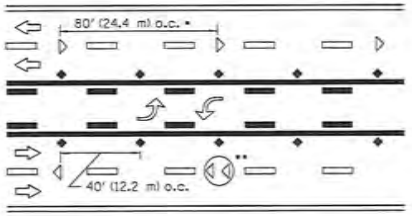


Reduce to 40' (12.2 m) o.c. on curves with posted or advisory speeds of 45 mph (70 km/h) or less.

TWO-LANE /TWO-WAY

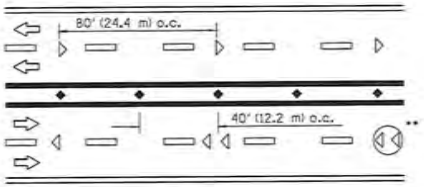


LANE REDUCTION TRANSITION



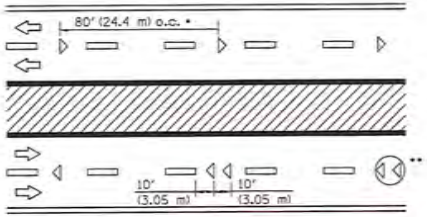
*,** See MULTI LANE DIVIDED detail for lane marker notes.

TWO-WAY LEFT TURN



*,** See MULTI LANE DIVIDED detail for lane marker notes.

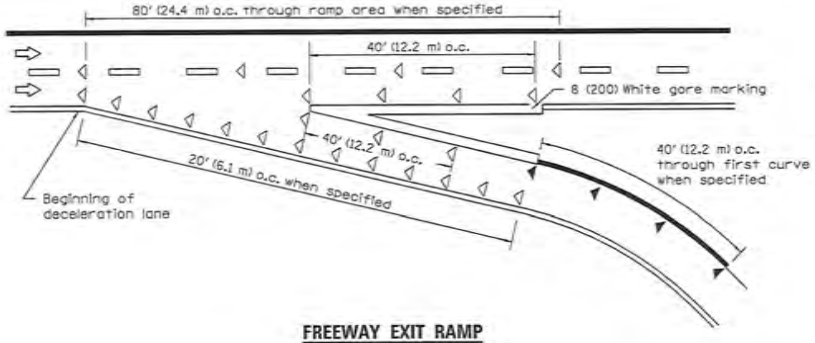
MULTI-LANE UNDIVIDED



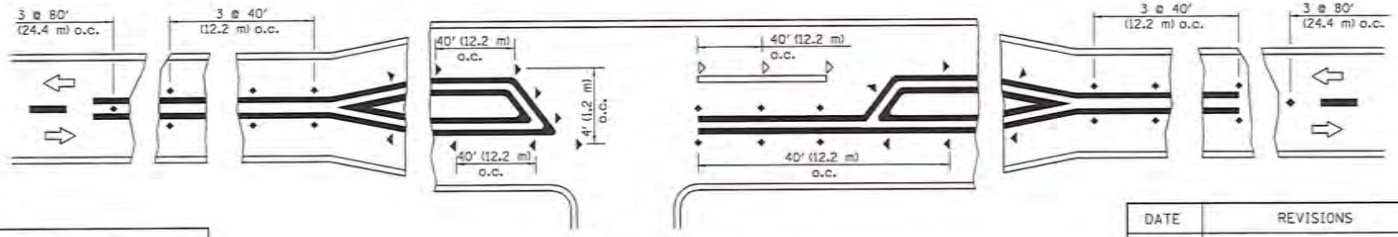
* Reduce to 40' (12.2 m) o.c. on curves where advisory speeds are 10 mph (15 km/h) lower than posted speeds.

** Where double lane line markers are specified, they shall be spaced as shown.

MULTI-LANE DIVIDED



FREEWAY EXIT RAMP



RURAL LEFT TURN

SYMBOLS

- Yellow stripe
- White stripe
- One-way amber marker
- One-way crystal marker
- Two-way amber marker

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

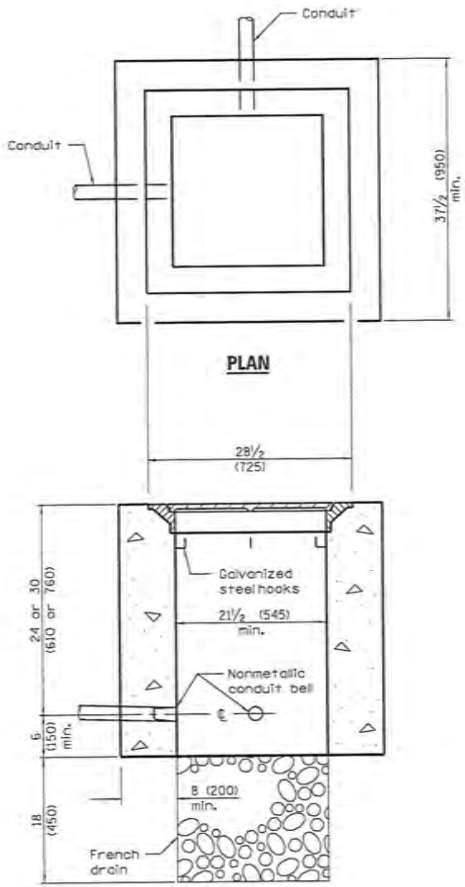
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-99	Extended double line to show different scenario in RURAL LEFT TURN.

