



Charles D. Baker, Governor
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July 9, 2021

606272-114724

ADDENDUM NO. 3

To Prospective Bidders and Others on:

BARNSTABLE
**Federal Aid Project Nos. CMQ-0035(043), HSI-0035(043), NFP(N/I)-0035(043),
STP-0035(043) & TAP-0035(043)**
Intersection Improvements and Related Work (Including Signals)
at Iyannough (Route 28) and Yarmouth Roads

BIDS TO BE OPENED AND READ:

TUESDAY, JULY 20, 2021 at 2:00 P.M.

Transmitting changes to the Contract Documents as follows:

DOCUMENT 00010:

Revised page 1.

DOCUMENT 00104:

Revised page 3.

DOCUMENT 00715:

Deleted document in its entirety and inserted new document (20 pages).

PLANS:

Revised sheets 89 and 90 of 231.

Please take note of the above, substitute the revised pages and drawings for the originals, delete document as noted, insert new document in proper order, and acknowledge Addendum No. 3 in your Expedite Proposal file before submitting your bid.

Very truly yours,

Eric M. Cardone, P.E.

Construction Contracts Engineer

HA

cc: Thomas H Currier, Project Manager

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③ Addendum No. 3, July 9, 2021

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NOTICE TO CONTRACTORS (Continued)**PRICE ADJUSTMENTS**

- ③ This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt \$542.50 per ton, Portland cement \$146.36 per ton, diesel fuel \$2.558 per gallon, and gasoline \$2.434 per gallon. MassDOT posts the **Price Adjustments** on their Highway Division's website at <https://www.mass.gov/topics/highway-construction-resources>

This Contract contains Price Adjustments for steel. See Document 00813 - PRICE ADJUSTMENT FOR STRUCTURAL STEEL AND REINFORCING STEEL for their application and base prices.

MassDOT projects are subject to the rules and regulations of the Architectural Access Board (521 CMR 1.00 et seq.)

Prospective bidders and interested parties can access this information and more via the internet at WWW.COMMBUYS.COM.

BY: Jamey Tesler, Acting Secretary and CEO, MassDOT
Jonathan L. Gulliver, Administrator, MassDOT Highway Division
SATURDAY, MAY 29, 2021

DOCUMENT 00715



SUPPLEMENTAL SPECIFICATIONS

(English Units)

DATE: JUNE 30, 2021

The 2021 *Standard Specifications for Highways and Bridges* are amended by the following modifications, additions and deletions. This Supplemental Specifications prevail over those published in the Standard Specifications.

The Specifications Committee has issued these Supplemental Specifications for inclusion into each proposal until such time as they are updated or incorporated into the next Standard Specifications.

Contractors are cautioned that these Supplemental Specifications are dated and may vary from time to time as they are updated.

DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 7.00: Legal Relations and Responsibility to Public

Subsection 7.15 Claims Against Contractors for Payment of Labor, Materials and Other Purposes.

(page I.61) Replace the words after "Chapter 30, Section 39G, of the General Laws, as amended, reads as follows:" with the following;

Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and, water mains, airports and other public works, the contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

Subsection 7.15 (Continued)

Within sixty-five days after the effective date of a declaration of a substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quantity and price of the work done and all but one per cent retainage, if held by the awarding authority, on that work, including the quantity, price and all but one per cent retainage, if held by the awarding authority, for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payment filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section thirty-nine F, but no contract subject to said section thirty-nine F shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by this section on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and, unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority shall prepare and forthwith send to the contractor for acceptance a final estimate for the quantity and price of the work done and all retainage, if held by the awarding authority, on that work less all payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and send to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the date of payment.

Subsection 7.15 (Continued)

Within 15 days, 30 days in the case of the commonwealth, after receipt from the contractor, at the place designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its estimate of the fair value of its claims against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and a retention to secure satisfactory performance of the contractual work not exceeding five per cent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section thirty-nine F of chapter thirty; provided, that a five per cent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

Substantial completion, for the purposes of this section, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one per cent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

DIVISION II CONSTRUCTION DETAILS

SECTION 200: DRAINAGE

SUBSECTION 230: CULVERTS, STORM DRAINS, AND SEWAR PIPES

Subsection 230 CULVERTS, STORM DRAINS, AND SEWAR PIPES.

(page II.63) Change SEWAR to SEWER in the title.

SECTION 400: SUB-BASE, BASE COURSES, SHOULDERS, PAVEMENTS AND BERMS

SUBSECTION 430: CEMENT CONCRETE BASE COURSE

MATERIALS

Subsection 430.40 General.

(page II.99) Replace this Subsection with the following.

Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

*4,000 psi, 1.5 to 3/4 inch, Cement Concrete	M4.02.00
Preformed Joint Filler	M9.14.0
Hot Poured Joint Sealer	M3.05.0

Subsection 430.40 (Continued)

*When specified, High Early Strength Cement Concrete Base Course shall contain High Early Strength Portland Cement (Type III) meeting AASHTO M 85 Standard Specification for Portland Cement or Accelerating Chemical Admixtures (Type C or Type E) meeting AASHTO M 194 Standard Specification for Chemical Admixtures and listed on the MassDOT Qualified Construction Materials List (QCML) for Concrete Admixtures.

SUBSECTION 445: SHOULDERS**MATERIALS****Subsection 445.40 General.**

(page II.103) Replace the words Sodding (Field) with the word Sod.

SUBSECTION 628: PERMANENT IMPACT ATTENUATORS**Subsection 628 Permanent Impact Attenuators.**

(page II.277) Replace this subsection with the following.

SUBSECTION 628: IMPACT ATTENUATORS**628.20: General**

Work under this subsection shall consist of furnishing, installing, and in the case of temporary, the removal of impact attenuators in close conformance with the specifications of the manufacturer, and in close conformance with the locations, lines, and grades shown on the plans and/or designated in the Special Provisions.

MATERIALS**628.40: General**

Materials shall meet the requirements specified in the following Subsections of Division III, Materials and as otherwise specified herein.

