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# UPS Cabinet

**District of Columbia Department of Transportation**  
**BOLT ON UPS CABINET ASSEMBLY**  
**WITH INVERTER CHARGER AND BATTERY BANK**

**GENERAL**

This specification establishes the minimum requirements for a complete emergency battery backup system for use with Light Emitting Diode (LED) Traffic Signal Modules. The Battery Backup System (BBS) shall include, but not be limited to the following: Inverter/Charger, batteries, combination power transfer relay and manual bypass switch and all necessary hardware and interconnect wiring. The BBS shall provide reliable emergency power to a traffic signal system (Vehicle and Pedestrian Traffic) in the event of a power failure or interruption.

The BBS shall be capable of providing power for full run-time operation for an "LED-only" intersection (all colors: red, yellow, green and pedestrian heads), an intersection with only yellow and/or pedestrian incandescent bulbs or flashing mode operation for an intersection using Red LED's.

**1. The contractor shall supply UPS systems that meet the following performance specifications:**

UPS system shall be DDOT version of  
The Dimensions brand model 24M11-WBE bolt on unit,  
offered by Sensata Technologies, or approved equal.  
UPS shall include the DDOT approved version of :  
Dimensions brand independent power panel and transfer switch.

**2. OPERATION**

**1.1.1.1.1. Compatibility**

BBS shall be compatible with The District Department of Transportation's 336S and 336 Super stretch traffic controller cabinet, Model 170E Controllers, Model 2070 Controllers and cabinet components for full time operation.

**1.1.1.1.2. Run-Time**

The BBS shall provide a minimum six (6) hours of full run-time operation for an "LED-only" intersection (minimum 700W/1000VA active output capacity, with 80% minimum inverter efficiency).

**1.1.1.1.3. Output Capacity**

The BBS shall be able to provide a minimum of 1100W @ +25°C, continuous active output capacity, with 80% minimum inverter efficiency while running in Backup Mode (on batteries). The BBS shall be able to provide 850W @ +74°C, continuous active output capacity.

**1.1.1.1.4. Output Voltage**

When utilizing battery power, the BBS output voltage shall be between 110 VAC and 125 VAC, pure sine wave output, ≤ 3% THD, 60Hz ± 0.05Hz.

**1.1.1.1.5. DC System Voltage**

The BBS DC system voltage shall be 24 Vdc.

**1.1.1.1.6. Transfer Time**

The maximum transfer time allowed, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries shall be 40 milliseconds. The same maximum allowable transfer time shall also apply when switching from inverter line voltage to utility line voltage.

**1.1.1.1.7. Operating Temperature**

Operating temperature for the inverter/charger, and power transfer relay and manual bypass switch shall be -40 °C to +74 °C.

**1.1.1.1.8. AC Feedback**

BBS shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service.

**1.1.1.1.9. Surge Protection**

The BBS shall have lightning surge protection compliant with IEEE/ANSI C.62.41.

**1.1.1.1.10. Power & Control Connections**

The BBS shall be easily replaced by having easily removable AC input and output cables. The DC input connection shall be a one piece Anderson type connector. The external transfer relay control and battery temperature compensation cables shall be a quick release connector. The AC, DC, external transfer relay, and battery temperature compensation cables shall be removable without the use of a screwdriver.

**1.1.1.1.11. AC Connection**

The AC input and output shall be separate panel mounted plug / receptacles that allow no possibility of accidental exposure to dangerous voltages (male receptacle for AC Input and female receptacle for AC Output). The receptacles shall utilize some form of locking mechanism or hold down clamps in order to prevent accidental disconnects.

**1.1.1.1.12. DC Connection**

The DC connection shall be a recessed one piece Red Anderson style receptacle.

**1.1.1.1.13. Relay / Temperature Probe Connection**

The external power transfer relay control and battery temperature sense inputs shall be heavy duty panel mounted connectors. The temperature probe must have a lug for attaching the sensor to the battery.

