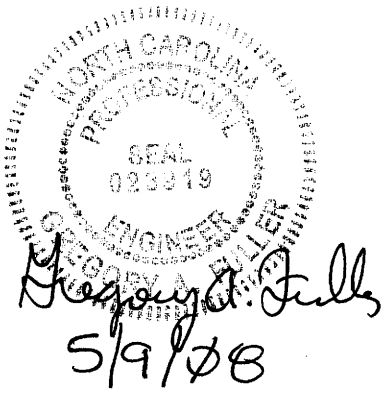
CCTV CAMERA RELOCATION
Project Special Provisions

Intelligent Transportation Systems



Prepared By:S.C. Yow
April 28, 2008

Contents

1. 2006 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2006 Standard Specifications are revised as follows:

1.1 GENERAL REQUIREMENTS (1098-1)

Page 10-268, Subarticle 1098-1(H)

In the first paragraph, revise the second sentence to "Ensure service disconnects are listed as meeting UL Standard UL-489 and marked as being suitable for use as service equipment."

In the second paragraph, revise the first sentence to "Furnish NEMA Type 3R meter base rated 100 Ampere minimum that meets the requirements of the local utility. Provide meter base with sockets' ampere rating based on sockets being wired with minimum of 167 degrees F insulated wire."

In the second paragraph, last item on page, revise to "With or without horn bypass."

Page 10-269, Subarticle 1098-1(H)

Revise the second line to "Listed as meeting UL Standard UL-414."

In the first full paragraph on page, remove the first sentence.

Revise the last paragraph to "If meter base and electrical service disconnect are supplied in the same enclosure, ensure assembly is marked as being suitable for use as service equipment. Ensure combination meter and disconnect mounted in a pedestal for underground service is listed as meeting UL Standard UL-231. Otherwise, ensure combination meter and disconnect is listed as meeting UL Standard UL-67.

1.2 WOOD POLES (1098-6)

Page 10-272, Delete article. Refer to Subarticles 1082 –3(F) and 1082-4(G).

2. GENERAL REQUIREMENTS

2.1 DESCRIPTION

Dismantle and relocate one existing Closed Circuit Television (CCTV) camera and metal pole in accordance with these Project Special Provisions and as indicated on the Plans. Use the existing metal pole, 336 stretch (336S) pole mounted equipment cabinet and all existing equipment contained inside the equipment cabinet unless otherwise stated in these Project Special Provision or on the Plans. Furnish and install a new metal pole foundation. Install new conduit, junction boxes and fiber optic communications cable. Modify the existing electrical service. Test the relocated CCTV camera at the Division 7 Triad Regional Traffic Management Center (TRTMC) located in Greensboro, NC.

The Department will utilize CCTV camera at this location to monitor traffic along this route while the bridge is under construction. The Contractor must not allow the CCTV camera system to be off-line for more than 21 days. Coordinate with the Engineer for the CCTV camera relocation construction sequence.

2.2 MATERIALS

A. General

Conform to these Project Special Provisions and the 2006 Standard Specifications for Roads and Structures (also referred to herein as the "Standard Specifications"). The current edition of these specifications and publications in effect on the date of advertisement shall apply.

Conform to the requirements of the pay items included in these Project Special Provisions. All other pay items for items not described in these Project Special Provisions are included in the Standard Specifications and must be conformed to as described in those specifications unless modified herein.

Unless otherwise stated, furnish new equipment, materials, and hardware that meet the requirements of these Project Special Provisions. Permanently inscribe the manufacturer's name, model number, serial number, and any additional information needed for proper identification on each piece of equipment housed in a case or housing. Ensure all materials are compatible with the existing equipment as specified in these Project Special Provisions.

B. Qualified Products List

The Department has a Qualified Products List (QPL) available for the contractor's use. The QPL web site is:

http://www.doh.dot.state.nc.us/preconstruct/traffic/TMSSU/SMS/QPL/

C. Submittal Requirements

Before beginning installation of any component, submit manufacturer's specifications, catalog cut sheets, system block diagrams, and / or wiring diagrams (as applicable) for each proposed piece of equipment. The Engineer will return submittals with comments to the Contractor within forty (40) days. Once materials have been approved, the Contractor may begin installation. Provide three (3) copies of each submittal for review.

D. Warranties

Ensure all equipment and workmanship supplied is fully warranted. Unless otherwise required herein, provide manufacturer's warranties on all Contractor-furnished equipment for material and workmanship that are customarily issued by the equipment manufacturer and that are at least one (1) year in length from the completion of the 30-day Observation Period. Include unconditional coverage for all parts and labor necessary or incidental to the repair of defective equipment or workmanship and malfunctions that arise during the warranty period.

Upon successful completion of the 30-day Observation Period, transfer manufacturer's warranties with proper validation by the manufacturer to the Department or its designated maintaining agency.

E. Documentation

For documentation that exceeds 8.5 x 11 inch, furnish good quality, highly legible, reproducible drawings; however, the use of 11 x 17 inch drawings folded and bound into manuals will be acceptable.

Provide wiring diagrams for each location in which new equipment is installed or wiring /cabling configurations are modified.

2.3 CONSTRUCTION METHODS

A. General

Unless otherwise stated in these Project Special Provisions, perform work that meets the requirements of the Standard Specifications and these Project Special Provisions. In the event of a conflict between these Project Special Provisions and the Standard Specifications, these Project Special Provisions shall govern.