Gravel Borrow.....	M1.03.0
Cement Concrete.....	M4.02.00
Impact Attenuators.....	M9.18.0
Redirective Impact Attenuators.....	M9.18.1
Non-Redirective Impact Attenuators	M9.18.2
Low-Maintenance Impact Attenuators	M9.18.3
Retroreflective Sheeting.....	M9.30.0

Impact attenuators shall be listed on the QTCE.

The Contractor shall supply an impact attenuator that meets or exceeds the Test Level (TL) designated in the description of the bid item.

The Contractor shall supply an impact attenuator for each location that can shield, at a minimum, the full width of the hazard but shall not exceed any maximum widths or lengths shown in the Plans or Special Provision.

Impact attenuators on bridge decks or spanning bridge joints shall require no anchorage to the bridge deck unless approved by the Engineer.

SECTION 628 (Continued)

Transitions to rigid or semi-rigid barriers or connections to fixed objects such as bridge piers shall be supplied and installed by the Contractor and included in the unit price of the impact attenuator.

The approach end shall include a Type 3 Object Marker conforming to the requirements of the MUTCD. The sheeting material shall meet the requirements of M9.30.0: Retroreflective Sheeting.

The Contractor shall submit Shop Drawings for all materials a minimum of 60 days in advance of installation. Shop Drawings shall include a parts list, manufacturer's instructions for installation, drawings, transition details and drawings (if needed), and all service, maintenance, and/or owner's manuals. Any part of the system that varies from the exact make and model that was crash tested must be clearly identified in the Shop Drawings. The Contractor shall not proceed with installation prior to receipt of Shop Drawing approval.

628.41: Permanent

Impact attenuators classified as Permanent shall be installed by the Contractor and become property of the Department upon acceptance.

Permanent impact attenuators shall be supplied with all new, unused parts.

All materials and work associated with anchoring a Permanent Impact Attenuator, including the installation of a concrete slab if required by the manufacturer, shall be included in the bid price of the item.

628.42: Temporary

Impact attenuators classified as Temporary shall be installed by the Contractor and remain property of the Contractor during deployment and after removal. The Contractor shall be responsible for maintaining the attenuator in working condition throughout its deployment and repairing and/or replacing damaged components or systems per Subsection 7.17: Traffic Accommodation.

Temporary Impact Attenuators shall not require anchoring into a concrete foundation. Asphalt anchors, if required by the manufacturer, shall be supplied and installed by the Contractor and shall be included in the bid price of the item.

The condition of Temporary Impact Attenuators shall meet the quality standards set forth in the *Quality Standards for Work Zone Traffic Control Devices* published by ATSSA. Failure to meet these minimum standards will require the Contractor to clean or replace any retroreflective sheeting at no additional cost.

CONSTRUCTION METHODS**628.60: General**

Excavation for attenuator foundations and anchorage, if required, shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with gravel borrow.

The impact attenuator and any anchorage or transitions, if necessary, shall be installed in accordance with the manufacturer's instructions. Any modification to the instructions or change in design due to field conditions must be approved by the Engineer.

628.61: Temporary Impact Attenuators

A Temporary Impact Attenuator shall be removed or removed and reset at the conclusion of the temporary traffic control plan setup and is no longer needed. The final removal shall be considered incidental to the cost of the item.

Removing and Resetting Temporary Impact Attenuators shall consist of removing and then reinstalling a Temporary Impact Attenuator to a new location shown on the plans or as directed by the Engineer.

SECTION 628 (Continued)

Once a Temporary Impact Attenuator has been removed, the pavement surface shall be restored as needed. This work shall include filling any holes and the sweeping of any debris that may have accumulated around it during deployment. This work shall be considered incidental to the cost of the item.

A damaged Temporary Impact Attenuator shall be repaired or replaced within 24 hours. The damaged location shall be protected by a Truck Mounted Attenuator, or as directed by the Engineer, until the impact attenuator has been restored to working conditions.

COMPENSATION**628.80: Method of Measurement**

All impact attenuators will be measured as a single unit, each in place.

Temporary Impact Attenuator Removed and Reset will be measured as a single unit, each, to completely remove and reinstall the attenuator to a new location.

628.81: Basis of Payment

All impact attenuators will be paid for at the contract unit price for each location, which includes full compensation for all labor, equipment, materials, foundation and/or anchorage, and all incidental work necessary to complete the work as specified.

The final removal of a Temporary Impact Attenuator shall be considered incidental to the cost of the item.

Temporary Impact Attenuator Removed and Reset will be paid for at the contract unit price for the entire remove and reset operation and will include full compensation for all labor, equipment, materials, anchorage, restoration, and all incidental work necessary to complete the work as specified. Adjusting a Temporary Impact Attenuator that has moved due to passing traffic or weather events and/or the movement of a Temporary Impact Attenuator to accommodate the Contractor is not considered Removing and Resetting and will not be paid for.

Gravel Borrow required to replace unsuitable soils for any foundation and anchorage work will be paid for at the contract unit price under Item 151. Gravel Borrow.

A Truck Mounted Attenuator, if required to protect a damaged Temporary Impact Attenuator, will be paid for at the contract unit price under Item 853.403 Truck Mounted Attenuator.

628.82: Payment Items

628.302	Permanent Impact Attenuator, Non-Redirective, TL-2.....	Each
628.303	Permanent Impact Attenuator, Non-Redirective, TL-3.....	Each
628.304	Temporary Impact Attenuator, Non-Redirective, TL-2	Each
628.305	Temporary Impact Attenuator, Non-Redirective, TL-3	Each
628.312	Permanent Impact Attenuator, Redirective, TL-2	Each
628.313	Permanent Impact Attenuator, Redirective, TL-3	Each
628.214	Temporary Impact Attenuator, Redirective, TL-2.....	Each
628.215	Temporary Impact Attenuator, Redirective, TL-3.....	Each
628.322	Permanent Impact Attenuator, Low-Maintenance, TL-2	Each
628.323	Permanent Impact Attenuator, Low-Maintenance, TL-3	Each

SECTION 800: TRAFFIC CONTROL DEVICES**SUBSECTION 815: TRAFFIC CONTROL SIGNALS****Subsection 815.20 General***(page II.366) Replace the ninth paragraph with the following,*

All electrical connections, splicing, grounding, resistance tests, service connections and circuit identification shall be done by a licensed electrician holding "Certificate B" issued by the State Examiners of Electricians. All work within the traffic control cabinet shall be done by an IMSA Certified Traffic Signal Field Technician Level II.