**1.1.1.1.14. General Connections**

All connections shall provide mechanically and electrically secure connections without the use of a screwdriver. The only exception will be the 18-position Relay Terminal Block which shall require a small screwdriver for holding down the relay wires.

**1.1.1.1.15. Unit Failure**

In the event of inverter/charger failure, battery failure or complete battery discharge, the power transfer relay shall revert to the NC (and de-energized) state, where utility line power is connected to the cabinet.

**1.1.1.1.16. Overload**

The Battery Backup System must be able to shutdown to protect against internal damage in the event of an overload at its' output.

**3. Functionality, Displays, and Controls**

**1.1.1.1.17. Standby Type System**

There shall be two, user adjustable transfer point set types if the user wanted to use the BBS as a "Standby" type system instead of the default "Buck/Boost or Line Interactive" type system. The user will be able to select either "Normal" or "Generator" transfer points. The user will be able to set the low and the high cutoff transfer points which are adjustable between 89 and 135 AC volts. The BBS will automatically apply the 5 volt difference for the return transfer points.

1.1.1 If the BBS is configured to use these adjustable transfer points, the BBS shall bypass the utility line power whenever the utility line voltage is outside of the set transfer points ( $\pm 2\text{VAC}$ ).

1.1.2 In cases of low (below the set low cutoff point) or absent utility line power, when the utility line power has been restored at or above  $5\text{ VAC} \pm 2\text{ VAC}$  of the set low cutoff point for more than 30 seconds (or the user configured line qualify time), the BBS shall transfer from battery backed inverter mode back to utility line mode.

1.1.3 In cases of high (above the set high cutoff point) utility line power, when the utility line power has been restored at or below  $5\text{ VAC} \pm 2\text{ VAC}$  of the set high cutoff point for more than 30 seconds (or the user configured line qualify time), the BBS shall transfer from battery backed inverter mode back to utility line mode.

**1.1.1.1.18. Buck/Boost or Line Interactive Type System**

The BBS shall be line interactive by default, and have a Buck/Boost function or mode of operation. The Buck/Boost shall have a range of 80-160Vac. There are not to be any user configurable transfer point settings for the Buck/Boost function. With Buck/Boost selected as the sense type, the output to the signal system will be regulated to voltages between 102-130 Vac.

**1.1.1.1.19. Buck Boost Counters and Run Time**

There will be a Buck and Boost event counter and run time meter accessible through the LCD and Ethernet. Buck and Boost events will be recorded separately from each other. The counter and run time meter will show the cumulated information since the last reset.

**1.1.1.1.20. Line Qualify Time**

The BBS will have an adjustable line qualify time. The range will be from 1 to 60 seconds, in 1 second increments. The factory default setting will be 30 seconds.

**1.1.1.1.21. LCD Display**

The BBS shall have a 4 line by 20 character backlit LCD display. The main screen shall indicate information regarding; transfer points, transfer point type, time of day status, utility input voltage, charger on/off status, battery percent of charge, battery voltage, BBS Mode, a scrolling line of text (which automatically lists any faults, alarms and relay status information), inverter event counter and run time meter. The run time meter shall indicate run time in hours and minutes. The display shall be temperature compensated and have a user selectable contrast adjustment by pressing "Enter" at the main screen.

**1.1.1.1.22. Keypad**

The BBS shall have a 4-way navigational keypad so that the user can navigate the menu system by using "↑", "↓", "←", "→", "Enter", and "Esc" keys. There shall also be an "Inv" key to turn the inverter on or off.

**1.1.1.1.23. Status LED's**

The BBS shall have three status LED's.

1.1.4 Green LED "Output" – This is to be on any time the BBS is providing output for either backup, buck, or boost modes.

1.1.5 Red LED "Fault" – This is to be on any time there are any faults in the system.

1.1.6 Yellow LED "Alarm" – This is to be on anytime there are alarms on the system.

**1.1.1.1.24. Charger**

The BBS shall have an integral charger. The charger shall be a 4 step charger (zero-volt start, bulk, accept, and float).