Immediately cease work and notify the Engineer and the affected owners if damage to existing utilities, cables, or equipment occurs. Make all required repairs and replacements at no additional cost to the Department.

B. Regulations and Codes

Furnish material and workmanship conforming to the National Electric Code (NEC), the National Electric Safety Code (NESC), Underwriter's Laboratories (UL) or other listing agencies approved by the North Carolina Department of Insurance, and all local safety codes in effect on the date of advertisement. Comply with Article 4, Chapter 87 of the North Carolina General Statutes (Licensing of Electrical Contractors). Comply with the Plans, all previously referenced specifications, and all applicable local ordinances and regulations before and during all stages of electrical work.

When required by the local ordinances and governmental agencies, upon completion of the work, have all systems inspected and approved in writing by the authorized governmental electrical inspector for the area. Furnish written certification of the authorized inspector's approval to the Engineer. Inspection by the authorized governmental electrical inspector must neither eliminate nor take the place of inspections by the Engineer. Upon the Engineer's receipt of written certification and the Contractor's written request for a final inspection of the installations, the Engineer will perform a final inspection.

3. CCTV EQUIPMENT RELOCATION

3.1 DESCRIPTION

Dismantle and relocate one existing CCTV camera in accordance with these Project Special Provisions and as indicated on the Plans. Use the existing metal pole, 336S pole mounted equipment cabinet and all existing equipment contained inside the equipment cabinet. Reuse as much of the existing cabling as possible. If cables and connectors are damaged during dismantling and relocating the CCTV camera, the contractor must replace damaged equipment with new equipment at no additional cost to the Department.

3.2 MATERIALS

A. General

Install all necessary cable, connectors and incidental hardware to make a complete and operable system. Furnish and install a new lightning arrestor and install in-line between the CCTV camera and the equipment cabinet components.

B. CCTV Camera Attachment to Pole

Use stainless steel banding approved by the Engineer.

CCTV camera attachment must withstand wind loading at 90 mph maximum wind speed and gust factor of up to 110 mph. Attachment must support a minimum camera unit dead load of 45 pounds.

C. Surge Suppression

All equipment at the top of the pole must be protected by grounded metal oxide varistors connecting each power and control conductor to ground.

Coaxial cable from each camera must be protected by a surge protector equivalent to Vicon V15LP, at each end of the cable.

3.3 CONSTRUCTION METHODS

A. General

Remove existing CCTV camera and mount the camera unit onto relocated existing CCTV metal pole as shown on the Plans at a height of 45 feet above ground level.

Install the CCTV assembly at the location stated in these Project Special Provisions and as shown on the Plans.

Mount CCTV camera on side of pole nearest intended field of view and avoids occluding the view with the pole. Obtain approval of camera orientation from the Engineer.

Integrate the existing CCTV camera unit with the existing pan, tilt and zoom (PTZ) transmission equipment, equipment cabinet, and equipment cabinet power supply.

B. Electrical and Mechanical Requirements

Ground all equipment as called for in the Standard Specifications, these Special Provisions, and grounding details (see Figure 1) attached to the end of this document using new grounding equipment.

Install surge protectors on all ungrounded conductors entering the CCTV enclosure. House the protectors in the CCTV equipment cabinet in a manner approved by the Engineer. The air terminal ground wire must not pass through this cabinet.

Install coaxial cable as required to interconnect PTZ equipment with the CCTV unit. Ensure that all connections are tight and fully secure.

3.4 MEASUREMENT AND PAYMENT

Relocate CCTV assembly will be measured and paid in actual number of CCTV assemblies relocated, installed, integrated, and accepted. No separate measurement will be made for cabling, connectors, CCTV camera attachment assemblies, relocation of the existing field equipment cabinet, conduit, condulets, grounding equipment, surge protectors, or any other equipment or labor required to relocate and install the CCTV assembly and integrate it with the existing CCTV camera system as these will be considered incidental to relocating the CCTV assembly.

No measurement will be made for coaxial cable. Coaxial cable, furnished and installed in the quantities required, will be incidental to relocating the CCTV assembly.

Payment will be made under:

Pay Item	Pay Unit
Relocate CCTV Assembly	**Each**

4. CCTV METAL POLE

4.1 GENERAL

Remove, relocate and reinstall metal CCTV pole with grounding systems, and all necessary hardware. The work covered by this special provision includes requirements for the removal of an existing CCTV metal pole and its foundation, relocating it, and reinstalling it on a new foundation. Comply with other provisions in this contract, and as directed by the Engineer regarding time restrictions to perform this work and provide a fully operational camera monitoring system in the new location.

Remove and dispose of the metal pole foundation include reinforcing steel, electrical wires, and anchor bolts to a minimum depth of two feet below the finished ground elevation. At the Contractor's option, remove the complete foundation.

Comply with Sub article 1098-1B "General Requirements" of the *Standard Specifications* for submittal requirements. Furnish a foundation design using actual soil test data along with existing shop drawings for approval. Existing shop drawings may be obtained from:

Atlantic Technical Sales Inc.
14522-K Lee Road
Chantilly, Virginia 20151
Engineer of Record: Robert R. Mantz, PE (Phone No. 703-631-6661)
Drawing Reference No.: MM3695-1

Provide design calculations based on actual soil conditions with these submittals. Provide triplicate copies. Ensure that shop drawings show materials specifications for each component and identify welds by type and size. Provide an itemized bill of materials for all structural items necessary for the foundation.