TYPICAL APPLICATIONS RAISED REFLECTIVE PAVEMENT MARKERS

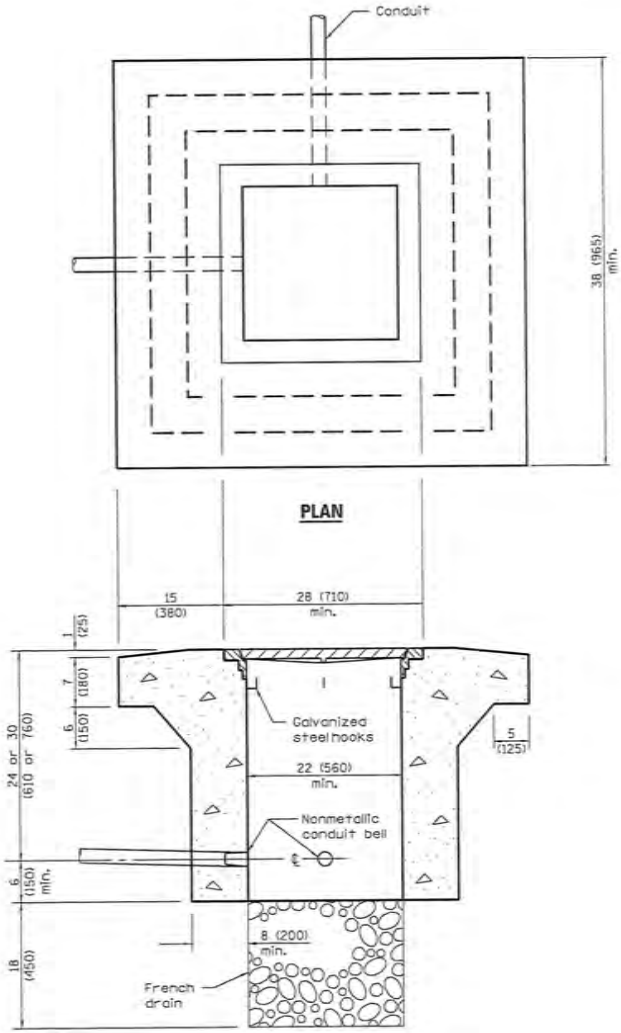
STANDARD 781001-03



PLAN

ELEVATION

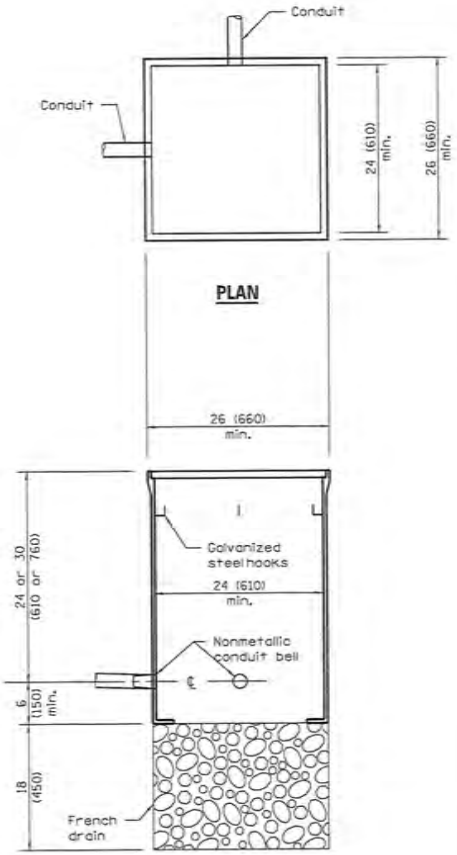
PORTLAND CEMENT CONCRETE



PLAN

ELEVATION

PORTLAND CEMENT CONCRETE
HEAVY DUTY



PLAN

ELEVATION

COMPOSITE CONCRETE

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

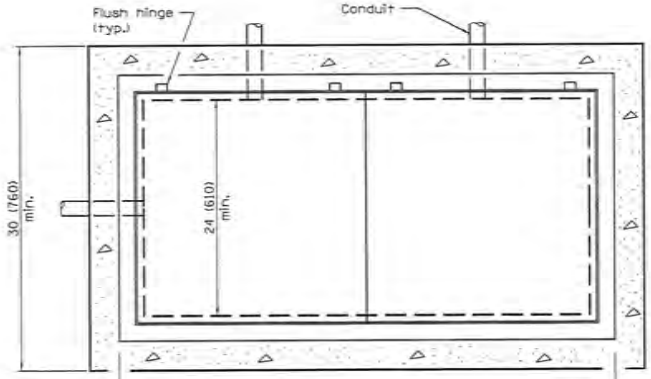
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

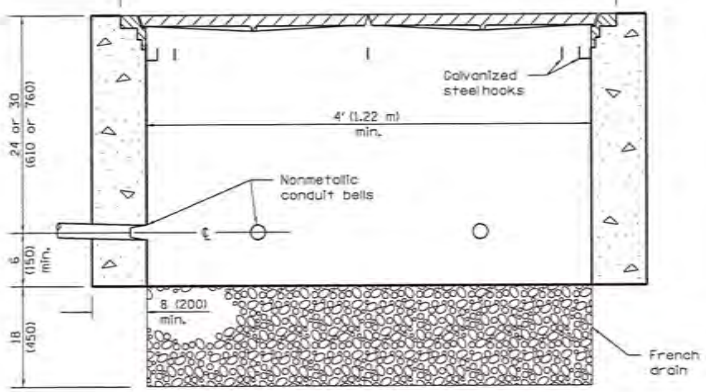
DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
1-1-07	Revised composite conc.
	handhole. Rem. weights
	of frames and covers.