1.1.7 The charger shall have the capability of providing the charge current required by the battery up to 20 amps DC.

1.1.8 The user shall be able to select either "gel" or "AGM" type batteries. The default setting is for AGM.

1.1.9 The BBS shall use a temperature-compensated battery charging system. The charging system shall compensate over a range of 2.5 – 4.0 mV/ °C per cell.

1.1.10 The temperature sensor shall be external to the inverter/charger unit. The temperature sensor shall come with 2 meters (6'6") of wire and have a lug at the end for termination to the negative post of a battery for the best temperature measurement.

1.1.11 Batteries shall not be recharged when battery temperature exceeds 50 °C ± 3 °C.

1.1.12 Recharge time for the battery, from "protective low-cutoff" to 80% or more of full battery charge capacity, shall not exceed ten (10) hours.

1.1.1.1.25. **Backup Counter and Run time**

The BBS shall include a front-panel event counter display to indicate the number of times the BBS was in Backup, Buck, and Boost modes; and a front-panel hour meter to display the total number of hours and/or minutes the unit has operated in those modes since last reset. The run time shall be displayed in HHH:MM format. All meters shall be re-settable. The information displayed shall be cumulative since last reset.

1.1.1.1.26. **Event Log**

There shall be an event log that is 256 lines in length. Data shall be recorded in a FIFO format so that the oldest record is purged as the newest is entered. The event log shall date and time stamp all events. Each event that is recorded will also show the operating mode of the BBS before the event (Standby, Backup, Buck, and Boost).

1.1.1.1.27. **Dry Relay Contacts**

The BBS shall provide the user with 6 programmable dry relay contacts. These dry relay contacts shall be rated for 3 amps @ 125 Vac. Each relay can be programmed to trigger by more than one condition simultaneously. If any relay is energized, it will show up on the main screen of the LCD, Ethernet web browser, and the RS-232 menu. The programming options are as follows:

- 4. On Battery
- 5. Low Battery
- 6. Timer
- 7. Time of Day
- 8. Alarm
- 9. Fault
- 10. BBS Failure
- 11. Off

- 1.1.13 The relay contact terminal blocks shall conform to On-Shore Technology, type ED2200/22, or Phoenix Contact type FRONT 2,5-H/SA 5, or WECO type 180-A-111, or equivalent. The spacing between each terminal shall be 0.197" (5mm), with the hold-down screw and wire entrance both on the same face, facing forward and in the horizontal axis.

1.1.1.1.28. **Timer Relay Contacts**

The BBS shall have a timer that will energize the dry contact relays (that are configured for "Timer") after the user configured time has elapsed. This timer is started when the BBS is in Backup mode. The user can configure the timer from 0 to 480 minutes, in 1 minute increments. The factory default setting is at 120 minutes.

**1.1.1.1.29. Low Battery Relay Contacts**

The BBS shall have an adjustable low battery relay setting. This setting shall be adjustable so that the user can set the point at which the low battery relay energizes. This setting applies to any dry contact relay that is configured for "Low Battery". This setting is adjustable from 0 to 100% of remaining usable battery capacity in 5% increments. This setting must be in percent. The factory default setting is 40%.

**1.1.1.1.30. Battery Voltage Test Points**

The BBS shall include a LCD display to indicate battery voltage and standard meter probe input jacks (+) and (-) to read the battery voltage externally.

**1.1.1.1.31. Circuit Breakers**

The BBS shall be equipped with Input and Output AC circuit breakers. The BBS shall also have a DC input circuit breaker.

**1.1.1.1.32. Time of Day Program**

The BBS shall be equipped with a Time Of Day (TOD) program. The user can set the beginning and the end time of the TOD program. The user can also "Enable" and "Disable" the program. Operation is such that if the program is enabled and the BBS goes to Backup mode, the TOD program will energize any dry contact relays that are programmed for TOD. If the BBS is still in Backup mode and the TOD program has expired, any relay that was energized by the TOD program will de-energize when the TOD program expires.

