HURST-ROSCHE, INC.

TECHNICAL SPECIFICATIONS

CIPP SEWER LINING
MAIN TRUNKLINE
LEVIN DRIVE TO JEROME LANE

CITY OF CAHOKIA HEIGHTS

Project funded by

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY GRANT

Prepared by

Hurst-Rosche, Inc.
5 Bank Square
East St. Louis, Illinois
H-R 860-0683

August 2023

TABLE OF CONTENTS

Technical Specifications

End TOC

1. GENERAL

1.1 SUMMARY

A. Piezometers have been installed at the following locations to provide ground water information in the vicinity of the sanitary sewer trunkline rehabilitation locations:

1. Piezometer PZ 7 - 2102 Florence Place (East End of Florence Place)
2. Piezometer PZ 10 - 4222 Andrews Drive (at St. Christopher Lane)
3. Piezometer MW-1285M - Levee Road (North of Levin Drive)

B. Copies of the following additional project information is included in this section:

1. Piezometer Readings

C. The piezometer readings contained herein are presented for general information. The groundwater monitoring information has been conducted in accordance with standard practices and procedures. The results of these monitoring activities represent the subsurface conditions at the specific locations and dates indicated. Subsurface conditions between these locations and on differing dates may vary. The information provided herein is not intended as a substitute for the personal investigation, independent interpretation, and judgment of the contractor.

END 01031

PIEZOMETER READINGS
CITY OF CAHOKIA HEIGHTS

Piezometer PZ 7
2102 Florence Place
(East End of Florence Place)

PIEZOMETER READINGS (GROUND ELEVATION 418)		
DATE	DEPTH	ELEVATION
08/01/22	15	403
08/15/22	15	403
09/01/22	15	403
09/15/22	15	403
10/01/22	16	402
10/15/22	16	402
11/01/22	16	402
11/15/22	15	403
12/01/22	16	402
12/15/22	16	402
01/01/23	15	403
01/15/23	15	403
02/01/23	15	403
02/15/23	15	403
03/01/23	15	403
03/15/23	15	403
04/01/23	14	404
04/15/23	14	404
05/01/23	15	403
AVERAGE	15	403

PIEZOMETER READINGS
CITY OF CAHOKIA HEIGHTS

Piezometer PZ 10
4222 Andrews Drive
(at St. Christopher Lane)

PIEZOMETER READINGS (GROUND ELEVATION 410)		
DATE	DEPTH	ELEVATION
08/01/22	8	402
08/15/22	8	402
09/01/22	9	401
09/15/22	9	401
10/01/22	9	401
10/15/22	10	400
11/01/22	9	401
11/15/22	10	400
12/01/22	10	400
12/15/22	10	400
01/01/23	10	400
01/15/23	9	401
02/01/23	9	401
02/15/23	9	401
03/01/23	10	400
03/15/23	9	401
04/01/23	8	402
04/15/23	8	402
05/01/23	9	401
AVERAGE	9	401

PIEZOMETER READINGS
CITY OF CAHOKIA HEIGHTS

Piezometer MW-1285M
Levee Road
(North of Levin Drive)

PIEZOMETER READINGS (GROUND ELEVATION 402)		
DATE	DEPTH	ELEVATION
08/01/22	11	391
08/15/22	13	389
09/01/22	14	388
09/15/22	15	387
10/01/22	16	386
10/15/22	16	386
11/01/22	17	385
11/15/22	17	385
12/01/22	17	385
12/15/22	17	385
01/01/23	17	385
01/15/23	17	385
02/01/23	17	385
02/15/23	17	385
03/01/23	17	385
03/15/23	15	387
04/01/23	12	390
04/15/23	12	390
05/01/23	11	391
AVERAGE	15	387

1. GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor provide:

1. Dewatering of excavation to allow construction of sewers, manholes, and appurtenances in the dry and with firm excavation walls and foundation.
2. Bypass of flowing sewer mains around the excavation site to downstream manholes.

2. EXECUTION

2.1 DEWATERING:

A. The Contractor shall install and operate a suitable dewatering system to allow all work related to the construction of the sewer mains to be accomplished in the dry and with firm excavation walls and foundation. Water which has accumulated in excavated areas shall be removed by the Contractor. The dewatering system shall be installed prior to beginning excavation activities and shall be of such type and operated in such a manner so as not to remove material from the foundation or wall area of the excavation. All dewatering and related equipment and materials shall be and remain the Contractor's property and, when no longer required, shall be removed in their entirety from the site. Any holes shall be backfilled with material similar to that of the adjacent area and compacted to the density of the material surrounding the hole. Dewatering facilities to be constructed under this Contract shall be included in the base bid.

2.2 SEWER BYPASS:

A. Sewer flows shall be maintained at all times and shall be in accordance with local health and sanitary requirements. Bypass pumping shall be coordinated 48 hours in advance with the Owner’s Representative. Pumping, temporary connections or other suitable methods of diversion shall be employed so that the flow of sewage shall not be interrupted.

B. Sewage flows will be intercepted at existing manholes and bypass pumped. The Contractor will be required to furnish pumping equipment, conduits, and other equipment required to maintain flow without causing overflows backups, surges or any other abnormal flow conditions.

C. When bypass pumps are in use, they shall be monitored by the Contractor at all times.

D. Bypass pumping will be performed such that existing sewer lines are never placed under more than 3 feet of hydraulic head as measured from the sewer invert at the pump location.

E. Individual service laterals encountered during construction shall be diverted to the nearest downstream manhole. The cost of such diversion will be considered incidental to the construction of the sewer and shall be included in the base bid.

END 02400.

1. GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor:

1. Provide all materials, labor and equipment for seeding and mulching all disturbed areas of excavation and all other disturbed areas within the construction limits that will not be resurfaced.

1.2 REFERENCES. Specified references or cited portions thereof, current at date of bidding documents unless otherwise specified, govern the work. References to measurement and basis of payment made in any cited reference do not apply.

A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all addenda.

2. PRODUCTS

2.1 MATERIALS

A. All seeding materials shall be in accordance with Sections 250, 251 and 1081 of the IDOT Standard Specifications.

B. The seed mixture shall be Class 1 - Lawn Mixture in accordance with Article 250.07 of the IDOT Standard Specifications.

3. EXECUTION

3.1 SOIL PREPARATION

A. After all trenches have been backfilled; the areas to be seeded shall be prepared in accordance with Article 250.05 of the IDOT Standard Specifications.

3.2 FERTILIZER

A. Fertilizer nutrient shall be a 10-10-10 proportion applied at the rate of 270 pounds per acre. This is the weight of the nutrient only and does not include the weight of the filler material. The fertilizer shall conform to Article 1081.08 of the IDOT Standard Specifications.

3.3 SEEDING

A. The rate of application shall be 100 pounds/acre in accordance with Article 250.07 IDOT Standard Specifications. The area shall be continuously reseeded until a sound turf is established.

B. Seeding equipment and construction operations shall be in accordance with Section 250.03 of the IDOT Standard Specifications.