Summary of information needed for metal pole foundation review submittals:

- Existing Shop drawings & supporting calculations
- Foundation design
- Soil boring logs
- Soil boring location map
- Geotechnical report of soil classification

4.2 MATERIALS

Ensure material used in steel anchor bolts conforms to AASHTO M 314, and yield strength does not exceed 55,000 psi. Provide anchor bolts of the size, and material specified on existing shop drawings. Provide appropriate material quantities required by the design. Provide additional owner required materials described in the following two paragraphs. Galvanize each anchor bolt in accordance with AASHTO M232 or M298 from the top of the bolt to a minimum of 2" below the end of the threads.

Provide a circular anchor bolt lock plate that will be secured to the anchor bolts at the embedded end with 2 washers and nuts. Provide a base plate template that matches the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from ¼" minimum thick steel with a minimum width of 4". Galvanizing is not required.

Provide 4 heavy hex nuts and 4 flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material.

4.3 CONSTRUCTION METHODS

Remove existing CCTV metal pole, and associated foundation, associated anchor bolts, electrical wires and connections.

Store the CCTV metal pole at a location mutually agreed on by the Contractor and the Engineer. Ensure that the pole is stored in an area that minimizes potential damage to the pole.

Erect CCTV pole only after concrete has attained a minimum allowable compressive strength of 3000 psi. Follow anchor nut-tightening procedures below to complete the installation of the upright. Connect pole to grounding electrodes. Install metal pole, hardware, and fittings as shown on the manufacturer's installation drawings. Install metal pole so that when the pole is fully loaded it is within 2 degrees of vertical.

For holes in the pole used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.

Perform repair of damaged galvanizing that complies with the *Standard Specifications*, Article 1076-6 "Repair of Galvanizing."

Anchor Nut Tightening Procedure

Compute the required projection of the anchor bolt above the foundation top. Compute the total projection based on the following:

- Provide between 3 and 5 threads of anchor bolt projection above the top nut after tightening is complete. Avoid any additional projection, or a normal depth socket torque wrench can not be used on top nuts.
- Include the sum of the thickness of top nut, top nut flat washer or top nut beveled washer, base plate, leveling nut flat washer or leveling nut beveled washer, and leveling nut.

- Set the maximum distance between the bottom of the leveling nut and the foundation top to one nut height to avoid excessive bending stresses in the anchor bolt under service conditions.
- Do not use lock washers.

Installation Procedure:

1. Place a leveling nut and washer on each anchor bolt and install a template on top of the leveling nuts to verify that the nuts are level and uniformly contact the template. Use beveled washers if the leveling nuts cannot be brought into firm contact with the template. Verify that the distance between the bottom of the leveling nuts and the top of the concrete is no more than one nut height. Consider how attachments and applied loads may affect the vertical nature of the metal pole after erected and fully loaded. If necessary, induce a rake to the upright in the opposite direction of the anticipated loads during the initial erection by adjusting the leveling nuts accordingly. Failure to consider this could result in the upright being out of the allowable vertical tolerance as specified in the Metal Strain Pole Construction Methods of this special provision.
2. Install the vertical upright on the anchor bolts, and tighten nuts in compliance with steps 3, 4, and 5 below. Do not attach cantilever arms or messenger cable to the vertical post until all of the top nuts and leveling nuts have been properly tightened on the anchor bolts.
3. Install top nuts and washers. Install flat washers under the top and leveling nuts. Use beveled washers if the nuts cannot be brought into firm contact with the base plate. Lubricate threads of the anchor bolts, nuts, and bearing surface of the nuts and tighten to a snug-tight condition with a spud wrench following a star pattern (using at least two increments). Snug-tight condition is defined as 20% to 30% of the verification torque (600 ft-lbs.). Ensure lubricant is beeswax, stick paraffin, or other approved lubricant.
4. After the top nuts have been snug tightened, snug tighten the bottom nuts up to the base plate using the same procedure as described above. The base-plate must be in firm contact with both the top and bottom nuts to achieve the proper pretension in the anchor bolts.
5. Before further turning of the nuts, mark the reference position of the top nut in the snug-tight condition by match marking each nut, bolt shank, and base plate. Use ink or paint that is not water-soluble.
6. Turn the top nuts in increments using the star pattern (using at least two full tightening cycles) to 1/6 of a turn. Use a torque wrench to verify that at least 600 ft-lbs. is required to further tighten the top nuts. At least 48 hours after the entire structure and any attachments are erected, use a torque wrench again to verify that at least 600 ft-lbs. is still required to tighten the top nuts. Verify that the leveling nuts remain in firm contact with the base plate.
7. Do not place non-shrink grout between the base plate and foundation. This will allow for future inspection of leveling nuts and for adequate drainage of moisture.

4.4 MEASUREMENT AND PAYMENT

CCTV Metal Pole will be measured and paid in actual number of CCTV metal poles installed and accepted. Contract work includes field location of the pole placement position.

No additional measurement will be made of the removal and relocating the existing metal pole as this item is covered elsewhere.