SUBSECTION 828: TRAFFIC SIGNS**Subsection 828.20 General.***(page II.389) Replace this Subsection with the following;*

The provisions of this subsection shall apply to the fabricating, furnishing and erecting overhead and roadside guide signs, warning and regulatory signs, route and project markers and supports for delineators and markers.

Traffic Signs are officially erected devices, mounted on fixed or portable supports, whereby specific messages are conveyed by means of words or symbols, for the purpose of regulating, warning or guiding traffic.

The signs, foundations and supports shall be fabricated and erected in conformity with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*.

Subsection 828.21 Plans.*(page II.391) Delete the last sentence.***Subsection 828.40 General.***(page II.390) Replace this Subsection with the following;*

Materials shall meet the requirements specified in the following Subsection of Division III. Materials:

Retroreflective Sheeting.....	M9.30.0
Acrylic Plastic 3.25-Inch Diameter Center-Mount Reflector.....	M9.30.4
Demountable Reflectorized Delineator-Guard Rail	M9.30.7
Reflectorized Flexible Delineator Post.....	M9.30.8

Subsection 828.55 Hazzard Markers*(page II.395) Delete this Subsection.***Subsection 828.60 General.***(page II.396) Delete the first, second, fifth and sixth paragraphs.***Subsection 828.80 Method of Measurement.***(page II.397) Delete the third, fourth and fifth paragraphs.***Subsection 828.81 Basis of Payment.***(page II.398) Delete the second, third and fourth paragraphs.***Subsection 828.82 Payment Items.***(page II.398) Delete payment items 827.27, 827.33 and 835.*

SUBSECTION 840: SIGN SUPPORTS**MATERIALS****Subsection 840.30 General.**

(page II.401) Replace this subsection with the following,

All materials shall be new and shall meet the requirements specified in the following Subsections of Division III, Materials:

4,000 psi Cement Concrete	M4.02.00
Reinforcing Steel.....	M8.01.0
Anchor Bolts	M8.01.5
Sign Supports	M8.18.3

All overhead and cantilevered support structures shall be in accordance with the requirements of Subsection 960: Structural Steel and Miscellaneous Metal Products.

SUBSECTION 850: TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS**DESCRIPTION****Subsection 850.32 Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset.**

(page II.406) Delete this subsection.

MATERIALS**Subsection 850.52 Temporary Impact Attenuators**

(page II.409) Delete this subsection.

CONSTRUCTION METHODS**Subsection 850.72 Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset**

(page II.415) Delete this subsection.

COMPENSATION**Subsection 850.80 Method of Measurement**

(page II.417) Delete the second and third paragraphs from the bottom of the page and regarding temporary impact attenuators.

Subsection 850.81 Basis of Payment

(page II.420) Delete the first two paragraphs on this page and regarding temporary impact attenuators.

Subsection 850.82 Payment Items

(page II.421) Delete payment items 853.41, 853.411, 853.42, 853.421, 853.43, 853.431, 853.44, 853.441.

SUBSECTION 860: REFLECTORIZED PAVEMENT MARKINGS**CONSTRUCTION METHODS****Subsection 860.64 Accommodation of Traffic**

(page II.424) Replace this subsection with the following,

All traffic control devices required for pavement marking installation or protection of markings shall be in accordance with Subsection 850: Traffic Controls for Construction and Maintenance Operations.

Lane closures, shifts, or other temporary traffic control setups to accommodate pavement marking operations shall be approved by the Engineer.

Subsection 860.65 Recessed Markings

(page II.424) Add this new subsection.

860.65: Recessed Markings

Prior to cutting out the grooves for recessed markings, the Contractor shall layout the proposed pavement markings per 860.61: Layout of Work. Once the Engineer has inspected and approved the proposed striping layout, the grooves for the proposed pavement markings may be cut. No pavement grooving shall be done without the prior approval of the Engineer.

Groove position shall be a minimum of 4 inches from the edge of the pavement marking to any longitudinal pavement joints. The groove shall not be installed on bridge joints, on drainage structures, or in other areas identified by the Engineer. The groove shall not be installed continuously for intermittent pavement markings, but only where markings are to be applied.

The use of gang stacked diamond cutting blades to grind a smooth square slot is required for producing all grooves. The spacers between blade cuts shall be such that there will be less than a 10 mil rise in the finished groove between the blades. The acceptability of the surface texture will be determined by the Engineer.

The diamond grinder shall have an articulating head so that the slots are installed correctly on grades and super elevated sections.

Grooves that are ground deeper or wider than the specified allowable limits shall be repaired per the direction of the Engineer at no additional cost. Grooves that are ground too shallow, too narrow, or with unacceptable rises between blade cuts shall be reground to the correct size, depth, and surface finished at no additional cost. Slots ground out of alignment shall be patched using an approved method and materials.

Grooves shall be 1 inch \pm ¼ inch wider than the pavement marking width. Groove depth is dependent upon pavement marking material type and shall be per Table 860.65-1.

Table 860.65-1: Groove Depth for Recessed Pavement Markings

Pavement Marking Material Type	Groove Depth
Multi-Component (i.e., Epoxy, Polyurea, Urethane)	80 mil
Preformed	150 mil
Thermoplastic	Proposed wet thickness of line + 40 mil
Water-borne Paint	80 mil

Subsection 860.65 (Continued)

The Contractor may propose an alternate groove depth based upon recommendations of the pavement marking material manufacturer. An alternate depth shall be approved by the Engineer prior to installation.

Groove depth shall be consistent across the full width of the groove. Depth plates shall be provided by the Contractor to the Engineer to assure that the specified groove depth is achieved.

Grooves shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants. Shrouds and a vacuum apparatus shall be included as part of the grinder to remove larger pieces of pavement that are ground out. If water is used to clean the groove or the grooving process takes place during rainfall, a minimum of 24 hours of dry time is required prior to the placement of pavement markings. The grooves shall be dry for 24 hour prior to placement of the pavement markings.