3.4 MULCHING

A. All seeded areas shall be mulched. Mulching materials, equipment and construction operations shall be in accordance with Section 251 of the IDOT Standard Specifications. Mulch shall be applied uniformly to all seeded areas at the rate of two tons per acre by Method 1 as described in Article 251.03 of the IDOT Standard Specifications.

END 02480

1. GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor provide:

1. All labor, equipment, materials, plant and supervision to perform all work necessary to clean existing sewers in accordance with these specifications and as shown on the plans.

1.2 DEFINITIONS

A. The term "Clean" as used in these specifications, shall be defined as removing sufficient material to render the sewer line 99% of its original capacity.

B. The term "Reach" as used in the specifications, shall mean the length of pipe connecting two manholes.

2. EXECUTION

2.1 GENERAL

A. Hydraulic Cleaning Equipment:

1. The equipment used shall be of a movable dam type and shall be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. Sewer cleaning balls or other such equipment which cannot be collapsed instantly will not be considered as acceptable cleaning equipment. The movable dam shall be of equal diameter as the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure total removal of grease. Other equipment which produces the desired end results will be approved by the Owner’s Representative.

B. High Velocity Hydro-Cleaning Equipment

1. All high-velocity sewer cleaning equipment shall be truck-mounted for ease of operation. The equipment shall have a minimum of 500 feet of 3/4" I.D. high-pressure hose with a selection of two or more high-velocity nozzles. The nozzles shall have a capacity of 30 GPM at a working pressure of 500 to 1,500 psi. The nozzle shall be capable of producing a scouring action from 15 degrees to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high velocity gun for washing and scouring manhole walls and floors. The gun capacity shall equal 3 1/2 to 27 GPM at between 800 and 2090 psi. The gun shall be capable of producing flows from a fine spray to a long distance solid stream. The equipment shall carry its own 1,200-gallon water tank capable of holding corrosive or caustic cleaning or sanitizing chemicals, auxiliary engines and pumps, and hydraulically driven hose

reel. All controls shall be located so that the equipment can be operated above ground. Other equipment which produces the desired end result will be approved by the Owner's Representative.

C. Water for Cleaning

1. Water will be available only at those locations designated by the City of Cahokia Heights. Water shall be conserved and not wasted. The Contractor will be responsible for acquiring water from the City of Cahokia Heights. The Contractor will not be charged for the use of said water.

D. Disposal of Material

1. All sludge, dirt, sand, rocks, grease and other solid or semi-solid material removed during the cleaning operation shall be removed at the downstream manhole of the reach being cleaned. Passing material from reach to reach, which could cause line stoppages, accumulations of sand in wetwells or damage to pumping equipment will not be permitted.
2. When hydraulic cleaning equipment is used, a suitable weir or dam shall be constructed in the downstream manhole in such a manner that both the solids and water shall be trapped. This trapped solution shall then be pumped, using a four-inch double diaphragm trash pump, from the manhole into a retention chamber above ground. The retention chamber shall be of a size of not less than 10 feet by 6 feet by 1 foot high and shall be mounted for complete mobility. The chamber shall contain not less than two baffles to ensure complete settlement of the solids before returning the liquid to the sewer line.
3. All solids or semi-solids resulting from the cleaning operations shall be removed from the site and disposed of by the Contractor, as approved by the Owner's Representative. Removal and disposal in compliance with all local health and sanitary requirements and to the approval of the Owner's Representative will be incidental to the cleaning of the sewer lines.

E. Final Acceptance of Cleaning

1. Any damage to sanitary sewers resulting from the cleaning operations shall be the responsibility of the Contractor, and necessary repairs shall be made by the Contractor at no additional expense to the Owner. Final acceptance of this portion of the work shall be made upon completion of the television inspection and shall be to the entire satisfaction of the Owner's Representative.

END 02731.

1. GENERAL

1.1 REQUIREMENTS INCLUDE:

A. Contractor provide:

1. Television inspection of sewers is to be conducted only after cleaning and sewer replacement have been accomplished.

2. EXECUTION

2.1 GENERAL

A. Television Inspection, Main Sewers:

1. The sewer sections shall be visually inspected by means of closed-circuit television. The inspection will be done one manhole section at a time and the flow in the section being inspected will be suitably controlled as specified.
2. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, videotape recorder, and other components of the video system shall be capable of producing picture quality to the satisfaction of the Owner's Representative; and if unsatisfactory, the equipment shall be removed, and no payment will be made for an unsatisfactory inspection.
3. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his own equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete and no additional inspection will be required.
4. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the section being inspected to insure good communications between members of the crew.
5. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the

distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Owner's Representative.

B. Documentation of the television results shall be as follows:

1. Television Inspection Logs: Printed location records shall be kept by the Contractor and will clearly show the location in relation to an adjacent manhole. In addition, other points of significance such as locations of building sewers and other discernible features will be recorded, and a copy of such records will be supplied to the Owner.
2. Digital Format Video Recordings: The purpose of the video recordings shall be to supply a visual and audio record of problem areas of the lines that may be replayed. The video shall be a CD or DVD with a high quality picture and sound and shall be recorded in color. The video shall have an on-screen display showing the following:

    a. Upstream and downstream manhole numbers.
    b. Footage from the upstream manhole.
    c. Date of inspection.

3. Two copies of the inspection logs and video recordings of all inspections shall be furnished to the Owner.

END 02732.

1. GENERAL

1.1 REQUIREMENTS INCLUDE:

A. Contractor provide:

1. Sewer flows through the reaches to be televised, as well as through all tributary sewers, shall be maintained at all times throughout the entire project.
2. A fully operational back-up pump shall be maintained on site at all times for emergencies during care of flow/by-passing operations. The capacity of the back-up pump shall be sufficient to maintain sewer flows.

2. EXECUTION

2.1 CARE OF FLOW

A. General:

1. Sewer flows shall be maintained at all times and shall be in accordance with local health and sanitary requirements by pumping, fluming, temporary connections or by other suitable methods of diversion so that the project will not be delayed nor the flow of sewage interrupted.
2. When sewer line flows are above minimum requirements (generally not more than 1/4 of the pipe diameter) or inspection of the complete periphery of the pipe is necessary to effectively conduct the inspection and sealing operations, one or more of the following methods of flow control shall be used.
3. In order to accomplish the cleaning and television inspection in this contract, normal sewage flows must be maintained. Sewage flows shall be intercepted at existing manholes and restricted or bypass pumped as directed by the Owner's Representative. Where pumping is required, in the opinion of the Owner's Representative, to assure completion of the inspection and lining work, the Contractor will be required to furnish pumping equipment, conduits and other equipment necessary to bypass the sewage flows.
4. The bypass system shall be such that the maximum hydraulic head on the existing sewer line, when measured by the location of the pump, is less than 3.0 feet at all times. The hydraulic head shall be measured from the invert of the sewer.
5. Pumping will not be permitted unless other methods of sewer flow controls prove unsatisfactory for television observation. Bypass pumping for television inspection shall be included in the contract price for the work. Methods of controlling flow other than pumping shall be incidental to the cleaning and televising.