Payment will be made under:

Pay Item	Pay Unit
CCTV Metal Pole	Each

5. DRILLED PIER FOUNDATION FOR CCTV METAL POLE

5.1 DESCRIPTION

Perform a soil test at the proposed new location for the CCTV metal pole. Furnish soil test data to contractor selected foundation designer for foundation design.

Design a site-specific foundation for the existing CCTV metal pole. Design the foundation to conform to the applicable provisions in the NCDOT Metal Pole Standards and Section B4 (Non-Standard Foundation Design) below.

5.2 SOIL TEST AND FOUNDATION DETERMINATION

A. General

Drilled piers are reinforced concrete sections, cast-in-place against in situ, undisturbed material. Drilled piers are of straight shaft type and vertical.

1. Soil Test

Perform a soil test at the proposed pole location. Complete all required fill placement and excavation at each the pole location to finished grade before drilling each boring. Drill one boring to a depth of 26 feet.

Perform standard penetration tests (SPT) in accordance with ASTM D 1586 at depths of 1, 2.5, 5, 7.5, 10, 15, 20 and 26 feet. Discontinue the boring if one of the following occurs:

- A total of 100 blows have been applied in any 2 consecutive 6-in. intervals.
- A total of 50 blows have been applied with < 3-in. penetration.

Label the boring as CCTV B1 and provide a description of the location of the bore. Submit a legible (hand written or typed) boring log signed and sealed by a licensed geologist or professional engineer registered in North Carolina. Include the SPT blow counts and N-values at each depth of the boring, and provide a report that provides a general description of the soil types encountered.

2. Standard Foundation Determination:

Use the following method for determining the Design N-value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \ldots\ldots N@\text{Deepest Boring Depth})}{\text{Total Number of N-values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \ldots\ldots (N@\text{Deepest Boring Depth})^2$$

$$Z = (N@1' + N@2.5' + \ldots\ldots N@\text{Deepest Boring Depth})$$

$$N_{STD\ DEV} = \left(\frac{(\text{Total Number of N-values} \times Y) - Z^2}{(\text{Total Number of N-values}) \times (\text{Total Number of N-values} - 1)} \right)^{0.5}$$

Design N-value equals lesser of the following two conditions:

$N_{AVG} - (N_{STD\ DEV} \times 0.45)$

Or

$$\text{Average of First Four N-Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than 4 N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero for weight of hammer or weight of rod. If N-value is greater than 50, reduce N-value to 50 for calculations.

Submit completed boring logs collected in accordance with Section 2 (Soil Test) above to the contractor-selected foundation designer.

If the distance between the edge of the drilled pier and the top of a slope steeper than 2:1 (H:V) is less than 10 feet or the grade within 10 feet is steeper than 2:1 (H:V), contact the Engineer.

If assistance is needed with the required calculations, contact the Signals and Geometrics Structural Engineer at (919) 773-2800. However, in no case will the failure or inability to contact the Signals and Geometrics Structural Engineer be cause for any claims or requests for additional compensation.

3. Non-Standard Foundation Design

Design foundation based upon site-specific soil test information collected in accordance with Section 2 (Soil Test) above. Provide a drilled pier foundation for the CCTV pole with a length and diameter that results in a horizontal lateral movement of less than 1 inch at the top of the pier and a horizontal rotational movement of less than 1 inch at the edge of the pier. Submit a foundation design including plans, calculations, and soil boring logs to the Engineer for review and approval before construction. A professional engineer registered in the state of North Carolina must seal all plans and calculations.

5.3 DRILLED PIER CONSTRUCTION METHODS

Excavation

Perform excavations for drilled piers to the required dimensions and lengths including all miscellaneous grading and excavation necessary to install the drilled pier. Depending on the subsurface conditions encountered, excavation in weathered rock or removal of boulders may be required.

Dispose of drilling spoils as directed and in accordance with Section 802 of the *Standard Specifications*. Drilling spoils consist of all material excavated including water or slurry removed from the excavation either by pumping or with augers.

Construct all drilled piers such that the piers are cast against undisturbed soil. If a larger casing and drilled pier are required as a result of unstable or caving material during drilling, backfill the excavation before removing the casing to be replaced. No additional payment will be made for substituting a larger diameter drilled pier in order to construct a drilled pier cast against undisturbed soil.

Construct drilled piers within the tolerances specified herein. If tolerances are exceeded, provide additional construction as approved by the Engineer to bring the piers within the tolerances specified. Construct drilled piers such that the axis at the top of the piers is no more than 3 inches in any direction from the specified position. Build drilled piers within 1% of the plumb deviation for the total length of the piers. Construct the finished top of pier elevation between 5 inches above and

2 inches above the finished grade elevation. Form the top of the pier such that the concrete is smooth and level.

If unstable, caving, or sloughing soils are anticipated or encountered, stabilize drilled pier excavations with either steel casing or polymer slurry. Steel casing may be either the sectional type or one continuous corrugated or non-corrugated piece. Ensure all steel casings consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the specified pier size and a minimum wall thickness of 1/4 inches. Extract all temporary casings during concrete placement in accordance with this special provision unless the Contractor chooses to leave the casing in place in accordance with the requirements below.