After the depth, width, length, and surface condition has been approved by the Engineer, an air lance shall be used to remove fine particles from the groove. Air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up from entering the groove. The Contractor shall prevent traffic from traversing the grooves per 860.63: Protection of Markings and re-clean grooves, as necessary, prior to application of pavement markings at no additional cost.

All grooves must be approved by the Engineer prior to the placement of pavement markings.

SUBSECTION 871: NON-MOTORIZED TRAFFIC DATA COLLECTION**SUBSECTION 871.40 Non-Motorized Traffic Data Collection**

(page II.425) Add this new Subsection in numerical order.

SUBSECTION 871: NON-MOTORIZED TRAFFIC DATA COLLECTION**DESCRIPTION****871.20: General**

This work shall include the installation and calibration of permanent or portable non-motorized traffic counting stations (NTCS) used to collect pedestrian and/or bicycle volume and volume-related data. The devices shall be installed at the locations shown on the plans.

All data collected by the devices shall become property of the Department. There shall be no reoccurring or ongoing fees associated with accessing, retrieving, or collecting data once the device has been installed.

MATERIALS**871.40: General**

Materials shall meet the requirements specified in the following Subsections of Division III, Materials and as otherwise specified herein.

Electrical Conduit-Flexible Metallic (Type FM)	M5.07.2
Shielded Loop Detector Lead-In Cable.....	M8.16.11
Type 13 Loop Detector Wire THHN with Tube.....	M8.16.13
Non-motorized Traffic Counting Stations (NTCS)	M9.31.0

SECTION 871 (Continued)

NTCS shall use detection technologies such as loop detectors, piezoelectric sensors, infrared, video, microwave, radar, or a combination thereof to count pedestrians and/or bicyclists passing through one or more defined detection zones.

NTCS shall be prequalified on the QTCE.

NTCS components shall be weather-hardened, suitable for outdoor use, and vandal-proof. All enclosures shall be NEMA rated.

NTCS that require independent mounting structures and/or foundations shall have those costs included in the bid price. All permanent structures shall be designed for wind loading of 90 mph per *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Mounting to existing, Department-owned structures will require approval by the Engineer. No NTCS components may be installed on utility poles without prior authorization from both the utility owner and the Engineer.

The Contractor shall submit Shop Drawings for all materials a minimum of 60 days in advance of installation. The Contractor shall not proceed with installation prior to receipt of Shop Drawing approval.

871.41: Portable Devices

Items classified as Portable will be deployed by the Contractor for a period of time specified in the Contract and then removed. Portable NTCS shall remain the property of the Contractor at the completion of the deployment. However, all data collected during the deployment shall be the property of the Department, per 871.20: General.

Portable NTCS device memory shall have the capability of storing a minimum of 30 days of count data. If the collected data is automatically retrieved and stored on a non-Department server, access and retrieval of that data shall be provided at no additional cost for a minimum of 1 year after collection.

The Contractor shall maintain the batteries during deployment in a manner that minimizes disruption to data collection.

871.42: Permanent Devices

Items classified as Permanent shall be installed by the Contractor and become property of the Department upon acceptance.

Permanent NTCS device memory shall have the capability of storing a minimum of 90 days of count data. If the collected data is automatically retrieved and stored on a non-Department server, access and retrieval of that data shall be provided at no additional cost for a minimum of 5 years after collection.

If a solar-powered device is proposed, the Contractor shall include solar calculations for the proposed installation as part of the Shop Drawing review.

If a traffic signal cabinet is to be used to provide power for a Permanent NTCS for Intersections, all work within such a cabinet must be preapproved and may only be performed in the presence of the Engineer. All additional wiring, components, materials, and labor required shall be considered incidental to the unit price.

871.43: Data Access, Connectivity, and Security

NTCS shall allow data retrieval and configuration in the field via Wi-Fi or Bluetooth® enabled communication.

SECTION 871 (Continued)

Permanent NTCS shall allow remote data retrieval using via a built-in or external 4G LTE or 5G cellular modem. The cellular modem shall include a 10-year connectivity and service agreement that, at a minimum, includes:

- Cellular connectivity for the duration of the agreement that is paid for as a single, up-front cost by the Contractor and reflected in the unit price of the NTCS and has no cellular overage charges.
- Extended warranty on the hardware for the duration of the agreement.
- Telephone and email support.
- Over-the-air software and security updates.

The cellular modem and connectivity and service agreement may be omitted if the following are all met:

- The NTCS can operate with a wired internet connection and there is no degradation in data quality or features if a cellular modem is not used.
- A Department-owned high-speed internet connection will be installed under a separate pay item or an existing Department-owned high-speed internet connection has been identified in the plans as acceptable for use with the NTCS.
- Any costs related to integrating the NTCS with the high-speed internet connection including, but not limited to wiring, adaptors, and security features are considered incidental.
- All work integration work performed with an existing Department-owned high-speed internet connection is done in the presence of the Engineer.

For any point-to-point Wi-Fi access points, the following security protocols shall be met:

- All Wi-Fi access points and remote clients shall be configured to use 256-bit Wired Equivalent Privacy (WEP) Encryption or greater for all links between units.
- The Contractor shall disable all Service Set Identifier (SSID) broadcasts.
- The Contractor shall disable "guest mode."
- The Contractor shall disable wireless firmware upgrade mode.
- All Wi-Fi access points shall be set to use only defined connection points; the use of auto connection shall not be allowed.
- The Contractor shall disable FTP file sharing on all Wi-Fi access points and remote clients.

The Contractor shall reconfigure all default passwords on all supplied devices, including software, to custom, unique complex alpha numeric passwords comprised of special symbols, uppercase and lowercase letters, and numbers that are a minimum of 8 characters in length. The Contractor shall generate a complete list of all proposed passwords. That list shall be submitted to the Engineer for approval. No manufacture default or duplicate passwords shall be allowed.