HANDHOLES

STANDARD 814001-02

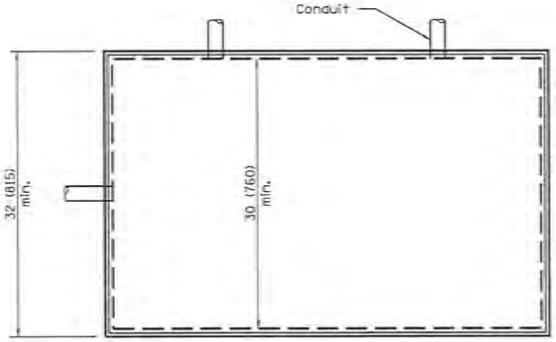


PLAN

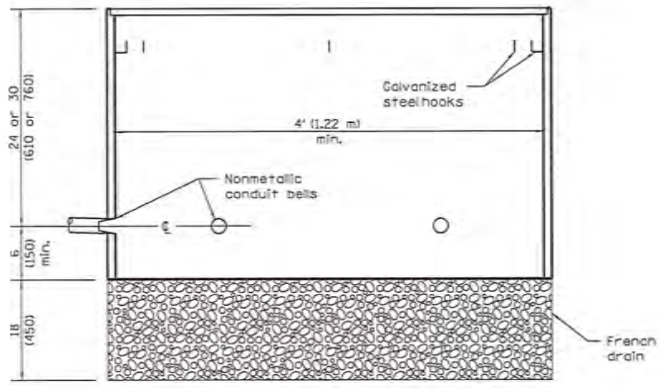


ELEVATION

PORTLAND CEMENT CONCRETE



PLAN



ELEVATION

COMPOSITE CONCRETE

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

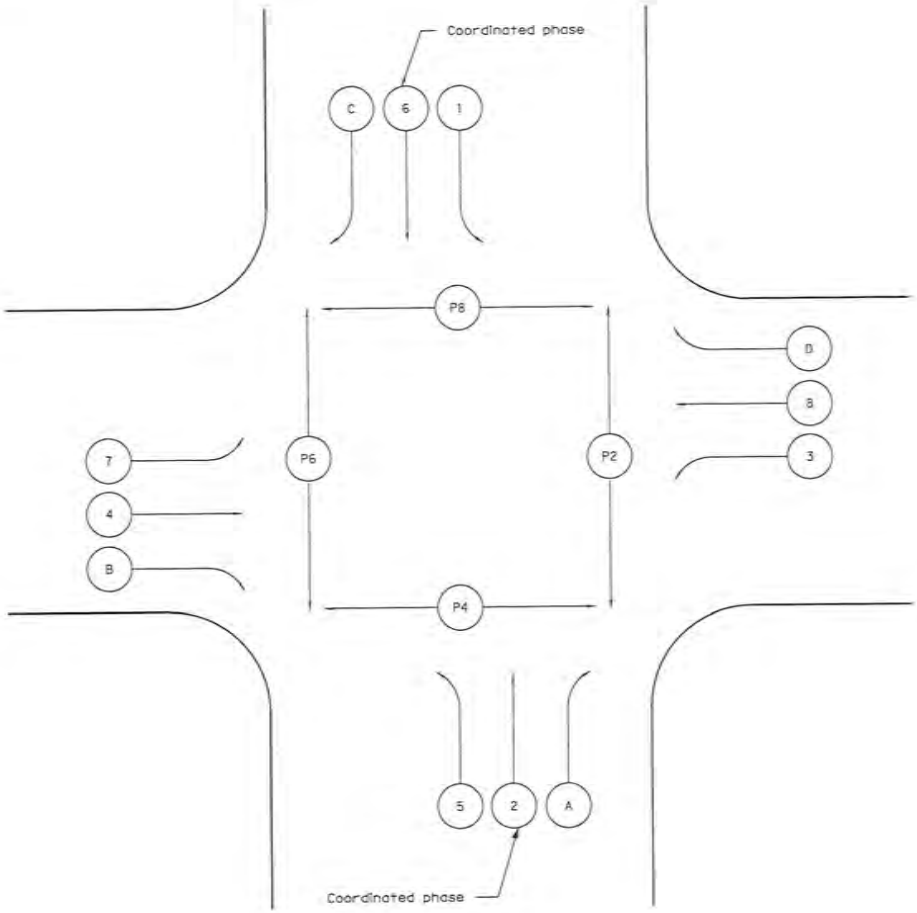
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

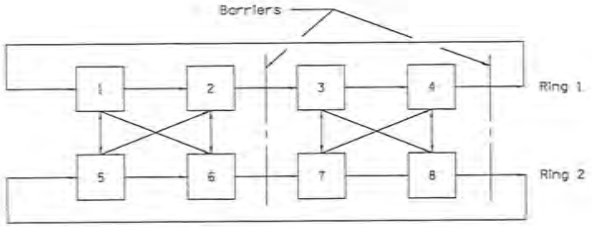
DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
1-1-07	Revised composite conc.
	handhole. Rem. weights
	of frames and covers.

DOUBLE HANDHOLES

STANDARD 814006-02



STANDARD PHASE DESIGNATION DIAGRAM (NEMA)



NEMA EIGHT PHASE DUAL RING ACTUATED CONFIGURATION

LEGEND

(X), [X]	Vehicular phase no. x
(PX)	Pedestrian phase no. x
(A), (B), (C), (D)	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 January 1, 2009
ENGINEER OF OPERATIONS

APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

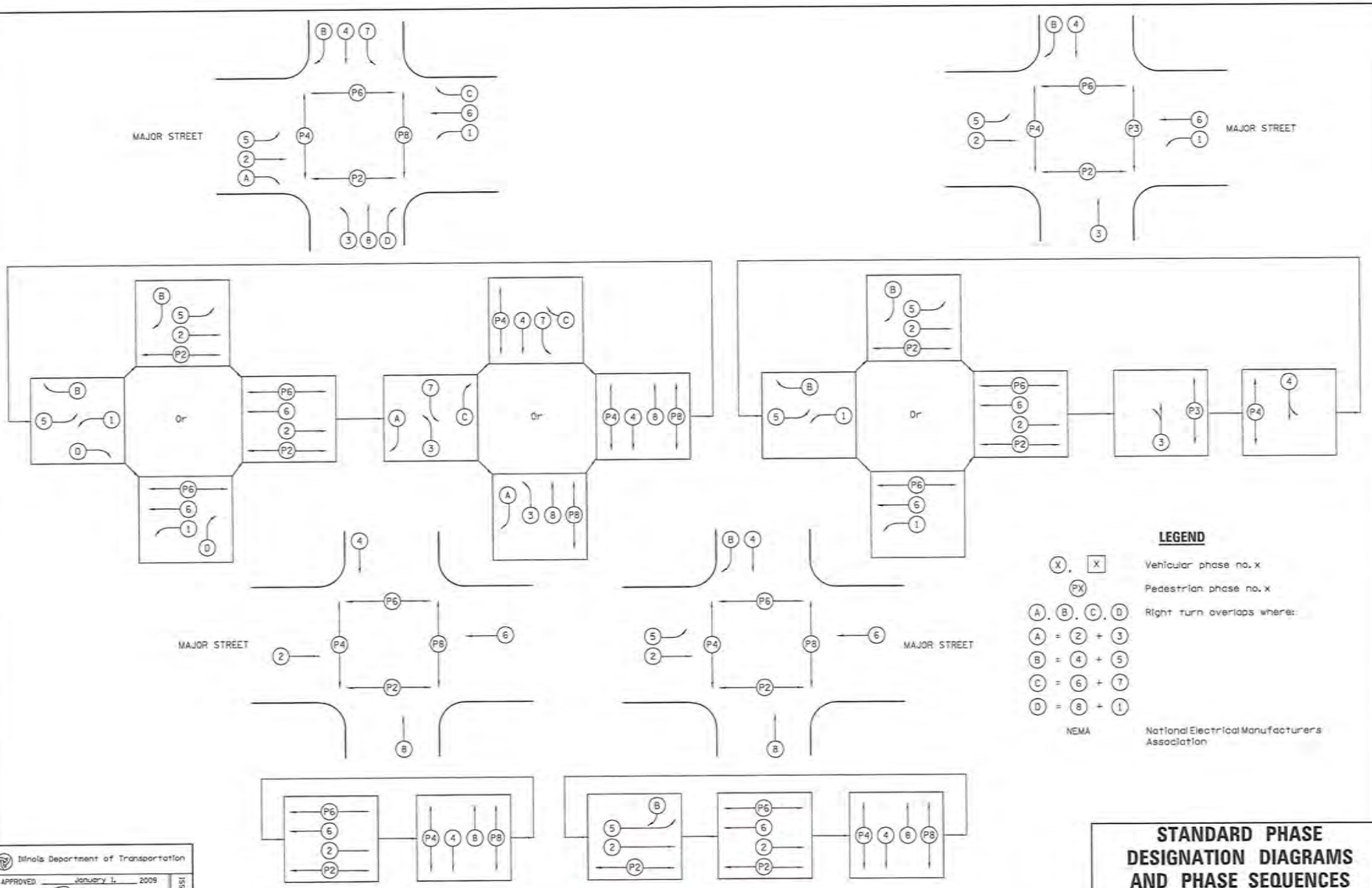
ISSUED 1-1-97

DATE	REVISIONS
1-1-09	Omitted note regarding units of length.
1-1-97	Renum. Standard 2393-2.

STANDARD PHASE DESIGNATION DIAGRAMS AND PHASE SEQUENCES

(Sheet 1 of 2)

STANDARD 857001-01



LEGEND

(X), [X]	Vehicular phase no. x
(PX)	Pedestrian phase no. x
(A), (B), (C), (D)	Right turn overlaps where:
(A) = (2) + (3)	
(B) = (4) + (5)	
(C) = (6) + (7)	
(D) = (8) + (1)	
NEMA	National Electrical Manufacturers Association

PHASE DESIGNATION DIAGRAMS AND CORRESPONDING PHASE SEQUENCES

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

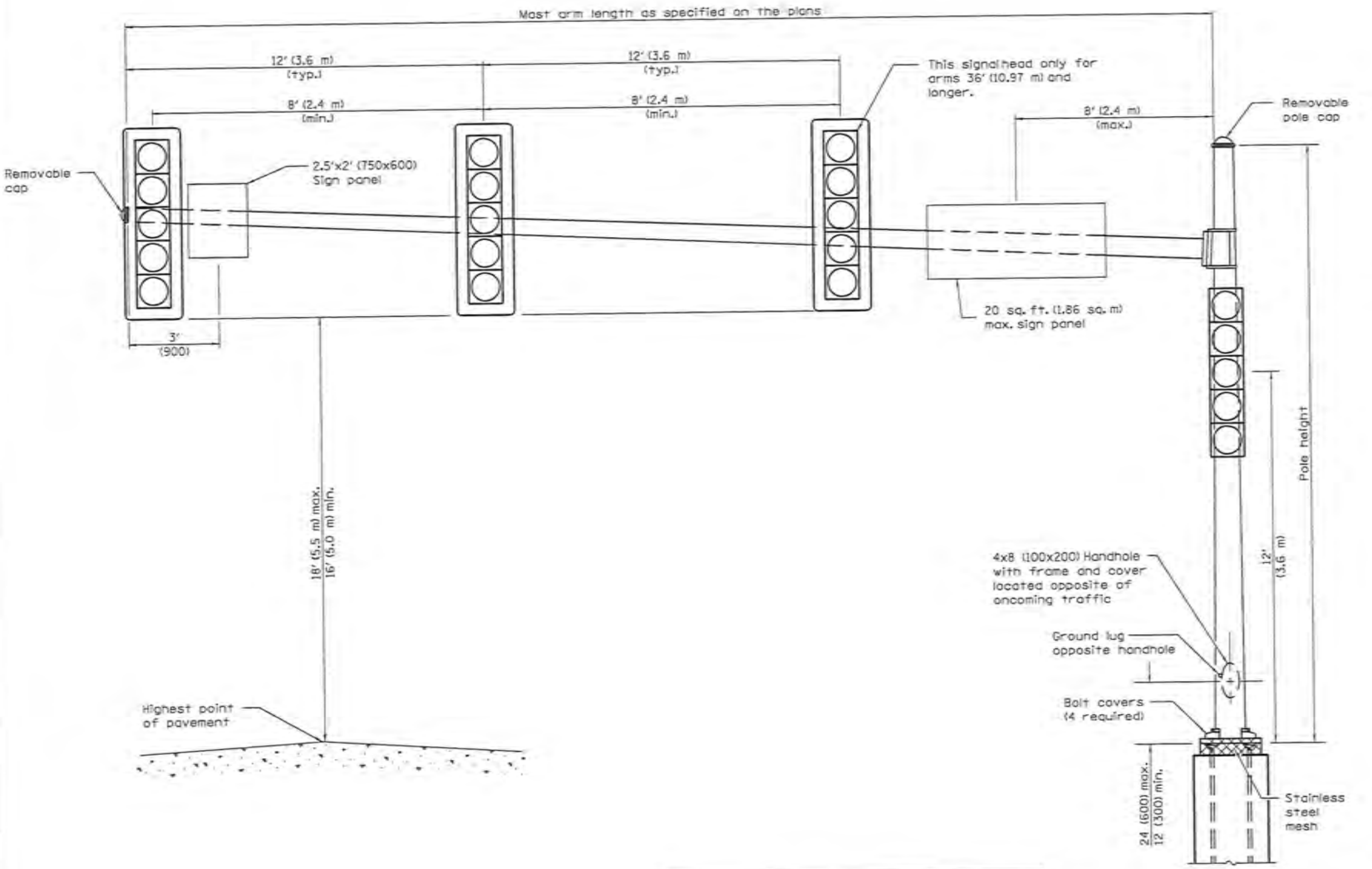
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