Any temporary steel casing that becomes bound or fouled during pier construction and cannot be practically removed may constitute a defect in the drilled pier. Improve such defective piers to the satisfaction of the Engineer by removing the concrete and enlarging the drilled pier, providing a replacement pier or other approved means. All corrective measures including redesign as a result of defective piers will not be cause for any claims or requests for additional compensation.

Any steel casing left in place will be considered permanent casing. Permanent steel casings are only allowed for strain poles. When installing permanent casing, do not drill or excavate below the tip of the permanent casing at any time such that the permanent casing is against undisturbed soil. The Contractor may excavate a hole smaller than the specified pier size to facilitate permanent casing installation. Ensure the sides of the excavation do not slough during drilling. Ensure the hole diameter does not become larger than the inside diameter of the casing. No additional compensation will be paid for permanent casing.

If polymer slurry is chosen to stabilize the excavation, use one of the following polymers listed in the table below:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd 3648 FM 1960 West, Suite 107 Houston, TX 77068 (800) 525-5237
Super Mud	PDS Company 105 West Sharp Street El Dorado, AR 71730 (800) 243-7455
Shore Pac GCV	CETCO Drilling Products Group 1500 West Shure Drive Arlington Heights, IL 60004 (800) 527-9948
Novagel Polymer	Geo-Tech Drilling Fluids 220 North Zapata Hwy, Suite 11A Laredo, TX 78043 (210) 587-4758

Use slurry in accordance with the manufacturer's guidelines and recommendations unless approved otherwise by the Engineer. The Contractor should be aware that polymer slurry may not be appropriate for a given site. Polymer slurry should not be used for excavations in soft or loose soils as determined by the Engineer.

In wet pour conditions, advise and gain approval from the Engineer as to the planned construction method intended for the complete installation of the drilled pier before excavating.

1. Reinforcing Steel

Completely assemble a cage of reinforcing steel consisting of longitudinal and spiral bars and place cage in the drilled pier excavation as a unit immediately upon completion of drilling unless the excavation is entirely cased. If the drilled pier excavation is entirely cased down to the tip, immediate placement of the reinforcing steel is not required.

Lift the cage so racking and cage distortion does not occur. Keep the cage plumb during concrete operations and casing extraction. Check the position of the cage before and after placing the concrete.

Securely cross-tie the vertical and spiral reinforcement at each intersection with double wire. Support or hold down the cage so that the vertical displacement during concrete placement and casing extraction does not exceed 2 inches.

Do not set the cage on the bottom of the drilled pier excavation. Place plastic bolsters under each vertical reinforcing bar that are tall enough to raise the rebar cage off the bottom of the drilled pier excavation a minimum of 3 inches.

In order to ensure a minimum of 3 inches of concrete cover and achieve concentric spacing of the cage within the pier, tie plastic spacer wheels at five points around the cage perimeter. Use spacer wheels that provide a minimum of 3 inches "blocking" from the outside face of the spiral bars to the outermost surface of the drilled pier. Tie spacer wheels that snap together with wire and allow them to rotate. Use spacer wheels that span at least two adjacent vertical bars. Start placing spacer wheels at the bottom of the cage and continue up along its length at maximum 10-foot intervals. Supply additional peripheral spacer wheels at closer intervals as necessary or as directed by the Engineer.

2. Concrete

Begin concrete placement immediately after inserting reinforcing steel into the drilled pier excavation. If the drilled pier excavation is entirely cased down to the tip, immediately placement of the concrete is not required.

a) Concrete Mix

Provide the mix design for drilled pier concrete for approval and, except as modified herein, meeting the requirements of Section 1000 of the *Standard Specifications*.

Designate the concrete as Drilled Pier Concrete with a minimum compressive strength of 4500 psi at 28 days. The Contractor may use a high early strength mix. Make certain the cementitious material content complies with one of the following options:

- Provide a minimum cement content of 640 lbs/yd^3 and a maximum cement content of 800 lbs/yd^3; however, if the alkali content of the cement exceeds 0.4%, reduce the cement content by 20% and replace it with fly ash at the rate of 1.2 lb of fly ash per lb of cement removed.
- If Type IP blended cement is used, use a minimum of 665 lbs/yd^3 Type IP blended cement and a maximum of 833 lbs/yd^3 Type IP blended cement in the mix.

Limit the water-cementitious material ratio to a maximum of 0.45. Do not air-entrain drilled pier concrete.

Produce a workable mix so that vibrating or prodding is not required to consolidate the concrete. When placing the concrete, make certain the slump is between 5 and 7 inches for dry placement of concrete or 7 and 9 inches for wet placement of concrete.

Use Type I or Type II cement or Type IP blended cement and either No. 67 or No. 78M coarse aggregate in the mix. Use an approved water-reducer, water-reducing retarder, high-range water-reducer or high-range water-reducing retarder to facilitate placement of the concrete if necessary. Do not use a stabilizing admixture as a retarder in Drilled Pier Concrete without approval of the Engineer. Use admixtures that satisfy AASHTO M194 and add admixtures at the concrete plant when the mixing water is introduced into the concrete. Redosing of admixtures is not permitted.

Place the concrete within 2 hours after introducing the mixing water. Ensure that the concrete temperature at the time of placement is 90°F or less.

b) Concrete Placement

Place concrete such that the drilled pier is a monolithic structure. Temporary casing may be completely removed and concrete placement may be temporarily stopped when the concrete level is within 42 to 48 inches of the ground elevation to allow for placement of anchor bolts and conduit. Do not pause concrete placement if unstable caving soils are present at the ground surface. Remove any water or slurry above the concrete and clean the concrete surface of all scum and sediment to expose clean, uncontaminated concrete before inserting the anchor bolts and conduit. Resume concrete pouring within 2 hours.