871.44: Pull Boxes, Posts, and Enclosures

All NTCS sensors and necessary components shall be integrated into a waterproof and vandal-proof enclosure. The enclosure may either be mounted to a post or constructed in the form of a pillar or post. If the enclosure is constructed in the form of a pillar or post, it shall be no more than 48 in. tall and have a maximum width of no more than 8 in.

Pull boxes, if required, shall be considered incidental to the cost of the NTCS.

Materials and dimensions of all posts, enclosures, and foundations, if required, shall be included with the Shop Drawings submittal.

SECTION 871 (Continued)**CONSTRUCTION METHODS****871.60: General**

All work shall be in accordance with the manufacturer's instructions. All electrical work including, but not limited to, conduit installation, service connections, and wiring shall be in conformance with the MEC.

The Contractor shall install and configure the NTCS as per the manufacturer's specifications. Any conflicts between the manufacturer's specifications and Subsection 871: Non-Motorized Traffic Data Collection shall be resolved in writing prior to the start of construction.

NTCS shall be installed at the location of the detection zone shown on the plans. The Contractor shall verify the location in the field with the Engineer prior to installation.

All components associated with the installation of NTCS shall be installed in a location that does not inhibit the movement of pedestrians along an accessible route, nor impede the passage of bicycles or motor vehicles. At the completion of installation, the pedestrian route past the sensor(s) shall remain fully ADA and MAAB compliant.

Access to a traffic signal cabinet, if required, must be preapproved by the Engineer. Work within such cabinets may only be performed by a Prequalified Contractor and in the presence of the Engineer.

It shall be the responsibility of the Contractor to determine methods to secure Portable NTCS during deployment to reduce the likelihood of theft or vandalism. Any such methods shall be approved by the Engineer prior to deployment. Upon the end of the deployment period for Portable NTCS, the site shall be restored to its original condition.

871.61: Inductive Loop Detectors and Piezoelectric Sensors

Any manufacturer's specifications for inductive loop detector or piezoelectric sensor installation that differ from the requirements listed in this construction specification shall take precedence.

Inductive loop detectors and piezoelectric sensors, if required as a component of the NTCS, shall be installed at the location of the detection zone shown on the plans. Minor adjustment in location to avoid castings, expansion joints in cement concrete, utilities, uneven pavement, or other obstructions will be allowed. The Contractor shall mark the exact location of the detector(s) or sensor(s) for approval by the Engineer prior to installation.

A. Saw Cuts.

A saw equipped with a diamond blade shall be used to cut the slots in the pavement. The saw must be equipped with a depth gauge and horizontal guide to assure proper depth and alignment of the slot. The diamond blades to be utilized for the saw cut shall provide a clean, well-defined saw cut without damage to adjacent areas. All saw cuts connecting the loop detectors or piezoelectric sensors with the edge of pavement must be separated by at least 1 ft to prevent pavement damage.

The saw cut for inductive loop detectors shall be $\frac{5}{16}$ in. wide and 2 in. deep, or as directed by the engineer. A $1\frac{1}{4}$ in. diameter hole shall be drilled at each intersecting sawcut or lead in angle point to prevent sharp bends in the cable. All cuts and drilled holes shall be to the full 2 in. depth.

The saw cut for piezoelectric sensors shall be $\frac{3}{4}$ in. wide and 1 in. deep using a single blade in one pass. The saw cut shall be 8 in. (4 in. on each side) longer than the sensor length, and the depth of the saw cut shall be $\frac{1}{2}$ in. deeper at both ends.

SECTION 871 (Continued)

All saw cuts shall be flushed with clean water to remove the saw slurry and filtered compressed air shall be used to remove all dust and moisture from the slot. Sand or other moisture absorbing materials shall not be used in the slot. Installation of the loop cable or piezoelectric sensor in the slots may not take place until the slot is clean and completely dry.

The installation brackets for piezoelectric sensors shall be placed every 6 in.

B. Conduits and Wiring.

A PVC-coated Type FM conduit shall be installed between the pavement and the NTCS post base or pull box. The conduit shall be installed at a minimum depth of 6 in. below the ground and pavement surfaces.

For loop detectors, Type 13 Loop Detector Wire shall be installed starting at the NTCS post base or pull box, around the cut loop the specified number of times, then back to the NTCS post base or pull box. The wire shall be placed in the saw cuts with no kinks or curls and no stretching of the insulation. The wire shall be pushed as deep into the slot as possible with the use of a dull or blunt-faced tool; screwdrivers or other sharp tools that could damage the wire shall be prohibited. Wire damaged during installation shall be removed and replaced at no additional cost.

There shall be no splices anywhere in these wire runs except between Type 13 Loop Detector Wire and Shielded Loop Detector Lead-In Cable. This splice shall only be made in the NTCS post base or in a pull box. Splices shall only be moisture preventing, epoxy-filled, clear rigid mold type.

Piezoelectric lead-in cables shall be directly from the NTCS post base to the saw cut via the Type FM conduit. No splices in lead-in cables will be allowed.

Multiple loop detector and/or piezoelectric sensor cables shall be identified by colored tape or fabric tags at each access point. If multiple loops and/or piezoelectric sensors are installed, each shall be given a number that number shall be clearly designated within the NTCS enclosure.

C. Electrical Testing.

All tests shall be performed in the presence of the Engineer before and after the loops and/or sensor is sealed in the pavement. The cost of equipment, labor, and materials to perform such testing and retesting, if necessary, following repairs, replacement, or adjustment of any detector shall be included in the unit price for the item.

Each loop wire shall be tested for proper installation to obtain resistance (R), quality (Q), and Inductance (I) and a copy of the test results shall be provided to the Engineer:

- The resistance (R) for each loop sensor shall not exceed 3 ohms per 1,000 ft as measured by a high-quality meter suitable for measurements of low resistance.
- The quality of each loop tested (Q value) shall be no less than 5.
- The measured inductance (I) of each loop shall conform to calculated inductance values after accounting for the size of the loop, the number of turns, the wire gauge and length of cable.
- The piezoelectric sensor shall be tested in accordance with the manufacturer specifications before and after the sensor is sealed in the pavement. A copy of the completed piezo test results showing the capacitance, dissipation, and resistance of each piezo sensor installed shall be provided to the Engineer.