END 02734

1. GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor provide:

1. Intent: It is the intent of this specification to provide for the rehabilitation of sanitary sewers by the installation of a resin-impregnated flexible felt tube inserted into the existing pipe using hydrostatic pressure or other means. Curing shall be accomplished by circulating hot water, or other approved method, to cure the resin to a hard, impermeable, corrosion resistant pipe within a pipe.
2. This specification references ASTM standards, which are made a part hereof by reference and shall be the latest edition thereof.
3. Chemical Resistance Requirements: The finished pipe in place shall be fabricated from materials which when cured will meet the chemical resistance guidelines of ASTM F-1216.

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Transport, deliver, unload, store, and handle all felt tube and fittings in a manner to prevent damage to the materials or the work.

B. All damaged, broken or otherwise defective materials will be rejected.

1.3 MEASUREMENT AND PAYMENT

A. Payment for the work included in this section will be in accordance with the prices set forth in the proposal for the quantity of work performed. Progress payments will be made monthly based on the work performed during that period.

B. Measurement for lineal feet (LF) of CIPP installed shall be from center of manhole to center of manhole for complete, entire reaches of sewer. For partial reaches, measurement shall be from starting manhole center to end of installed length, as determined by length of liner pipe used.

2. PRODUCTS

2.1 GENERAL SPECIFICATIONS GOVERNING THE WORK

A. The materials provided under this section shall conform to ASTM F1216 and the requirements of the CIPP manufacturer.

B. Installation of CIPP by the “pull-in and inflate” method in accordance with ASTM F1743 is an acceptable alternative to ASTM F1216 for this project.

C. The Contractor shall field verify the diameter and length of the existing pipeline prior to ordering the liner material.

2.2 PRODUCT, MANUFACTURER/INSTALLER QALIFICATION REQUIREMENTS

A. Since sewer products are intended to have a 50-year design life, and in order to minimize the Owner's risk, only proven products with substantial successful long-term track records will be approved. All trenchless rehabilitation products and installers must be pre-approved prior to the formal opening of proposals.

B. Products and Installers seeking approval must meet all of the following criteria to be Commercially Acceptable:

1. For a Product to be considered Commercially Proven, a minimum of five successful wastewater collection system projects of a similar size and scope of work shall be performed in the U.S. and documented to the satisfaction of the Owner to assure commercial viability.
2. For an Installer to be considered as Commercially Proven, the installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least 5 (five) years active experience in the commercial installation. In addition, the Installer must have successfully installed at least 1,000,000 feet of a cured-in-place product in wastewater collection systems. Acceptable documentation of these minimum installations must be submitted to the Owner. Installer's project managers must have a minimum of 2 years of CIPP installation experience and must be on-site during the installation of the CIPP products.
3. Sewer rehabilitation products submitted for approval must provide third party test results supporting the structural performance (short-term and long-term) of the product and such data shall be satisfactory to the Owner. No product will be approved without independent third party testing verification.
4. The rehabilitation manufacturing process shall operate under a quality management system which is third-party certified to ISO 9000 or other recognized organization standards. Proof of certification shall be required for approval.
5. The owner authorizes the use of proven materials that serve to enhance the pipe performance specified herein. Proven materials have passed independent laboratory testing, not excluding long-term (10,000 hour) structural behavior testing, and have been successfully installed to repair failing host pipes in the U. S. for at least 4 years. In addition to the aforementioned, the owner may require that the contractor demonstrate that the enhancements proposed exceed the specifications herein, prior to the installation of the enhanced material systems. This section in no way shall be interpreted as authorization to deviate from the minimum standard practices set forth herein.

2.3 MATERIALS

A. Tube - the sewn tube shall meet the requirements of ASTM F1216, Section 5.1 and shall not contain fiberglass continuous strand matt. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, stretch to fit irregular pipe sections, and shall install smoothly around bends.

1. The wetout tubes shall have a uniform thickness that when compressed

at installation pressures will meet or exceed the design thickness.

2. The tube shall be made to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during installation.
3. The outside layer of the tube (before wetout) shall be polyethylene coated, a translucent flexible material that clearly allows inspection of the resin impregnation (wetout) procedure. The plastic coating shall hold the resin inside the tube without leakage, accommodate installation, stretch to size and shall not delaminate before, during or after curing of the CIPP.
4. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
5. The wall color of the interior pipe surface of the CIPP after installation shall be a light reflective color so that a clear detail examination with closed circuit television inspection equipment may be made.
6. Seams in the tube shall be stronger than the unseamed felt. Where the length requires joining, the sewn joint shall not be perpendicular to the long axis but spirally formed and sewn.

B. Resin - The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that meets the requirements of ASTM F1216, and the physical properties stipulated herein.

C. Structural Requirements

1. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall. The Long-Term Flexural Modulus shall be substantiated by independent lab testing (such as the Trenchless Technology Center at Louisiana Tech University). Such Long-Term Modulus shall not exceed 50% of the short-term values specified herein.
2. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly, or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
3. The cured pipe material (CIPP) shall conform to the structural properties, as listed below (if the contractor uses a modulus of elasticity other than 400,000 psi, then design calculations for the proposed system must be submitted for review and approval prior to installation):

Modulus of Elasticity	ASTM D790	400,000 psi
Flexural Strength	ASTM D790	4,500 psi

4. The required structural CIPP wall thickness shall be based on the following design parameters.

   a. Fully deteriorated pipe.
   b. Design safety factor of 2.0.
   c. Ovality of 5%.

d. Ground water depth = 5 feet above crown of sewer.
e. Soil depth (above crown of pipe) = 22 feet.
f. Soil modulus = 700 psi.
g. Soil density = 120 lb./cu.ft.
h. Live load = H20 Highway, 16,000 lbs.

5. The Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by his Company. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing as defined within the relevant ASTM standard. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50% of the short-term test results shall not be applied unless substantiated by qualified third party test data to the Owner's satisfaction. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
6. The Enhancement Factor 'K' to be used in 'Partially Deteriorated' Design conditions shall be assigned a value of 7.

D. Testing Requirements

1. Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix XII. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical-testing requirements.
2. Hydraulic Capacity - Overall, the Hydraulic profile shall be maintained as large as possible. The CIPP shall, as a minimum, have the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition. The roughness coefficient of the CIPP shall be verified by third party test data.
3. CIPP Field Samples - When requested by the Owner's Representative, the Contractor shall submit test results from previous field installation in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified have been achieved in previous field applications. Testing samples for this project shall be made and tested as specified herein.

3. EXECUTION

3.1 COORDINATION

A. The Contractor shall schedule work and notify all contractors in ample time so that provisions for their work can be made without delaying the progress of the project.

B. The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be temporarily out of service, the maximum amount of time of no service shall be 12 hours for any property served by the sewer. The Contractor shall be required to notify the Owner and all affected properties whose service laterals will be out of commission and to advise against water usage until the sewer main is back in service. Such notification shall be provided to the Utility Department at least one week prior to service disconnecting.