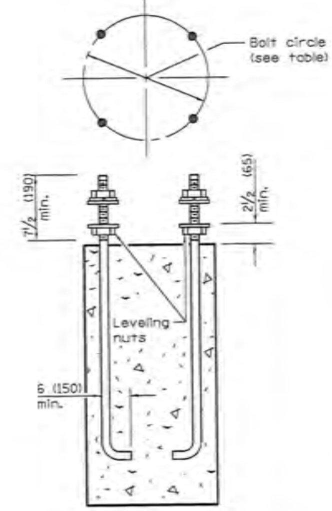
ISSUED 1-1-97

STANDARD PHASE DESIGNATION DIAGRAMS AND PHASE SEQUENCES

(Sheet 2 of 2)

STANDARD 857001-01





ANCHOR ROD DETAIL

MAST ARM LENGTH	BOLT CIRCLE	ANCHOR ROD SIZE
16' thru 20' (4.87 m thru 6.10 m)	15 (380)	1½ x 5' (38 x 1.5 m)
22' thru 30' (6.71 m thru 9.14 m)	18 (450)	1½ x 5' (38 x 1.5 m)
32' thru 40' (9.75 m thru 12.20 m)	18 (450)	1¾ x 7' (44 x 2.10 m)
42' thru 55' (12.80 m thru 16.80 m)	21 (535)	1¾ x 7' (44 x 2.10 m)

GENERAL NOTES

Signal heads, sign panels, and other attachments are shown for minimum design loading purposes only. Each signal head shall weigh 80 lb (36 kg) and have a projected area of 14.7 sq. ft. (1.37 sq. m).

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

DATE	REVISIONS
1-1-12	Changed 2.5'x8' sign panel to 20 sq. ft. (1.86 sq. m) max.
1-1-09	Switched units to English (metric).

STEEL MAST ARM ASSEMBLY AND POLE 16' THROUGH 55'

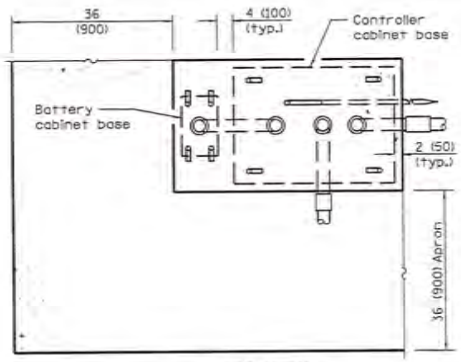
STANDARD 877001-05

Illinois Department of Transportation

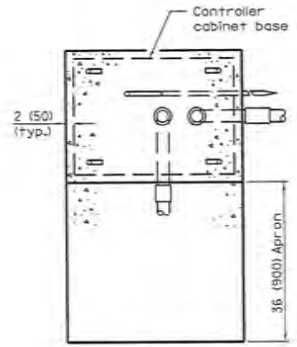
APPROVED January 1, 2012
ENGINEER OF OPERATIONS

APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02



TOP VIEW



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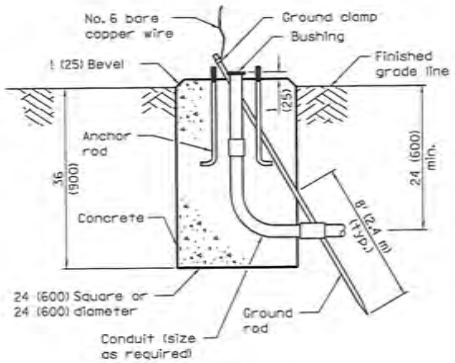
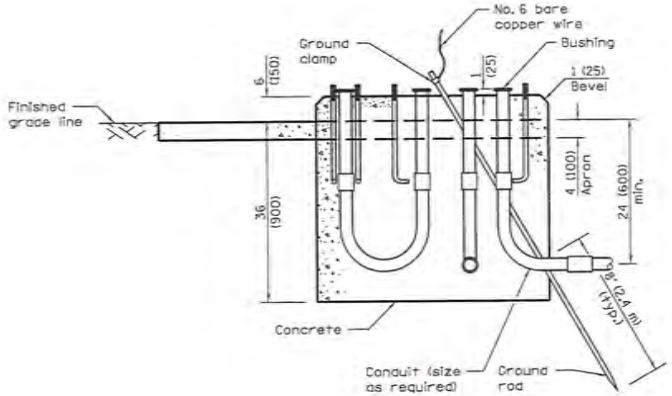
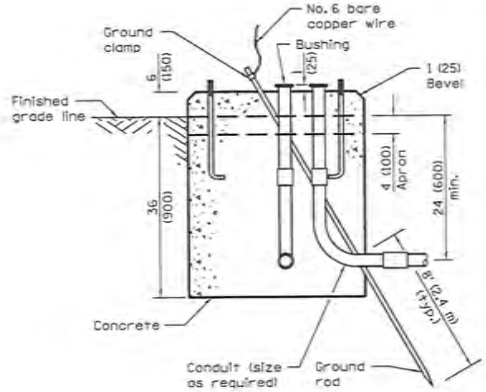


TYPE A



TYPE C
FOR GROUND MOUNTED
CONTROLLER CABINET
AND UPS BATTERY CABINET



TYPE D
FOR GROUND MOUNTED
CONTROLLER CABINET

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

DATE	REVISIONS
1-1-12	Replaced rebar No.'s
	with 'Vertical' for TYPE E
	foundation detail.
1-1-10	Revised note for
	foundation depth in tbl.
	Revised sizes of rebars.