**1.1.1.1.33. Keypad Password Protection**

The BBS Configuration and System menus (on LCD) shall be password protected with a 6 digit alphanumeric password. The password feature can be disabled by the user in the System menu. This feature by default is disabled.

**1.1.1.1.34. Web Browser Password Protection**

The web browser shall be password protected and require a user ID and a password. This feature by default is disabled.

**1.1.1.1.35. Bypass Switch**

The manual bypass switch module and power transfer relay shall be rated at 240VAC/30 amps.

## **12. Communications**

1.1.1.1.36. The UPS must be the capability to provide Ethernet and IP addressing communications for inclusion in systems with the capability for remote monitoring and programming. This capability must be provided internal to the unit. As an interim solution; UPS system must also be capable of serial communications via DDOT existing 170 controllers through available spare hardware port.

1.1.14 UPS supplier must comply with communications protocols currently used by DDOT QUICNET© system.

**1.1.1.1.37. User Configuration, System, and Status Menus**

All BBS Configuration, System, and Status menus shall be accessible and programmable from the RS-232 port and from the Ethernet port. Additionally, all log files shall be available through these ports.

**1.1.1.1.38. RS-232**

The BBS shall have RS-232 communications. The communications port shall be an EIA-232 (DB9-Female) connector.

1.1.15 The data transmission rate shall be user adjustable between 300 and 115200 baud.

**1.1.1.1.39. Ethernet**

The BBS shall have an Ethernet port as standard. The Ethernet port shall be an RJ45, EIA 568B pin out type connector. The data rate shall be 100mbps.

1.1.16 The BBS shall have an embedded web server.

1.1.17 The Ethernet port shall have user configurable IP, subnet mask, and gateway.

1.1.18 The firmware and web pages for the BBS shall be upgradeable through the Ethernet port using a Java applet. The applet shall have:

12.1.1.1.1. User input box for the IP address of the system that is to be upgraded.

12.1.1.1.2. "Connect" button to initiate communication to the BBS which reports current Model Number, Serial Number, MAC Address, System DC Voltage, and Firmware & Web page version levels.

12.1.1.1.3. "Update" button that when clicked automatically updates the BBS firmware and web pages on the BBS without the user having to select files for uploading.

12.1.1.1.4. Two progress bars that show that the web pages file and firmware file are being uploaded. At the end of the update the applet shall state to the user "All Operations Complete."

**1.1.1.1.40. Web Pages**

12.1.2. Shall have a header area that shows location, date, time, firmware version, BBS Mode, quick status updates of alarms –faults –and relay status. This header is to be on every web page.

12.1.3. Shall have a Configuration page that allows for configuration of; sense type, transfer points (normal and generator), line qualify time, Time of Day program, self test, low battery relay in percent, timer relay, and dry relay contacts

12.1.4. Shall have a Status page that shows the current settings of; sense type, transfer points, line qualify time, Time of Day program, self test, and dry relay contacts

12.1.5. Shall have a System page to configure; location, date, time, password, user ID, IP address, sub-net mask, and gateway address

12.1.6. Shall have an email page to configure which events trigger an email. It also shall allow input of up to 6 email addresses

12.1.7. Shall have a 256 line event log (FIFO). The event log shall be able to be printed from the web browser. The event log shall be able to be saved as an htm file. The event log shall also be able to be copied and pasted into an excel spreadsheet.