C. Public Notification - A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and inform them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:

a. Written notice to be delivered to each home or business describing the work, schedule, how it affects them, and a local telephone number of the Contractor they can call to discuss the project or any problems which could arise.
b. Personal contact and attempted written notice the day prior to the beginning of work being conducted on the section relative to the residents affected.
c. Personal contact with any home or business that cannot be reconnected within the time stated in the written notice.

D. Preparatory Procedures: The following procedures shall be adhered to unless otherwise approved by the Owner's Representative.

1. Cleaning: It shall be the responsibility of the Contractor to clean the pipeline with a high-pressure water jet of 1,500 to 2,000 psi maximum capacity and to remove internal debris out of the pipeline.
2. TV Inspection: Inspection shall be performed by experienced personnel. The interior of the pipeline shall be carefully inspected using closed-circuit television or other means to determine conditions, which may prevent proper installation, and it shall be noted so that these conditions can be corrected.
3. Obstruction Removal: The Contractor shall remove obstructions and intruding service connections that may prevent proper installation.
4. Flow Control: The Contractor shall provide for the bypassing of sewage entering or passing through the pipe to be rehabilitated.
5. Line Obstructions: It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the installation of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be removed by conventional sewer cleaning equipment, then the contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner’s representative prior to the commencement of the work and shall be considered as a separate pay item.

3.2 INSTALLATION

A. General:

1. The Contractor shall be responsible for confirming the locations of all branch service connections prior to installation and curing the CIPP.
2. The Contractor shall designate a location where the tube will be impregnated with resin using vacuum and distribution rollers to thoroughly saturate the tube prior to installation. The Contractor shall allow the Owner to inspect the materials and the "wet-out" procedure.
3. Resin Impregnation - The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A roller system shall be used to uniformly distribute the resin throughout the tube.
4. After the installation is complete, the Contractor shall supply a suitable heat source and water recirculation equipment. The equipment shall be capable of uniformly raising the water temperature to a level required to effectively cure the resin.
5. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gage shall be placed inside the tube at the downstream manhole at or near the bottom to determine the temperatures during cure. Water temperature in the pipe during the cure period shall be as recommended by the resin manufacturer.
6. Initial cure shall be deemed complete when inspection of the exposed portions of the tube appear to be hard and sound and the temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer and may require continuous recirculation of the water to maintain the temperature.
7. Cooldown: The Contractor shall cool the hardened pipe to a temperature below 100^0F before relieving the hydrostatic head. Cool down may be accomplished by the introduction of cool water into the pipe to replace water being pumped out of the manhole.
8. Finish: The new pipe shall be cut off in the manhole at a suitable location. The finished product shall be continuous over the length of pipe reconstructed and be free from dry spots, delamination and lifts. It shall also meet the leakage requirements or pressure test specified below. During the warranty period, any defects which will affect the integrity or strength of the product, shall be repaired at the Contractor's expense, in a manner mutually agreed upon by the Owner and the Contractor.
9. After the pipe has been cured in place, the Contractor shall reconnect the existing service connections. This shall be done from the interior of the pipeline without excavation using a robotic cutter. The Contractor shall certify he has a minimum of 2 complete working cutter units plus spare key components on the site before each installation. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

B. Testing

1. The water tightness of the cured-in-place pipe shall be gauged while curing and under a positive head.
2. For each installed length designated by the Owner in the contract

documents or purchase order, one CIPP sample shall be prepared from a section of the cured pipe at an intermediate manhole or at the termination point that has been installed through a like diameter pipe held in place by a suitable heat sink, such as sandbags. In areas with limited space and large diameter pipes, other sampling techniques may be required. The CIPP samples shall be tested in accordance with ASTM D-790 except that the full sample thickness shall be tested. The flexural properties of the samples shall meet the requirements specified in this section.

3. Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.4.

C. Cleanup

1. Upon acceptance of the installation work and testing, the Contractor shall reinstate the project area affected by his operations.

END 02735

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
BL	BASELINE
BGN	BEGIN
BM	BENCHMARK
BIND	BINDER
BIT	BITUMINOUS
BTM	BOTTOM
BLVD	BOULEVARD
BRK	BRICK
BBOX	BUFFALO BOX
BLDG	BUILDING
CATV	CABLE
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
ELEC	ELECRICAL
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
OPT	FIBER OPTIC
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
GIS	GEOGRAPHICAL INFORMATION SYSTEM
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
LIDAR	LIGHT DETECTION AND RANGING
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
NC	NORMAL CROWN
NB	NORTHBOUND
NE	NORTHEAST
NW	NORTHWEST
O/S	OFFSET
O&C	OIL AND CHIP
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 or RESIDENTUAL
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

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
1-1-21	Updated fonts, abbreviations
	and symbols.
1-1-19	Added new symbols.

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-08

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		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

ALIGNMENT ITEMS

	EX	PR
Baseline		
Centerline		
Centerline Break Circle		
Baseline Symbol		
Centerline Symbol		
PI Indicator		
Point Indicator		
Horizontal Curve Data (Half Size)	EX. 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		
Chiseled Square Found		
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)		

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		

HYDRAULICS ITEMS

	EX	PR
Overflow		
Sheet Flow		
Hydrant Outlet		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-08

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		

CONTOUR ITEMS

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

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

NON-HIGHWAY IMPROVEMENT ITEMS

	EX	PR
Noise Attn./Levee		
Field Line		
Fence		
Base of Levee		
Mailbox		
Multiple Mailboxes		
Pay Telephone		
Advertising Sign		
ITS* Camera		
Wind Turbine		
Cellular Tower		

*Intelligent Transportation Systems

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

(Sheet 3 of 9)

STANDARD 000001-08

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		

PAVEMENT MARKINGS

	EX	PR
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		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

STANDARD 000001-08

PAVEMENT MARKINGS (contd.)

	EX	PR
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		
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 LT & RT Turn Arrow		
Urban Thru Arrow		

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		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

(Sheet 5 of 9)

STANDARD 000001-08

PAVEMENT MARKINGS (contd.)

	EX	PR
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		
Rural Thru Arrow		
Rural Lt & Rt Turn Arrow		
Bike Lane Symbol		
Bike Lane Text		
Bike Path Shared		
Bike Shared Roadway		
Lane Drop Symbol		
Wrong Way Arrow		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

(Sheet 6 of 9)

STANDARD 000001-08

RIGHT OF WAY ITEMS (contd.)

	EX	PR
Access Control Line		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)		
Match Line		STA. 45+00
Slope Limit Line		
Typical Cross-Section Line		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

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(O) (Half Size)		DETOUR AHEAD
Left Lane Closed Ahead W20-5L(O) (Half Size)		LEFT LANE CLOSED AHEAD
Right Lane Closed Ahead W20-5R(O) (Half Size)		RIGHT LANE CLOSED AHEAD
Road Closed Ahead W20-3(O) (Half Size)		ROAD CLOSED AHEAD
Road Construction Ahead W20-1-(O) (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 7 of 9)

STANDARD 000001-08

SIGNING ITEMS (contd.)