CONCRETE FOUNDATION DETAILS

(Sheet 1 of 2)

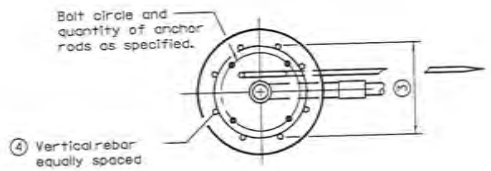
STANDARD 878001-09

Illinois Department of Transportation

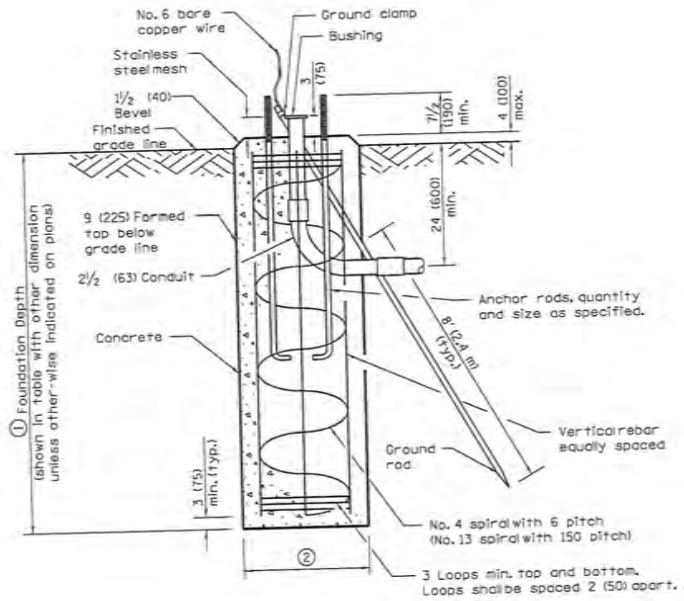
APPROVED January 1, 2012
ENGINEER OF OPERATIONS

APPROVED January 1, 2012
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02



TOP VIEW



TYPE E

Mast Arm Length	① Foundation Depth *	② Foundation Diameter	③ Spiral Diameter	④ Quantity of Rebars	Size of Rebars
Less than 30' (9.1 m)	10'-0" (3.0 m)	30 (750)	24 (600)	8	6 (19)
Greater than or equal to 30' (9.1 m) and less than 40' (12.2 m)	13'-6" (4.1 m)	30 (750)	24 (600)	8	6 (19)
	11'-0" (3.4 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 40' (12.2 m) and less than 50' (15.2 m)	13'-0" (4.0 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 50' (15.2 m) and up to 55' (16.8 m)	15'-0" (4.6 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 56' (16.8 m) and less than 65' (19.8 m)	21'-0" (6.4 m)	42 (1060)	36 (900)	16	8 (25)
Greater than or equal to 65' (19.8 m) and up to 75' (22.9 m)	25'-0" (7.6 m)	42 (1060)	36 (900)	16	8 (25)

* For standard and combination mast arm assemblies. Foundation depths for standard dual mast arms with the longest arm length upto and including 55' (16.8 m) shall be increased by 1' (0.3 m) of that shown in the table, based on the longer of the two arms.

These foundation depths are for sites which have cohesive soils (clayey silt, sandy clay, etc.) along the length of the shaft, with an average Unconfined Compressive Strength (Qu) > 1.0 tsf (100 kpa). This strength shall be verified by boring data prior to construction or with testing by the Engineer during foundation drilling. The Bureau of Bridges & Structures should be contacted for a revised design if other conditions are encountered.

Illinois Department of Transportation

APPROVED January 1, 2012
ENGINEER OF OPERATIONS

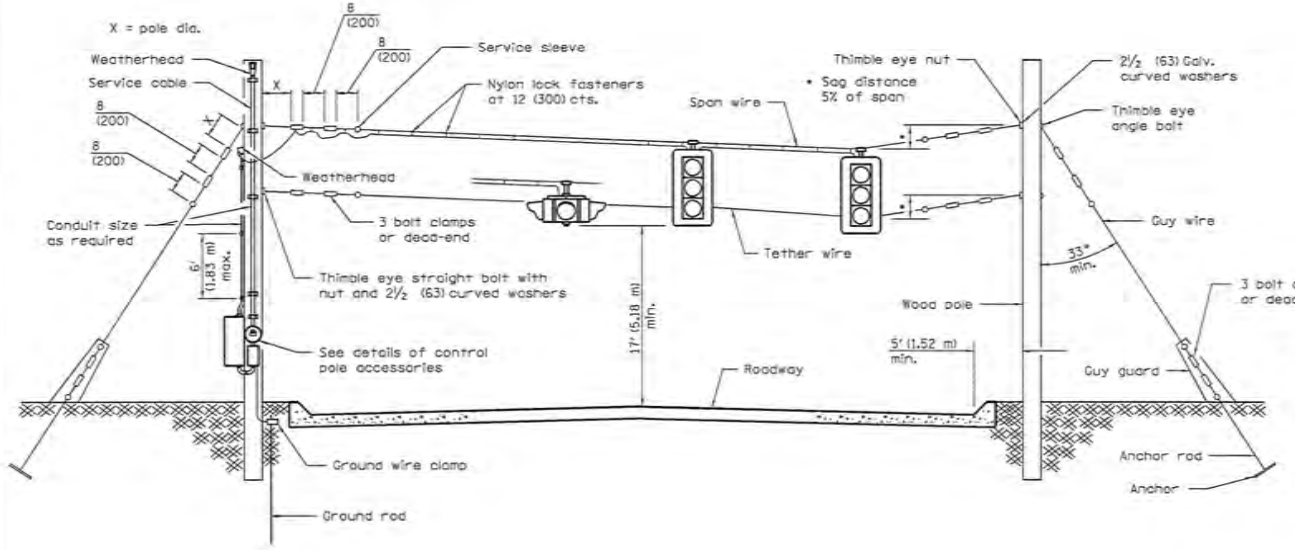
APPROVED January 1, 2012
ENGINEER OF GEOTECH AND ENVIRONMENT