If any inductive loop detectors or piezoelectric sensors fails to pass any of the above tests, it shall be repaired and then retested. If the retest fails, a new inductive loop detector or piezoelectric sensor shall be installed, and shall pass these tests, at no additional cost. This shall be repeated until the required tests are all satisfactory.

SECTION 871 (Continued)**871.62: System Testing, Calibration, and Acceptance**

Any client software to configure, test, and/or calibrate the NTCS shall be provided. Any costs associated with this software shall be included in the bid price of the item.

The type of testing count(s) that will be performed depends upon the device type (Intersection or Trail). Intersection devices shall be tested in all detection zones in all directions, on all axes. Trail devices shall be tested bidirectionally through the detection zone. Tests shall segregate by count subject type (pedestrians, bicyclists, and/or both).

The Contractor shall conduct accuracy testing to ensure proper operation of the NTCS. All testing shall take place during times of day and weather conditions when pedestrian and/or bicyclist activity will be anticipated. The accuracy testing shall consist of manual count collection by direction for a minimum of three 5-minute intervals for a total duration of 15 minutes in the presence of the Engineer. The Contractor shall retrieve the count collected by the NTCS during the same period and submit the manual and retrieved count data to the Engineer for verification of count accuracy.

Test results shall meet or exceed the accuracy levels stated in 871.45: Functional Requirements. Test results that fall under these levels will require the Contractor to modify, reconfigure, reinstall, and/or recalibrate and then retest at no additional cost.

All product documentation such as installation manual, user manual, wireless communication contract, warranties, and as-built drawings shall be submitted to the Engineer within 60 days of Acceptance for any Permanent NTCS.

COMPENSATION**871.80: Method of Measurement**

Portable NTCS will be measured by the day for every 24-hour period deployed.

Permanent NTCS will be measured as a single unit, each in place.

871.81: Basis of Payment

Portable NTCS for Intersections and Portable NTCS for Trails will be paid for at the contract unit price Day and shall include all materials, equipment, batteries and solar array (if required), software, data housing and transmission, and labor to install, test and calibrate, maintain, and remove the device.

Permanent NTCS for Intersections and Permanent NTCS for Trails will be paid for at the contract unit price each and shall include all materials, equipment, batteries and solar array, software, data housing and transmission for a period of 10 years, and labor to install, test and calibrate.

871.82: Payment Items

871.11	Portable NTCS for Intersections.....	Day
871.12	Portable NTCS for Trails	Day
871.21	Permanent NTCS for Intersections	Each
871.22	Permanent NTCS for Trails.....	Each

SECTION 900: STRUCTURES**SUBSECTION 901: CEMENT CONCRETE****CONSTRUCTION METHODS****Subsection 901.66 Placement, Finishing and Curing of Concrete Bridge Decks.***(page II.447) Replace paragraph A., 5. with the following,*

5. The method for curing the concrete deck. This will include the number of personnel that will be exclusively dedicated for this operation, the means for pre-wetting the burlap, the location of the wet burlap at the work site, the means for conveying the wet burlap to the work bridges and the amount of wet burlap that will be required to completely cover the deck. It shall also include a letter certifying that the fogging equipment produces atomized water droplets with an average droplet diameter of 0.003 in. or less that are uniformly distributed at a rate of at least 0.10 gallons/square foot/hour.

(page II.450) Replace paragraph D. Consolidation with the following,

The concrete shall be consolidated by means of approved high frequency internal vibrators (9,000 to 12,500 vibrations per minute in concrete) that shall be applied in a manner to ensure the consolidation of the concrete throughout the full depth of the deck in advance of the finishing machine. The Contractor shall use rubber vibrator heads or take other approved preventive measures to ensure that the vibrators will not damage the epoxy coated reinforcement. The Contractor shall have approved vibrators in service for each placement operation in accordance with Table 901.66-1. The backup vibrator shall be fully functional and shall be on site and available in case of equipment failure.

Table 901.66-1: Minimum Number of Internal Concrete Vibrators Required

Concrete Placement Rate	Number of Vibrators Required to be In Service	Total Number of Vibrators Required Including Backup
35 yd ³ to 60 yd ³ per hour	3	4
Greater than 60 yd ³ per hour	4	5

These vibrators shall be in operation in addition to the surface vibratory action from the vibrating pan(s) of the finishing machine. Consolidation by the vibrators shall leave the concrete free from voids and insure a dense surface texture, but the vibration of the concrete shall not be continued so long as to cause segregation or bleeding. A small uniform quantity of concrete shall be maintained ahead of the screed on each pass. At no time shall the quantity of concrete carried ahead of the screed be so great as to cause slipping or lifting.

(page II.454) Replace the second paragraph under F. with the following,

Curing shall begin by fog spraying during the placing and finishing operations. Fogging shall continue and shall be applied continuously, rather than intermittently, after the finishing operation until wet covering material has been placed over the concrete surface.

Subsection 901.82 Payment Items.*(page II.464) Add the following pay item;*

904.4 4,000 psi, ¾ inch, 585 HP Cement Concrete Cubic Yard

SUBSECTION 945: DRILLED SHAFTS

Subsection 945.51 Drilled Shaft Installation Plan.

(page II.488) Replace the first paragraph and number 1. with the following,

The Contractor shall submit a drilled shaft installation plan for review and approval of the Engineer at least 30 days prior to the anticipated date of beginning drilled shaft work. This plan shall provide the following:

1. The sequence of drilled shaft construction represented on a layout plan as it relates to the overall construction plan and the sequence of shaft construction in bents or groups.

Subsection 945.55 General Methods and Equipment

(page II.491) Change the title of C. Casing Construction Method. to C. Casing Method.

Subsection 945.58 Steel Reinforcement Configuration and Placement.

(page II.496) Replace the second paragraph with the following,

The clear spacing between bars of the steel reinforcement cage shall be at least 5 times the size of the maximum coarse aggregate size of concrete. Reinforcing steel bars shall be connected together using double wire ties at each intersection of the longitudinal bars and spirals. Hooks at the top of the steel reinforcement cage shall not be bent outward if there is any chance that temporary casing will be used. Similarly, interior hooks must be designed to permit adequate clearance for a concrete tremie pipe, i.e., 12 in. minimum.