	EX	PR
One Way Arrow Lrg. W1-6-(O) (Half Size)		
Two Way Arrow Large W1-7-(O) (Half Size)		
Detour M4-10L-(O) (Half Size)		DETOUR
Detour M4-10R-(O) (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-I100L (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

Illinois Department of Transportation

PASSED January 1, 2021

ENGINEER OF POLICY AND PROCEDURES

APPROVED January 1, 2021

ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

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 8 of 9)

STANDARD 000001-08

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		

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF POLICY AND PROCEDURES
APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

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		
GuyWire or Deadman Anchor		
Handhole		
Heavy Duty Handhole		
Junction Box		
Light Pole		
Manhole		
Monitoring Well (Gasoline)		
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	A A

VEGETATION ITEMS

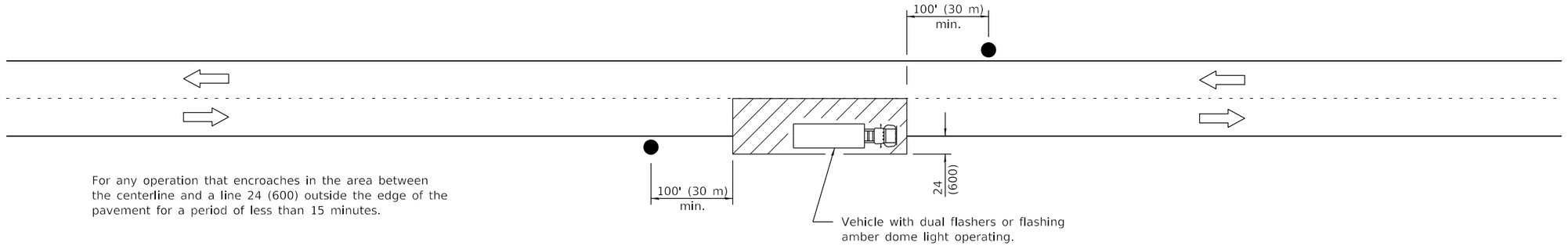
	EX	PR
Deciduous Tree		
Bush or Shrub		
Evergreen Tree		
Stump		
Orchard/Nursery Line		
Vegetation Line		
Woods & Bush Line		

WATER FEATURE ITEMS

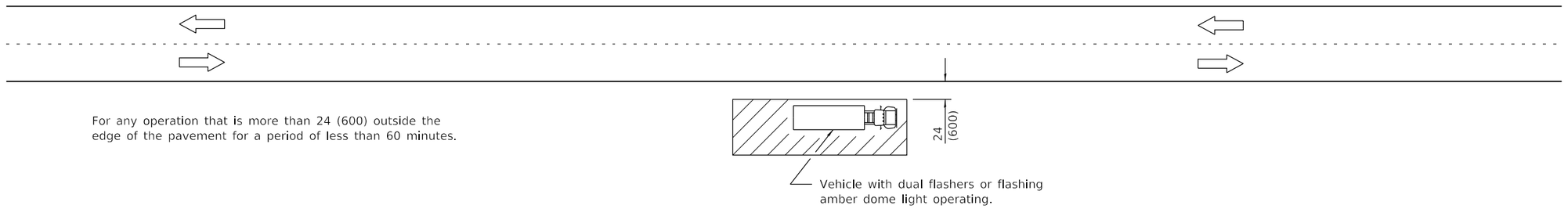
	EX	PR
Stream or Drainage Ditch		
Waters Edge		
Water Surface Indicator		
Water Point		
Disappearing Ditch		
Marsh		
Marsh/Swamp Boundary		

STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS

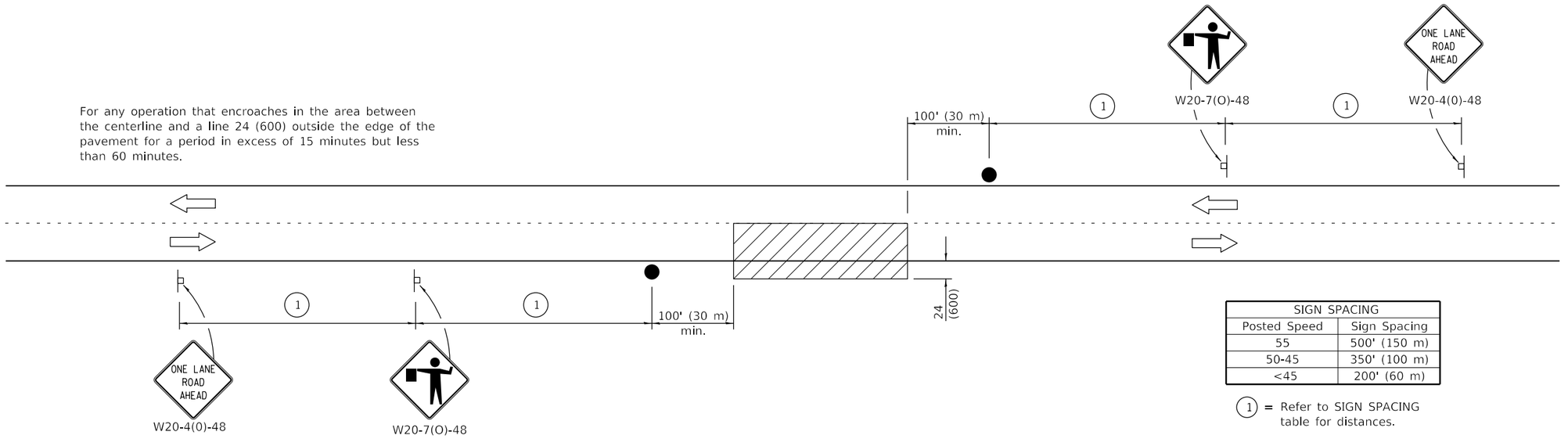
STANDARD 000001-08



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.