ISSUED 1-1-02

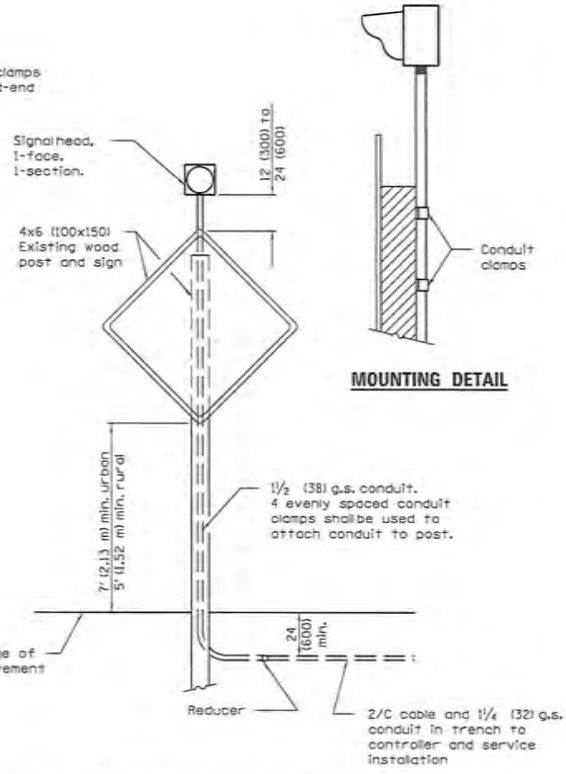
CONCRETE FOUNDATION DETAILS

(Sheet 2 of 2)

STANDARD 878001-09

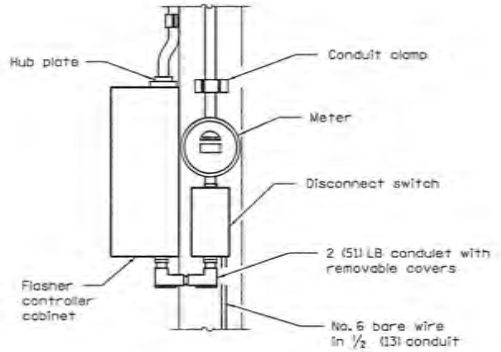


SPAN WIRE MOUNTED SIGNALS AND FLASHING BEACON

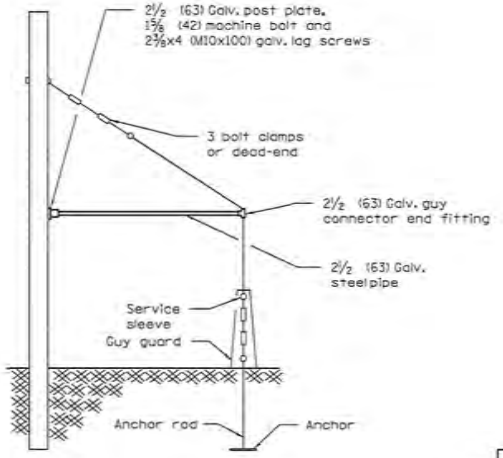


POST MOUNTED FLASHING BEACON

MOUNTING DETAIL



CONTROL POLE DETAIL



SIDEWALK GUY DETAIL

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

DATE	REVISIONS
1-1-09	Switched units to
	English (metric).
1-1-02	Renum. Standard 840001.

SPAN WIRE MOUNTED SIGNALS AND FLASHING BEACON INSTALLATION

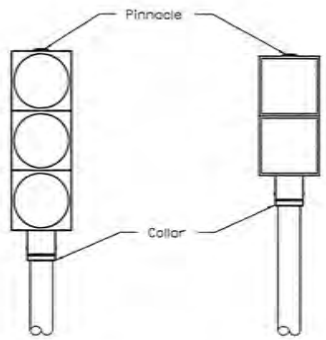
STANDARD 880001-01

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

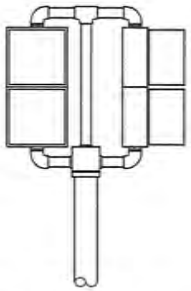
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02