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- C.5.1.6.23 **Power:** The AC power interface must be an independent panel design meeting the following minimum requirements.
- C.5.1.6.24 The Independent Panel Design must be used primarily for existing cabinets being retrofitted with UPS systems. This panel must be mounted in close proximity to the existing power interface and must provide the following: a 50A 120VAC single phase electrical service interface must be required at the direction of the engineer to support relocation of incoming utility service wiring to the new panel power-in terminal strip with a properly rated circuit breaker to control the utility power state, a surge suppressor to protect the UPS, the wiring to the Manual Bypass Switch must be integrated into this panel for incoming AC Power such that all wires are accessible within this panel on identified terminal stripes that will allow for the maintenance of the equipment using only standard hand tools. The output AC power from the Manual Bypass Switch shall be terminated on the original incoming utility power service terminals. The panel shall be covered with plexi-glass or other approved material to minimize the risk of electrical hazards.
- C.5.1.6.25 **Status/Alarms:** The Status/Alarms outputs of the UPS must be interfaced into the traffic controller through appropriately defined status inputs to report the conditions required above. Logic Common from the traffic controller must be provided to the common side of the status/alarm terminations and the status/alarm output must be returned to the controller.
- C.5.1.6.25.1 UPS assembly must include appropriate terminations and relays to facilitate connection of existing PHOTO ENFORCEMENT EQUIPMENT.
- C.5.1.6.25.2 Photo enforcement equipment must be connected in a matter that will not provide power from the UPS system when UPS system is in operation and in standby mode (photo enforcement equipment must be connected to always draw from PEPCO feed, and must not operate when intersection is on battery power).
- C.5.1.6.25.3 **Procedures:** When installing UPS at an existing traffic signal controller cabinet location, the Contractor shall notify the Agency Engineer a minimum of five days prior to beginning work. The traffic signal must not be disconnected from utility unless a representative of the DDOT representative is present and then only during the time of day and day of week designated by the DDOT representative .
- C.5.1.6.25.4 **Warranty:** The UPS, in its entirety, must be warranted for two years from the date of installation against defective material and workmanship. Batteries warranty must be a minimum of 3 years and must not be prorated during the warranty period.

C.5.1.6.25.5 The Contractor shall provide three blue and white prints of the control circuit diagram. The blue and white prints shall be produced from the original diagram and must be clear and legible. The Contractor shall install two copies of the circuit diagram inside the traffic signal controller cabinet or in the UPS cabinet in the ready accessible water resistant enclosure and must furnish one additional copy to the Engineer. The Contractor shall provide one set of the following to the Engineer: equipment list, operation and maintenance manuals, board level schematic diagram and wiring diagrams of the UPS and battery data sheets.

#### C.5.1.7 Documentation

C.5.1.7.1 An additional copy of the UPS software on CD or Jump drive must be provided to the Engineer at no additional cost.

### C.5.2 INSTALLATION

C.5.2.1 **Procedures:** The contractor shall deliver each UPS cabinet to the targeted intersection as a pre-configured, tested package; ready to be bolted onto the existing controller cabinet.

C.5.2.1.1 Contractor shall follow all DDOT construction standards and permitting regulations.

C.5.2.1.2 UPS assembly must be delivered to location fully charged and load tested.

C.5.2.1.3 Contractor shall schedule a pre-installation field visit to each targeted location. The pre-installation visit shall include a designated representative from DDOT. The pre-installation visit shall determine the actual side of the controller cabinet that the UPS cabinet will be attached.

C.5.2.1.4 Contractor shall take digital photograph of the targeted cabinet, and shall illustrate on the photograph, the actual mounting location of the UPS assembly.

C.5.2.1.5 DDOT shall approve or disapprove the proposed mounting location based on the

PDF submittal.