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

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

Illinois Department of Transportation

PASSED January 1, 2011
ENGINEER OF SAFETY ENGINEERING

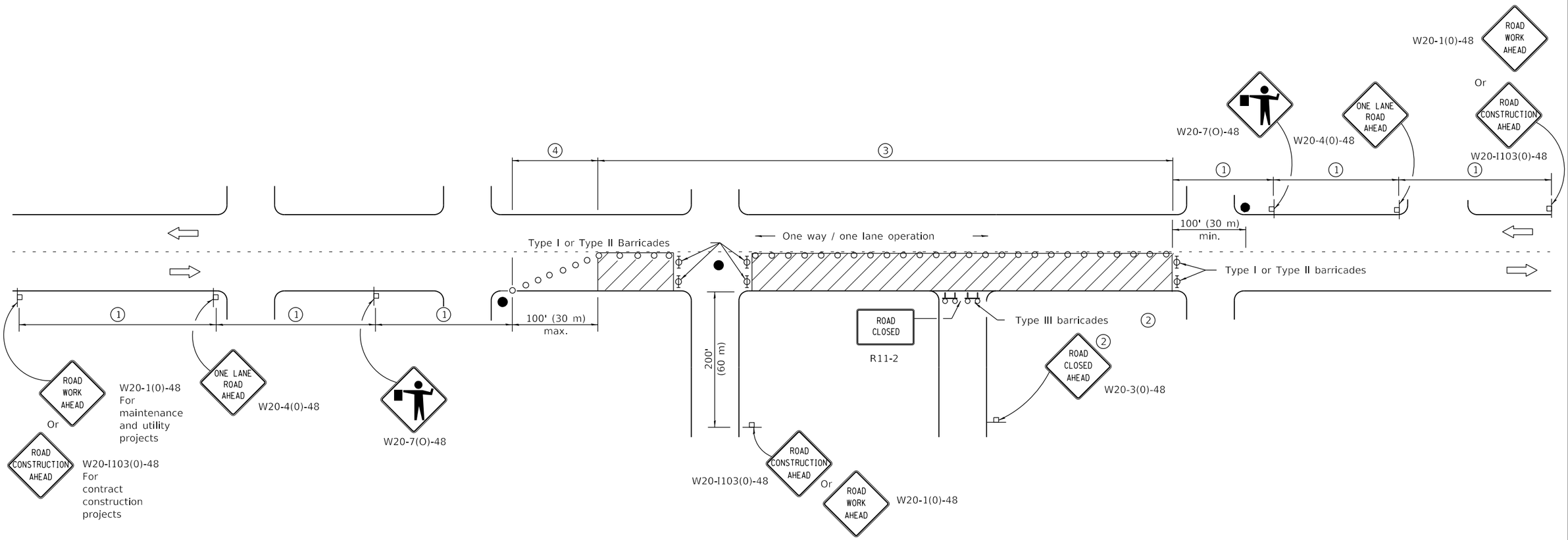
APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

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

PASSED January 1, 2011
ENGINEER OF SAFETY ENGINEERING

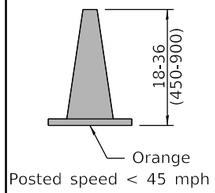
APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

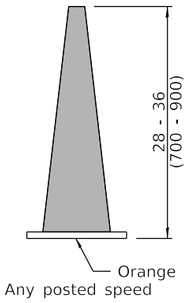
ISSUED 1-1-97

DATE	REVISIONS
1-1-11	Revised flagger sign.
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.

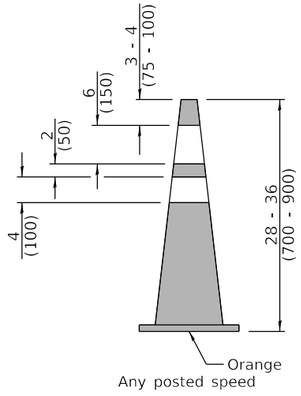
URBAN LANE CLOSURE, 2L, 2W, UNDIVIDED

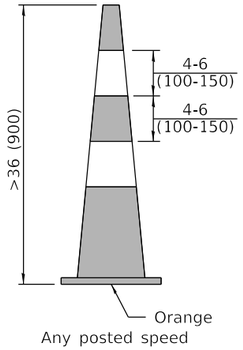
STANDARD 701501-06





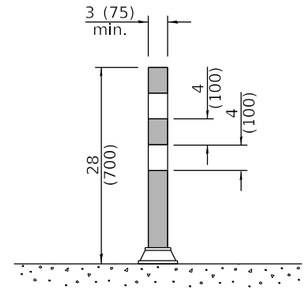
DAYTIME USE



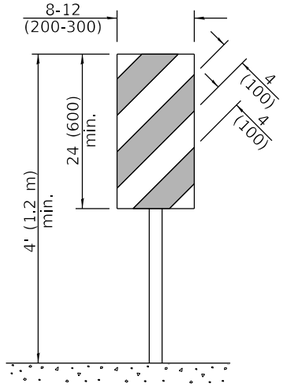


DAY OR NIGHTTIME USE

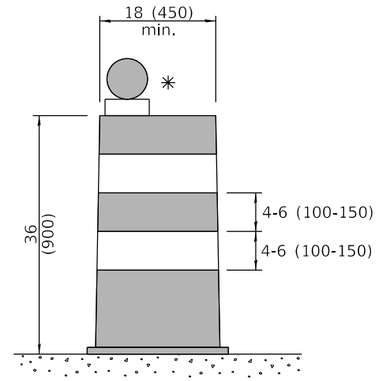
CONES



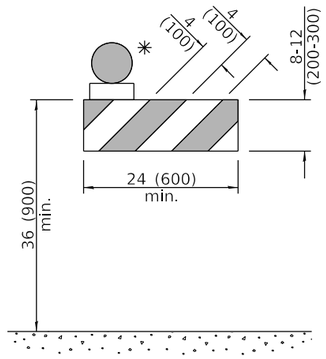
TUBULAR MARKER



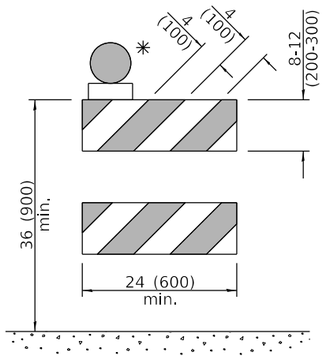
VERTICAL PANEL
POST MOUNTED



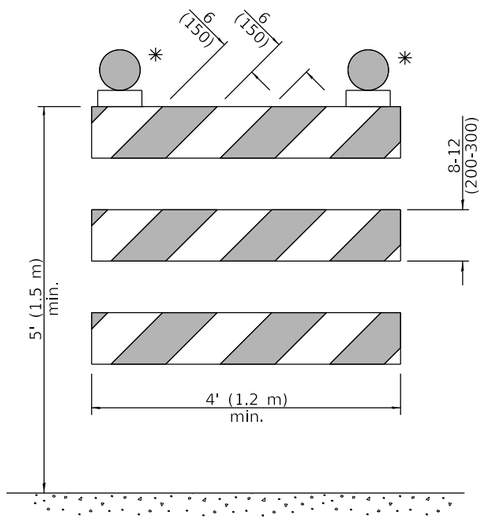
DRUM



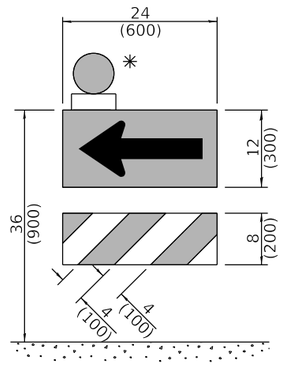
TYPE I BARRICADE



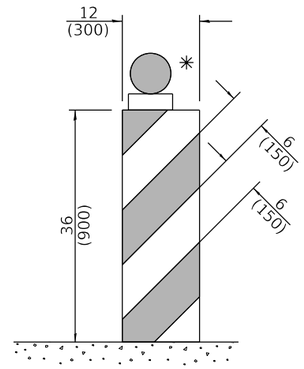
TYPE II BARRICADE



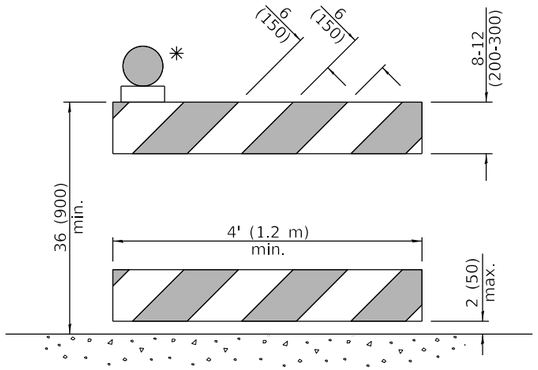
TYPE III BARRICADE



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, 2019
ENGINEER OF SAFETY PROG. AND ENGINEERING