Subsection 945.60 Inspection

(page II.501) Add the following paragraph to the end of B. Cross-hole Sonic Inspection, 6. Acceptance;

After the CSL testing has been completed and the shaft accepted the CSL tubes will be blown out with an air hose lowered to the bottom of the tube. The tube will then be filled with a neat cement grout. If the water cannot be removed the grout will be placed using tremie methods.

Subsection 945.61 Drilled Shaft Load Tests

(page II.502) Replace the second paragraph from the end of paragraph A. General, with the following;

Bi-directional load tests shall conform to the requirements of ASTM D8169 or as modified herein.

Other types of Load Tests may be included in a project's Special Provisions. A detailed Testing Plan, in conformance with the specification requirements, shall be submitted to the Engineer for review and approval.

The contractor shall supply calibration certificates from a certified testing laboratory for each instrument to measure load or movement during the load testing of the drilled shaft.

(page II.502) Change the title of paragraph B. Osterberg Cell (O-cell) Load Test with B. Osterberg Cell (Bi-directional or O-cell) Load Test.

(page II.502) Replace Paragraph B. 2. Manufacturer's Representative with the following;

2. Manufacturer's Representative and Contractor's Testing Engineer.

The Contractor shall obtain the services of a licensed Professional Engineer, with O-cell load testing experience, to conduct the test in compliance with these specifications, record all data and furnish reports of the test results to the Engineer. The Manufacturer's Representative from the supplier of the Bi-direction Load cell shall be present on site during the installation of the load cell and other instruments required for testing of the shaft, the placement of the concrete for the test shaft and during initial testing.

(page II.502) Replace Paragraph B. 6. Report with the following;

6. Report.

The contractor will supply a report in PDF format for each load test detailing the load-movement curves and test data. The report shall be reviewed and approved by the Engineer.

Subsection 945.81 Basis of Payment

(page II.507) Replace the second paragraph from the end with the following;

Osterberg load cell axial load testing shall be paid for at the contract unit price per each Osterberg load cell axial load test completed and accepted. Payment for Osterberg load cell axial load testing shall be considered full compensation for the performance of the load test, including all labor, equipment, and materials incidental to the test instrumentation, data collection and report (and subsequent removal of test apparatus and appurtenances) prepared under the direction of the Contractor's Testing Engineer and the Manufacturer's Representative.

DIVISION III MATERIALS SPECIFICATIONS

SECTION M4: CEMENT AND CEMENT CONCRETE MATERIALS

M4.02.15 Cement Mortar

(page III.65) Change Paragraph B to Paragraph A.

SECTION M9: MISCELLANEOUS MATERIALS

Subsection M9.18.0 Impact Attenuators

(page III.140) Add this new subsection.

All Impact Attenuators shall be tested to MASH crash testing standards.

Subsection M9.18.1 Redirective Impact Attenuators

(page III.140) Add this new subsection.

To be classified as a Redirective Impact Attenuator, the results of the following crash test designations must fall within the acceptable impact tolerances and evaluation criteria show in Table 2-3 of MASH (n = Test Level): n-30, n-31, n-32, n-33, n-34, n-35, n-36, n-37 (2270P Pickup Truck, only), and n-38.

Redirective Impact Attenuators will be designated as such on the QTCE.

Subsection M9.18.2 Non-Redirective Impact Attenuators

(page III.140) Add this new subsection.

To be classified as a Non-Redirective Impact Attenuator, the results of the following crash test designations must fall within the acceptable impact tolerances and evaluation criteria show in Table 2-3 of MASH (n = Test Level): n-40, n-41, n-42, n-43, n-44, and n-45.

Non-Redirective Impact Attenuators will be designated as such on the QTCE.

Subsection M9.18.3 Low-Maintenance Impact Attenuators

(page III.140) Add this new subsection.

To be classified as a Low-Maintenance Impact Attenuator, the device must:

1. Meet the criteria of M9.18.1 Redirective Impact Attenuators.
2. Meet the Department's minimum requirements for the evaluation of Low-Maintenance Impact Attenuators.

Low-Maintenance Impact Attenuators will be designated as such on the QTCE. A single product may be listed as both a Redirective Impact Attenuator and a Low-Maintenance Impact Attenuator.

Subsection M9.30.3 Acrylic, Prismatic Reflectors and Embossed Aluminum Frames for Signs

(page III.140) Delete this Subsection.

Subsection M9.31.0 Non-Motorized Traffic counting Stations (NTCS)

Subsection M9.31.0 NTCs for Intersections

Subsection M9.31.0 NTCs for Trails

(page II1.141) Add these new Subsections in numerical order.

M9.31.0: Non-motorized Traffic Counting Stations (NTCS)

NTCS shall have a count accuracy of 85% or greater, by direction of travel. When located on a facility that has both pedestrian and bicycle traffic, such as a multi-use path, the minimum count accuracy shall apply to both user types. When located on a facility that is limited to pedestrians, such as a sidewalk, the minimum count accuracy shall only apply to pedestrian counts. When located on a facility that is limited to bicyclists, such as a bike lane, the minimum count accuracy shall only apply to bicyclist counts.

NTCS shall have the capability to collect counts by direction and log the data for pedestrians and bicyclists separately.

The data collected shall be in predefined time interval bins. These bins shall, at a minimum, include options for 1-minute, 5-minute, 15-minute, 1-hour, and 24-hour intervals. 24-hour counts shall be formatted with intervals that start at midnight (0:00 a.m.). Data shall be exportable in a Department-defined .csv, .xlsx, and/or .xml format.

NTCS shall have an independent, battery-operated power source and shall not require a hard-wired service connection, with exceptions to Permanent NTCS for Intersections as described below. Batteries shall be sized to allow uninterrupted operation of the NTCS for a minimum of 1 year. Solar panels, if required, may be used to keep the batteries at a sufficient charge. All batteries shall carry a minimum 1-year warranty. Replacement batteries shall be industry standard, commercially available, and not proprietary to device.