- C.5.2.1.6 Contractor shall notify the DDOT, representative a minimum of five days prior to beginning work. The traffic signal must not be disconnected from utility power unless a representative of the DDOT representative is present.
- C.5.2.1.7 Contractor shall be responsible for all scheduling and coordination with PEPCO and MPD.
- C.5.2.1.8 Contractor shall securely attach UPS assembly to the approved side of the existing traffic controller cabinet.
- C.5.2.1.9 UPS assembly must be attached with no less than 4 of the appropriately sized bolts and fenders washers.
- C.5.2.1.10 All cable feed thru holes must be standard conduit sized and include feed chase nipples with appropriate bushings.
- C.5.2.1.11 UPS system must include mating connector to facilitate interface with DDOT Traffic signal emergency generator.  
UPS system must be connected to allow any existing generator ports to provide charging voltage to the battery banks during long term outages.
- C.5.2.1.12 UPS system must be tested under full intersection load prior to PEPCO power being restored and while intersection is still under manual police control to insure proper operation.
- C.5.1.6.11 Wiring for the UPS within the traffic signal controller cabinet and within the UPS cabinet (when required) must be sized in accordance with the NEC and must conform to the requirements the Agency Specifications. Wiring panels and terminal blocks must be neatly finished and clearly and permanently marked. Conductors must be neatly arranged and bundled in groups with cable ties. The bundled conductors shall not obstruct access to other circuits and terminals in the cabinet. A listing, indicating terminal numbers with a description of their use, shall be attached to the cabinet door and overlaid with a clear, plastic covering. Edges of the plastic overlay shall be sealed with a clear waterproofing compound. Unless cable is passing through the cabinet uninterrupted, incoming and outgoing conductors must have each wire connected to terminal post positions.
- C.5.1.6.12 The UPS cabinet assembly shall be side mounted on existing traffic controller cabinet.
- C.5.1.6.13 Cabinet for UPS must be weatherproof and constructed of welded sheet anodized aluminum, 0.125-inch minimum. Cabinet finish must include graffiti resistant coating. Cabinet mounting attachments must be durable, corrosion resistant,

compatible with the aluminum of the cabinet or isolated from it and of heavy-duty construction. Cabinets shall be no larger than 40 inches in height, 15 inches in width, and 10 inches in depth.

C.5.1.6.14 **Doors:** Cabinet doors shall provide full access to the cabinet interior and must have gaskets to ensure weatherproofing. The door must be equipped with the Agency's standard tumbler lock. Two keys for each cabinet shall be provided to the Engineer. Hinges must be stainless steel and continuous. Doors must have a doorstop arrangement that will allow it to be firmly positioned at 90 and 135 degrees,  $\pm 10$  degrees. The locking system for cabinets must be a three-point draw roller system. Rollers must be fabricated from nylon with a diameter of at least 8/10 inch. The door opening shall be double flanged on all four sides.

C.5.1.6.15 The door must have a screened and louvered vent design to prevent rain entry, with a standard size furnace vent filter. The filter tray shall be sized to house and secure the filter in place. The screen shall be constructed from at least 0.031-inch aluminum with 1/8-inch diameter openings positioned on 3/16 inch staggered centers. The screen must be placed on the inlet side of the filter and held in place by the filter or silicone adhesive.

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## 16. QUALITY ASSURANCE

1.1.1.1.41. Each BBS shall be manufactured by an ISO 9001:2008 certified company in accordance with a manufacturer Quality Assurance (QA) program.

1.1.1.1.42. QA process and test results documentation shall be kept on file for a minimum period of seven years.

1.1.1.1.43. Each system shall be visually inspected for any exterior physical damage or assembly anomalies. Any defects shall be cause for rejection.

## 17. WARRANTY

1.1.1.1.44. Manufacturers shall provide a five (5) year warranty. The first three years will be with the Advanced Replacement Program. Under the Advanced Replacement Program, the manufacturer will send out a replacement unit within two business days of the call notifying them of an issue. The manufacturer will send out either a new unit or a re-manufactured unit that is fully tested and is up to the latest revision. The manufacturer is responsible for all shipping charges to

the customer. The last two years of the warranty will be factory-repair warranty for parts and labor on the BBS.

1.1.1.1.45. Batteries shall be warranted for full replacement for two (2) years from date of purchase.

1.1.1.1.46. The warranty shall be included in the total bid price of the BBS.

# Traffic Signal and ITS, communications and Buck haul devices

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## District Department of Transportation (DDOT)

### Traffic signal and ITS, communications and Back haul devices.

DDOT is converting traffic signal serial communications to IP communications.