APPROVED January 1, 2019
ENGINEER OF DESIGN AND ENVIRONMENT

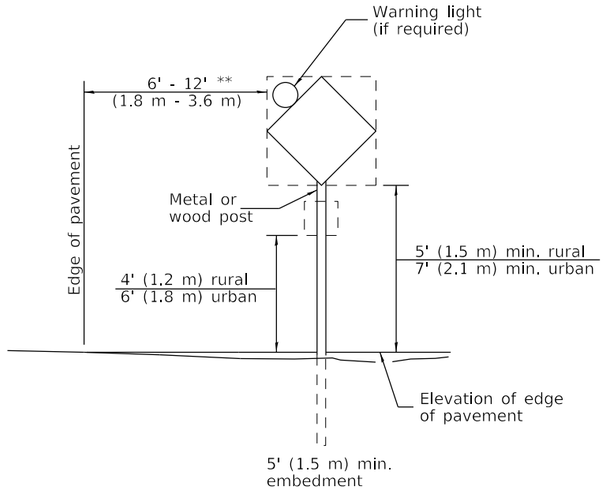
ISSUED 1-1-13

DATE	REVISIONS
1-1-19	Revised cone usage and
	added cones >36" (900 m) height.
1-1-18	Revised END WORK ZONE
	SPEED LIMIT sign from
	orange to white background.

TRAFFIC CONTROL DEVICES

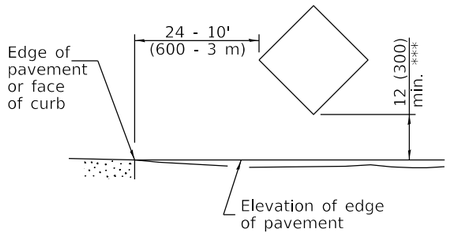
(Sheet 1 of 3)

STANDARD 701901-08



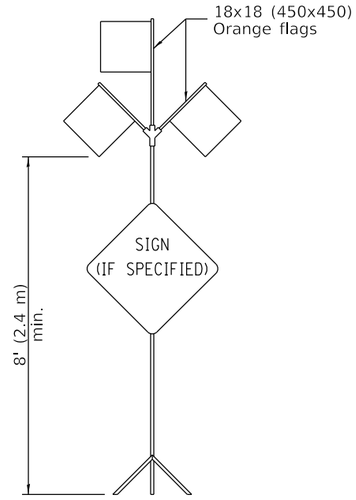
POST MOUNTED SIGNS

** 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 completely above the devices.



HIGH LEVEL WARNING DEVICE

G20-I104(0)-6036

G20-I105(0)-6024

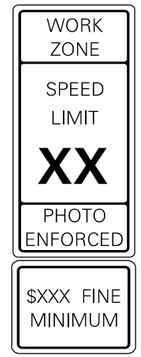
This signing is required for all projects 2 miles (3200 m) or more in length.

ROAD CONSTRUCTION NEXT X MILES sign shall be placed 500' (150 m) in advance of project limits.

END CONSTRUCTION sign shall be erected at the end of the job unless another job is within 2 miles (3200 m).

Dual sign displays shall be utilized on multi-lane highways.

WORK LIMIT SIGNING



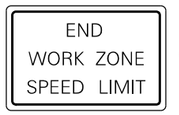
W21-III5(0)-3618

R2-1-3648

R10-I108p-3618 ****

R2-I106p-3618

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

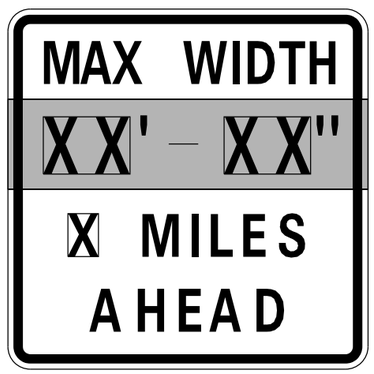


G20-I103-6036

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

HIGHWAY CONSTRUCTION SPEED ZONE SIGNS

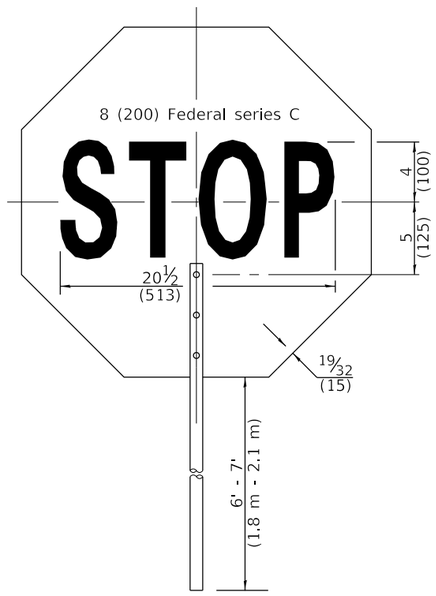
**** R10-I108p shall only be used along roadways under the juristiction of the State.



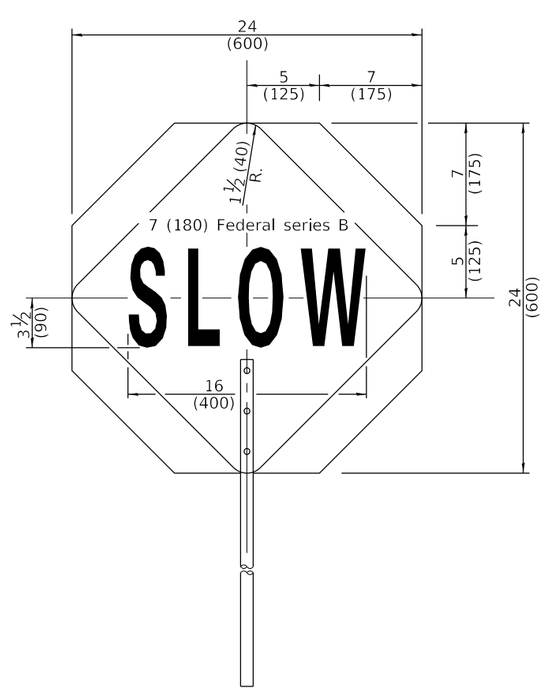
W12-I103-4848

WIDTH RESTRICTION SIGN

XX'-XX" width and X miles are variable.