As an exception to the independent power source requirement, a traffic signal cabinet may be used to leverage the installation of a Permanent NTCS for Intersections by providing Power over Ethernet (PoE) from the cabinet to the proposed device.

All NTCS shall offer free, manufacturer support available during typical business hours, Monday through Friday. Permanent devices shall be furnished with a manufacturer's warranty for all materials for at least one year following acceptance.

Firmware, software, and security updates shall be included at no cost for the life of the product.

M9.31.1: NTCS for Intersections

Items classified for use at Intersections shall have the capability of uniquely identifying, classifying, and discretely counting pedestrians and/or bicyclists passing through one or more user-defined zones, traveling in both directions along multiple axes.

The accuracy of Intersection Devices shall not be influenced by the presence of motor vehicles adjacent to the user-defined detection zones, if separate, or within the detection zone if the space is shared between motorized and non-motorized traffic, such as a shared lane or crosswalk.

M9.31.2: NTCS for Trails

Items classified for use on Trails shall have the capability of uniquely identifying, classifying, and discretely counting pedestrians and/or bicyclists passing a user-defined point or zone in both directions on a single axis.

The accuracy of Trail Devices shall not be influenced by the presence of motor vehicles that are offset a minimum of 6 ft from the edge of the detection point or zone.

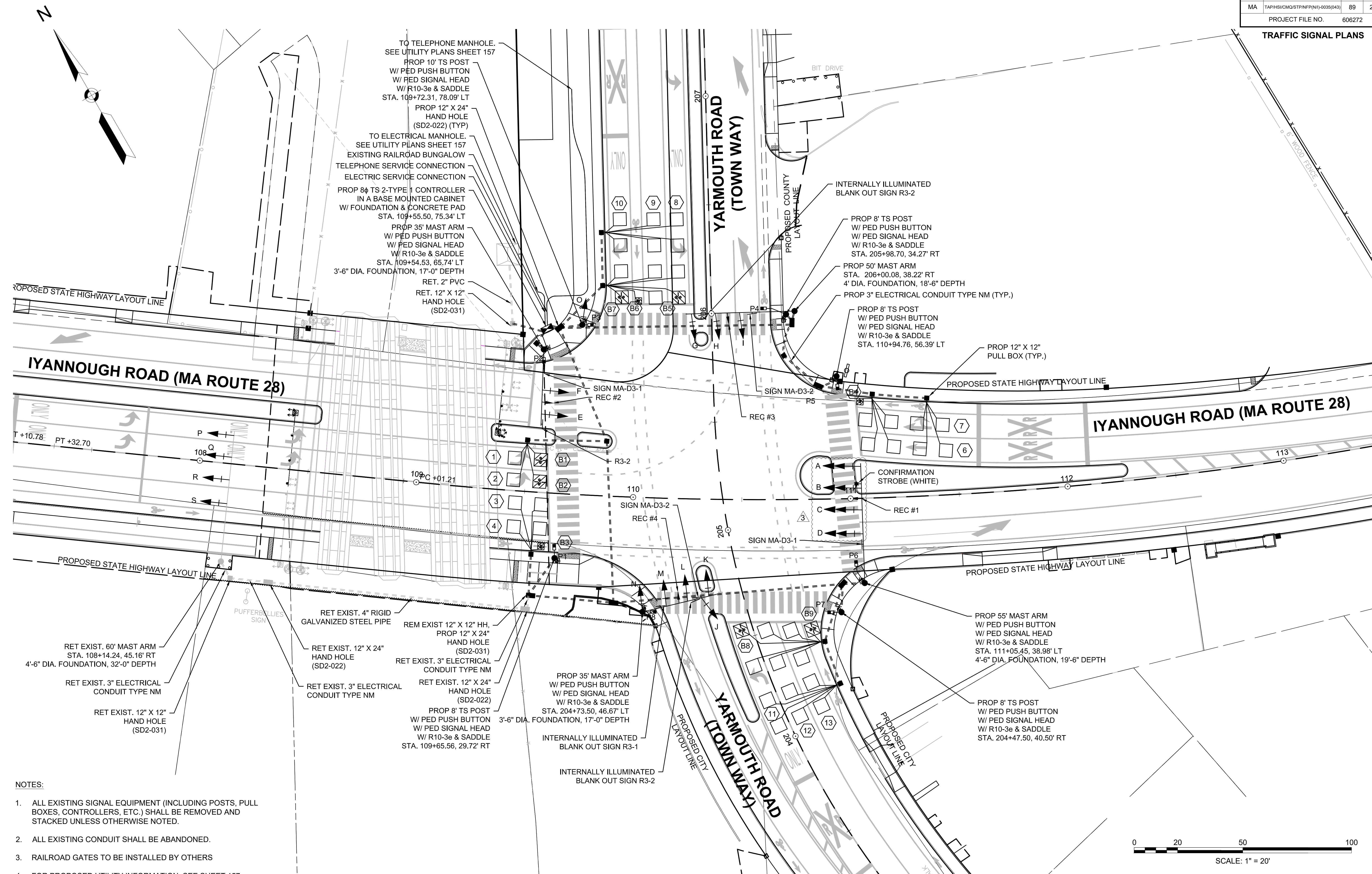
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END OF SUPPLEMENTAL SPECIFICATIONS

BARNSTABLE
IYANNOUGH RD (RTE 28) AND YARMOUTH RD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	TAPHSUCM02STPINFPR(NH)-0035(043)	89	231
PROJECT FILE NO.		606272	

TRAFFIC SIGNAL PLANS



NOTES:

- ALL EXISTING SIGNAL EQUIPMENT (INCLUDING POSTS, PULL BOXES, CONTROLLERS, ETC.) SHALL BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.
- ALL EXISTING CONDUIT SHALL BE ABANDONED.
- RAILROAD GATES TO BE INSTALLED BY OTHERS
- FOR PROPOSED UTILITY INFORMATION, SEE SHEET 157
- PROPOSED PAVEMENT MARKINGS ARE GRAYED OUT FOR CLARITY. FOR PROPOSED PAVEMENT MARKINGS, SEE SHEET 80