Do not dewater any drilled pier excavations unless the excavation is entirely cased down to tip. Do not begin to remove the temporary casing until the level of concrete within the casing is in excess of 10 feet above the bottom of the casing being removed. Maintain the concrete level at least 10 feet above the bottom of casing throughout the entire casing extraction operation except when concrete is near the top of the drilled pier elevation. Maintain a sufficient head of concrete above the bottom of casing to overcome outside soil and water pressure. As the temporary casing is withdrawn, exercise care in maintaining an adequate level of concrete within the casing so that fluid trapped behind the casing is displaced upward and discharged at the ground surface without contaminating or displacing the drilled pier concrete. Exerting downward pressure, hammering, or vibrating the temporary casing is permitted to facilitate extraction.

Keep a record of the volume of concrete placed in each drilled pier excavation and make it available to the Engineer.

After all the pumps have been removed from the excavation, the water inflow rate determines the concrete placement procedure. If the inflow rate is less than 6 inches per half hour, the concrete placement is considered dry. If the water inflow rate is greater than 6 inches per half hour, the concrete placement is considered wet.

- **Dry Placement:** Before placing concrete, make certain the drilled pier excavation is dry so the flow of concrete completely around the reinforcing steel can be certified by visual inspection. Place the concrete by free fall with a central drop method where the concrete is chuted directly down the center of the excavation.
- **Wet Placement:** Maintain a static water or slurry level in the excavation before placing concrete. Place concrete with a tremie or a pump in accordance with the applicable parts of Sections 420-6 and 420-8 of the *Standard Specifications*. Use a tremie tube or pump pipe made of steel with watertight joints. Passing concrete through a hopper at the tube end or through side openings as the tremie is retrieved during concrete placement is permitted. Use a discharge control to prevent concrete contamination when the tremie tube or pump pipe is initially placed

in the excavation. Extend the tremie tube or pump pipe into the concrete a minimum of 5 feet at all times except when the concrete is initially introduced into the pier excavation. If the tremie tube or pump pipe pulls out of the concrete for any reason after the initial concrete is placed, restart concrete placement with a steel capped tremie tube or pump pipe.

Once the concrete in the excavation reaches the same elevation as the static water level, placing concrete with the dry method is permitted. Before changing to the dry method of concrete placement, remove any water or slurry above the concrete and clean the concrete surface of all scum and sediment to expose clean, uncontaminated concrete.

Vibration is only permitted, if needed, in the top 10 feet of the drilled pier or as approved by the Engineer. Remove any contaminated concrete from the top of the drilled pier and wasted concrete from the area surrounding the drilled pier upon completion.

Permanently mark the top of each foundation with a stamp or embedded plate to identify the depth of the foundation.

3. Concrete Placement Time:

Place concrete within the time frames specified in Table 1000-2 of the *Standard Specifications* for Class AA concrete except as noted herein. Do not place concrete so fast as to trap air, water, fluids, soil or any other deleterious materials in the vicinity of the reinforcing steel and the annular zone between the rebar cage and the excavation walls. Should a delay occur because of concrete delivery or other factors, reduce the placement rate to maintain some movement of the concrete. No more than 45 minutes is allowed between placements.

4. Scheduling and Restrictions

During the first 16 hours after a drilled pier has achieved its initial concrete set as determined by the Engineer, do not drill adjacent piers, install adjacent piles, or allow any heavy construction equipment loads or "excessive" vibrations to occur at any point within a 20 foot radius of the drilled pier.

The foundation will be considered acceptable for loading when the concrete reaches a minimum compressive strength of 3000 psi. This provision is intended to allow the structure to be installed on the foundation in a shorter time frame, and does not constitute full acceptance of the drilled pier. Full acceptance will be determined when the concrete meets its full strength at 28 days.

In the event that the procedures described herein are performed unsatisfactorily, the Engineer reserves the right to shut down the construction operations or reject the drilled piers. If the integrity of a drilled pier is in question, use core drilling, sonic or other approved methods at no additional cost to the Department and under the direction of the Engineer. Dewater and backfill core drill holes with an approved high strength grout with a minimum compressive strength of 4500 psi. Propose remedial measures for any defective drilled piers and obtain approval of all proposals from the Engineer before implementation. No additional compensation will be paid for losses or damage due to remedial work or any investigation of drilled piers found defective or not in accordance with these special provision or the plans.

5.4 MEASUREMENT AND PAYMENT

Soil Test will be measured and paid for the actual number of soil test with SPT borings drilled, furnished and accepted.

Drill Pier Foundation will be measured and paid for the actual volume of concrete poured in cubic yards of drilled pier foundation furnished, installed and accepted.

CCTV Foundation Design will be measured and paid for the actual number of foundation designs for metal poles furnished and accepted.

Metal Pole Foundation Removal will be measured and paid for as the actual number of metal pole foundations removed and disposed.