FRONT SIDE



REVERSE SIDE

FLAGGER TRAFFIC CONTROL SIGN

Illinois Department of Transportation

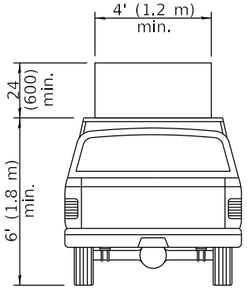
APPROVED January 1, 2019
ENGINEER OF SAFETY PROG. AND ENGINEERING

APPROVED January 1, 2019
ENGINEER OF DESIGN AND ENVIRONMENT

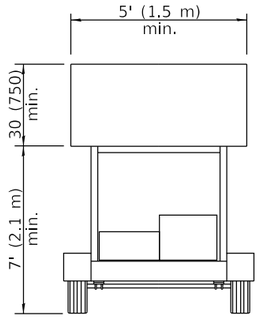
ISSUED 1-1-13

TRAFFIC CONTROL DEVICES

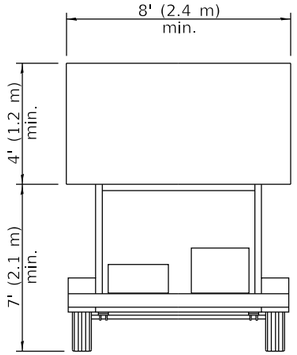
STANDARD 701901-08



**TYPE A
ROOF
MOUNTED**

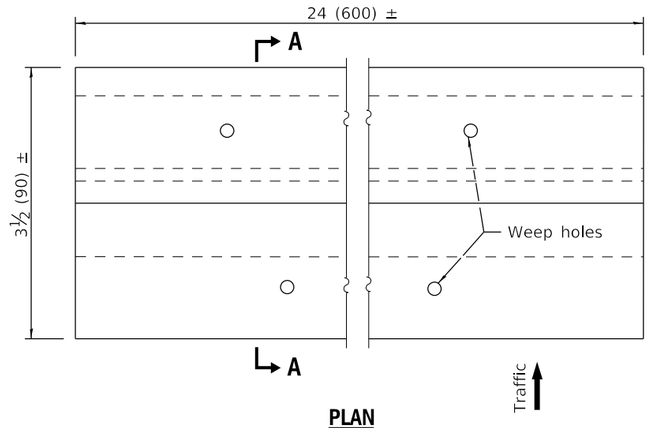


**TYPE B
ROOF OR TRAILER
MOUNTED**

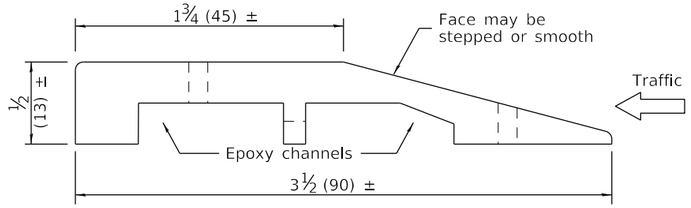


**TYPE C
TRAILER
MOUNTED**

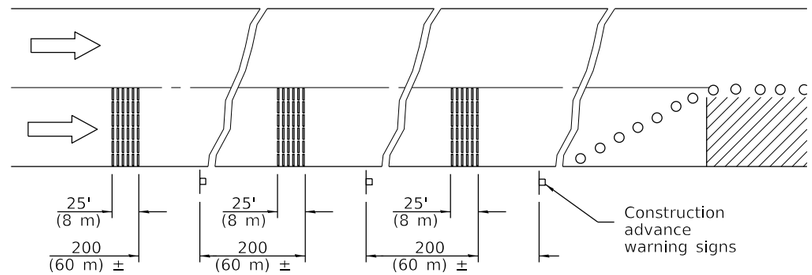
ARROW BOARDS

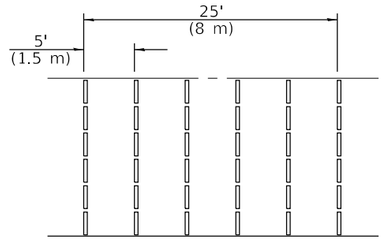


PLAN



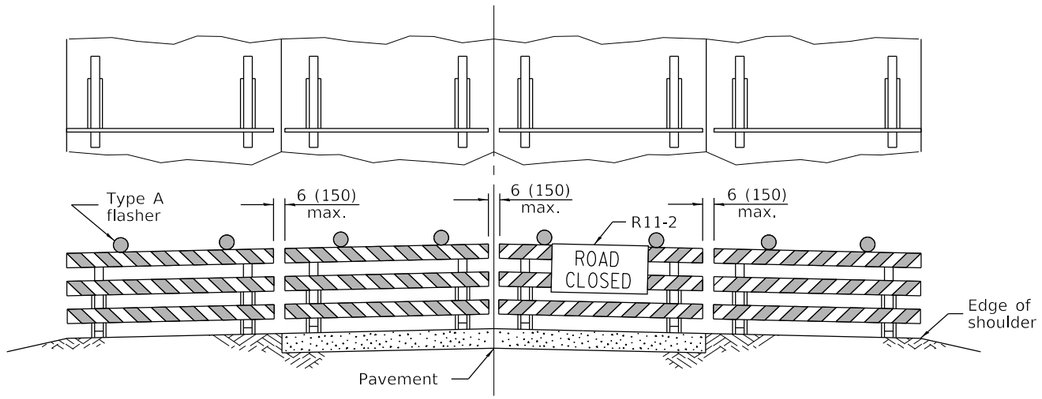
SECTION A-A





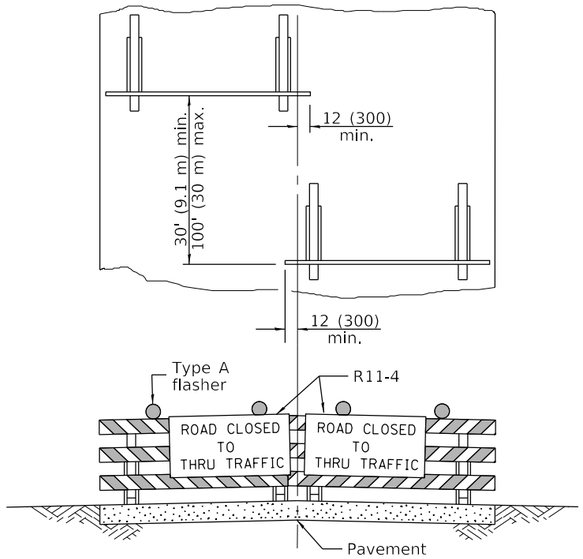
TYPICAL INSTALLATION

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 NCHRP 350 temporary sign supports directly in front of the barricade.

TYPICAL APPLICATIONS OF TYPE III BARRICADES CLOSING A ROAD

Illinois Department of Transportation

APPROVED January 1, 2019
ENGINEER OF SAFETY PROG. AND ENGINEERING

APPROVED January 1, 2019
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-13

TRAFFIC CONTROL DEVICES

(Sheet 3 of 3)

STANDARD 701901-08