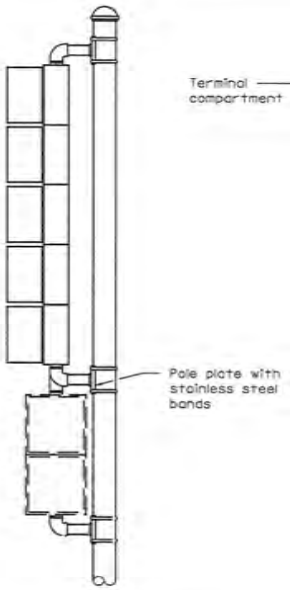
POST MOUNTED TRAFFIC SIGNAL HEAD

ONE WAY



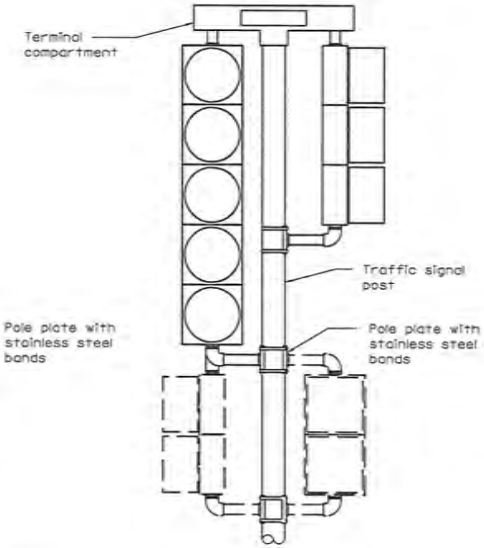
POST MOUNTED PEDESTRIAN SIGNAL HEAD

TWO WAY



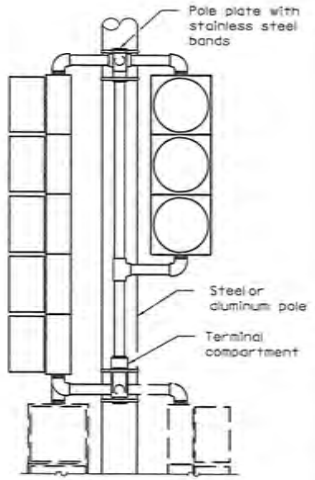
BRACKET MOUNTED TRAFFIC SIGNAL HEAD

ONE WAY

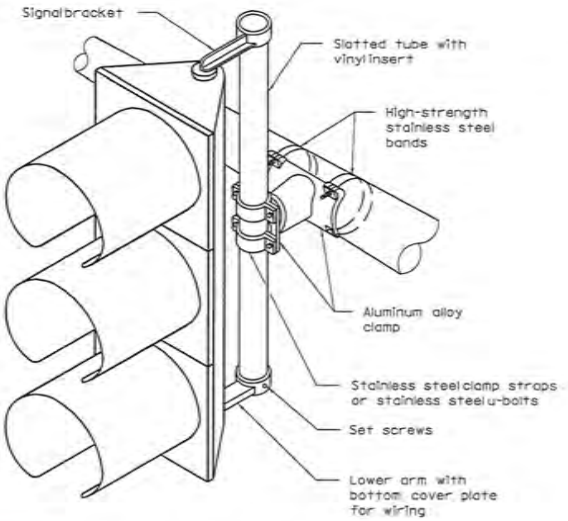


BRACKET MOUNTED TRAFFIC SIGNAL HEAD

TWO WAY



BRACKET MOUNTED TRAFFIC SIGNAL HEAD



STEEL MAST ARM MOUNTING

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

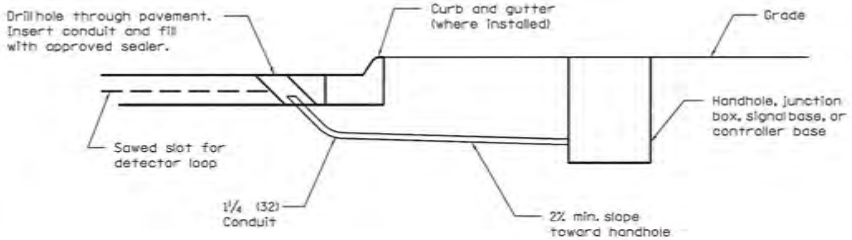
APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02

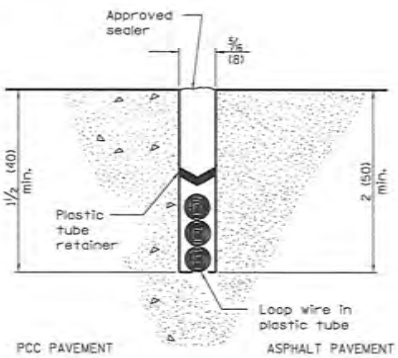
DATE	REVISIONS
1-1-09	Omitted note regarding units of length.
1-1-02	Renum. Standard 840006.

TRAFFIC SIGNAL MOUNTING DETAILS

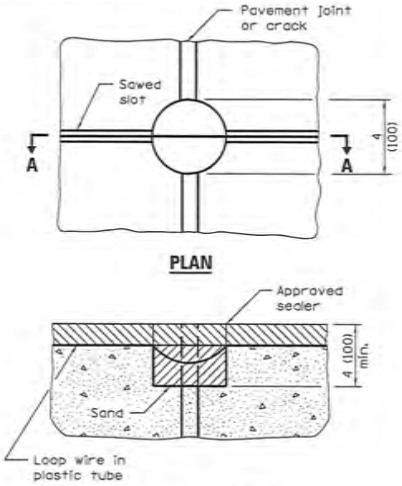
STANDARD 880006-01



DETECTOR LOOP LEAD–IN



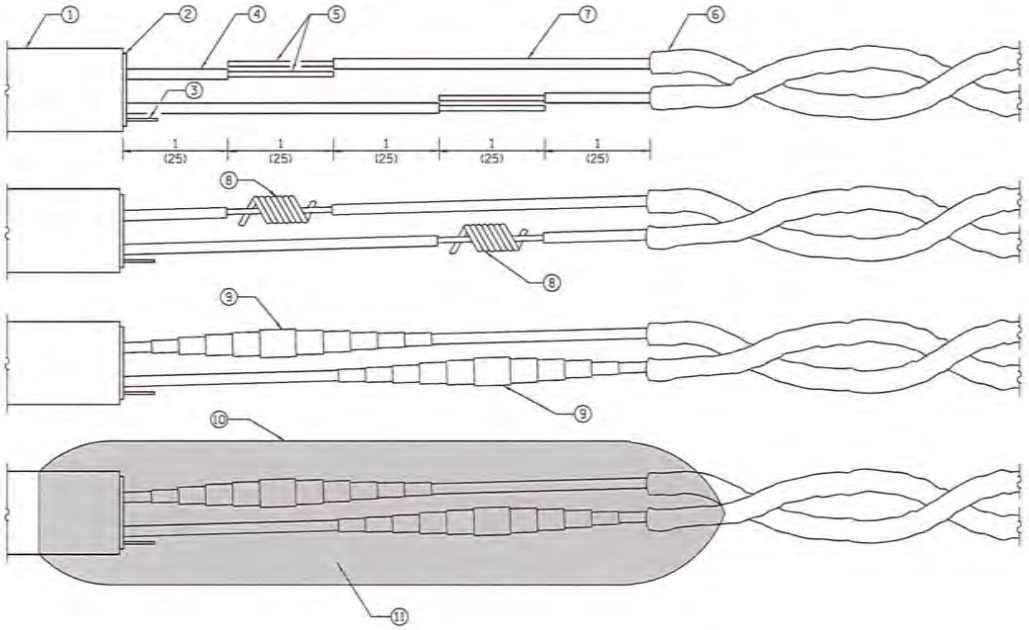
DETECTOR LOOP INSTALLATION



SECTION A–A

NOTE
Loop wire shall follow saw cut to bottom, forming slack section at joint.

DETECTOR LOOP AT PAVEMENT JOINT OR PAVEMENT CRACK



LOOP WIRE AND LEAD–IN CABLE SPLICE

① = Lead-in cable (single pair or multipair)
② = Lead-in cable shield
③ = Lead-in cable shield drain-wire
④ = Lead-in cable insulated conductor
⑤ = Bare conductor
⑥ = Loop wire in tube
⑦ = Loop wire insulated conductor
⑧ = Twisted and resin soldered conductor
⑨ = Electrical tape insulated spice
⑩ = Rigid mold
⑪ = Waterproof and dielectric resin

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

Illinois Department of Transportation

APPROVED January 1, 2009
ENGINEER OF OPERATIONS

APPROVED January 1, 2009
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02

DATE	REVISIONS
1-1-09	Switched units to
	English (metric)
1-1-02	Renum. Standard 846001.

DETECTOR LOOP INSTALLATIONS

STANDARD 886001–01