Payment will be made under:

Pay Item	Pay Unit
Soil Test	Each
Drilled Pier Foundation	Cubic Yard
CCTV Foundation Design	Each
Metal Pole Foundation Removal	Each

6. FIELD EQUIPMENT CABINET

6.1 DESCRIPTION

Mount the existing 336S cabinet to the relocated CCTV camera pole.

Furnish all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment, and terminate conduit in equipment cabinet. Cables and connectors may be reused in the relocation of the field equipment cabinet. If the cabinet, cables, connectors, equipment housed in the equipment cabinet are damaged during dismantling and relocating the field equipment cabinet, the contractor must replace all damaged equipment with new equipment at no additional cost to the Department.

6.2 MATERIALS

A. Surge Protection for System Equipment

Ensure the equipment cabinet's surge protection devices are relocated and installed in the same manner as the existing surge protection devices.

1. Main AC Power Input

Install or reinstall, if necessary, the existing power line surge protection device between the applied line voltage and earth ground.

2. Ground Bus

Provide a ground conductor that is not connected to the earth ground or the logic ground anywhere within the cabinet. Ensure that the earth ground bus and the neutral bus each have ten compression type terminals, each of which can accommodate wires ranging from number 14 through number 4. The earth ground bus and neutral bus shall be isolated from each other.

6.3 CONSTRUCTION METHODS

For each relocated field cabinet installation, use new banding or other method approved by the Engineer to fasten cabinet to pole.

Install all conduit, condulets, and attachments to the equipment cabinet in a manner that preserves the minimum bending radius of cables and creates water proof connections and seals.

6.4 MEASUREMENT AND PAYMENT

No measurement will be made of relocating the field equipment cabinet as it will be considered incidental to the CCTV assembly relocation. No measurement will be made for cabling, connectors, cabinet attachment assemblies, conduit, condulets, grounding equipment, surge protectors, or any other equipment or labor required to install the field equipment cabinet and integrate it with the CCTV equipment as these will be considered incidental to the CCTV assembly relocation.

7. MODIFY ELECTRICAL SERVICE

7.1 DESCRIPTION

Modify the existing electrical service at the location called out on the Plans. Comply with the National Electric Code (NEC), the National Electrical Safety Code (NESC), Standard Specifications, the Project Special Provisions and all local ordinances. Coordinate all work involving electrical service with the Department and local power company before any work begins.

7.2 MATERIALS

Furnish and install new number 8 AWG copper conductors from the existing power meter and disconnect to the relocated CCTV camera location.

7.3 CONSTRUCTION METHODS

Modify the existing electrical service at the location shown on the Plans to provide power to the relocated CCTV camera. Install new standard sized junction boxes parallel to the existing oversized junction boxes. Remove the existing number 8 AWG copper conductors from the existing power meter and disconnect to the existing CCTV camera. Remove and relocate the existing 1.25" conduit used for the power cable from the existing over sized junction boxes into the new standard sized junction boxes. Install the new number 8 AWG copper conductors from the existing power meter and disconnect to the relocated CCTV camera location through the new standard sized junction boxes, existing 1.25" conduit and newly installed 1.25" directional drilled conduit.

7.4 MEASUREMENT AND PAYMENT

Modify electrical service will be measured and paid in actual number of complete and functional modify service locations furnished, installed and tested. Contract work includes installing new conductors and making all necessary terminations to provide a fully functional electrical service.

No measurement will be made of risers, underground and exposed conduit runs, acquisition of service fees, electrical service conductors, ground rod, ground wire and any remaining hardware and conduit to connect the electrical service to the cabinet or the relocation of existing conduit into the new junction boxes as these will be considered incidental to modifying electrical service.

Payment will be made under:

Pay Item	Pay Unit
Modify Electrical Service	Each

8. SYSTEMS OPERATIONAL TEST AND OBSERVATION PERIOD

8.1 DESCRIPTION

Once all hardware has been installed and the system integration is complete, perform a System Operational Test, which fully exercises all functions of the system. Submit a test plan a minimum of fifteen (15) days prior to the scheduled start of the test. The Engineer who, within fifteen (15) days of receipt, will either approve or indicate changes required for approval of the test plan.

8.2 TEST PROCEDURES

Repair or replace any components or modules, which fail the System Operational Test.

Submit, as a minimum, the System Operational Test with all necessary documentation and tests to satisfy the following:

A. CCTV Field Tests

Demonstrate the each CCTV camera installed can be controlled locally at the camera site. The test should exercise all camera functionality as noted below:

- Pan 360 degrees left and right
- Tilt 180 degrees up and down
- Zoom In / Zoom Out
- Focus near / Focus far
- Auto-focus
- Iris open / Iris close
- Auto-iris
- Record and run presets

The Contractor should supply a Laptop or PDA loaded with the appropriate CCTV control software and a portable color monitor for use during this test.

In addition, the field test will include inspection of the cabinets, electrical service, grounding system, wire & cabling, and all other components installed at the CCTV site.

B. Software / Central System Test

Demonstrate all PTZ control functions (described in Section A above) using the existing video management software.

C. Halt of Systems Operational Test

In the event that any component of the system malfunctions or operates below the level specified the Systems Operational Test must be halted. The Contractor will determine and correct the problems, including repair or replacement of equipment, at no cost to the Department. Upon correction of the problems to the satisfaction of the Engineer, testing will resume.

8.3 30-DAY OBSERVATION PERIOD

Upon completion of all project work, the successful completion of the System Operational Test and the correction of all known deficiencies, including minor installation items, a 30-day Observation Period will commence. This Observation Period will consist of a 30-day period of normal operation without any failures. The 30-day Observation Period will be warranted by the payment and performance bond. The purpose of this period is to ensure that all components of the system function in accordance with these Project Special Provisions over an extended length of time.

Respond to system or component failures (or reported failures) that occur during the 30-day Observation Period within 48 hours. Correct said failures within 72 hours. Failures that can not be corrected within 72 hours will suspend the timing of the 30-day Observation Period beginning at the time when the failure occurred. After the cause of such failures has been corrected, timing of the 30-day Observation Period will resume. Failures that necessitate a redesign of any major component will terminate the Observation Period. Once the components have been redesigned or replaced, the 30-Day Observation Period will be restarted from zero. Failures in any of the components exceeding a total of three (3) occurrences will terminate the 30-day Observation Period. Once the failures have been corrected, the 30-day Observation Period will be restarted from zero.

All documentation must be completed prior to the end of the 30-day Observation Period. The 30-day Observation Period will not be considered part of the contract time. Final acceptance will occur upon the successful completion of the 30-day Observation Period and after all documentation requirements have been fully satisfied.

8.4 MEASUREMENT AND PAYMENT

No measurement will be made for Systems Operational Tests or Observation Period as these will be considered incidental to work covered elsewhere.

Figure 1

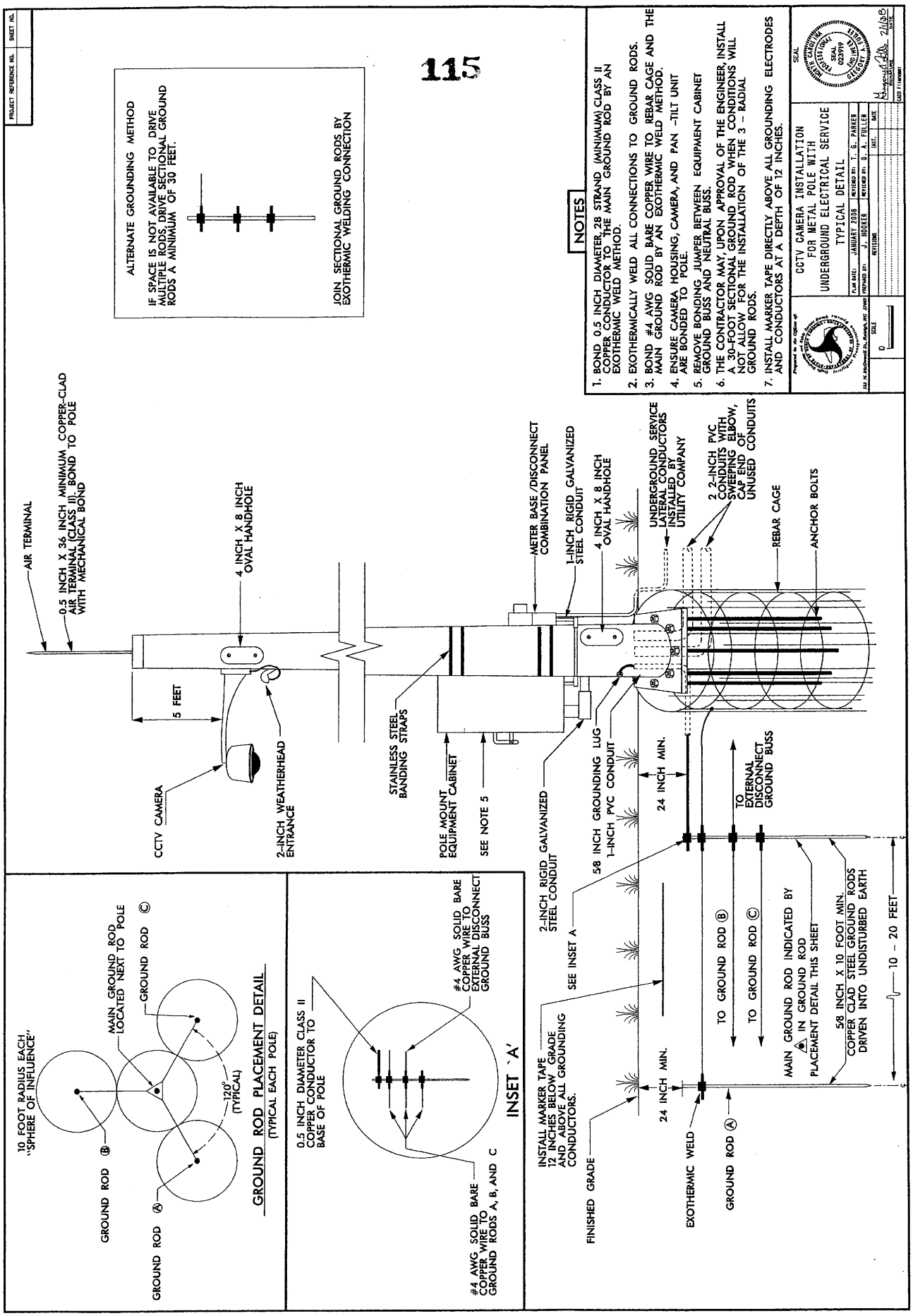


Figure 1