This specification details the minimum requirement for VDSL devices to be connected to the existing twisted pair cable plant.

This specification shall be adhered to when replacing or maintaining communications devices within the traffic signal IP communications systems.

This Specification also covers back haul VDSL devices used for IP communications back to the TMC for Traffic signals, Cameras, RWIS, HAR, and permanent count stations, and DDOT's wireless detector system network.

This specification also details minimum requirements for fiber optic cable and twisted pair copper communications cable.

1. Traffic signal communications VDSL device shall be Enable-IT 860 Pro, extreme distance VDSL modem kits, or approved equal.
  - 1.1. VDSL modems must be capable of 100Mbps Ethernet up to 1.5 miles (2.44 km) away over twisted pair copper wiring.
  - 1.2. VDSL modems must be capable of 40Mbps at 6,000 feet (1,828m) over twisted pair copper wiring.
  - 1.3. Each VDSL modem kit supplied must include a matched of pair VDSL modems with integrated, 4 port, 100baseT Ethernet switch.
  - 1.4. Each VDSL modem kit supplied must include as a minimum, field configurable, settable dip switch options, to determine the upstream and downstream unit.
  - 1.5. Each VDSL modem kit shall be replaced using both units supplied in kit and in kit quantities as directed by DDOT personnel, or based on existing quantities in existing Cabinet.
  - 1.6. 170 traffic controller Plug in module for IP communications shall be McCain brand Ethernet-to-Serial Interface Card or approved equal.
  - 1.7. 170 traffic controller Plug in module for IP communications shall be configured by DDOT personnel using the LANTRONIX DEVICE INSTALLER software.
  - 1.8. 170 traffic controller IP communications cabinet configuration shall include surface mount duplex RJ-11 with internal screw terminals.
  - 1.9. Duplex RJ-11 hacks shall have all internal wiring terminated with screw terminals.
2. IP over twisted pair back haul, head in device shall be Actelis Networks ML624, or approved equal.
  - 2.1. VDSL Back haul head in device shall allow direct bonding of a minimum of 4 copper pairs.
  - 2.2. VDSL Back haul head in device shall be configurable via Actelis supplied software and local dip switches.
  - 2.3. VDSL Back haul head in device shall be used as direct replacement when existing or as directed by DDOT personnel.

- 2.4. VDSL Back haul head in device shall be used as direct replacement for existing ADC brand modems when maintenance is required or as directed by DDOT personnel.
- 2.5. VDSL Back haul IP over twisted pair repeater device shall be used as direct replacement for existing ADC brand modems when maintenance is required or as directed by DDOT personnel.
- 2.6. VDSL Back haul IP over twisted pair repeater device shall be Actelis Networks ML688, or approved equal.
3. Existing VDSL communications devices for DDOT's Wireless system detector network shall be RUGGEDCOM Ethernet Field Switch TYPE 3 - 6 PORT COPPER, 2VDSL interfaces or approved equal
  - 3.1. Existing VDSL communications devices for DDOT's Wireless system detector network shall be comprised of an environmentally hardened Ethernet switching hub
  - 3.2. Existing VDSL communications devices for DDOT's Wireless system detector network shall be Type 3 switch and shall have 6 10/100BaseTX ports, 2 Ethernet over VDSL (EoVDSL) interfaces.
  - 3.3. Existing VDSL communications devices for DDOT's Wireless system detector network shall be used as direct replacement of existing device or as directed by DDOT personnel.
4. All copper twisted pair underground communications cable shall be 19 AWG minimum.
  - 4.1. All copper twisted pair underground communications cable shall conform to the industry standard specification for PE-39.
  - 4.2. All copper twisted pair underground communications cable shall include Corrugated, copper shielding, applied longitudinally with a single overlapping seam.
  - 4.3. All copper twisted pair aerial communications cable shall conform to the industry standard specification for PE-22.
  - 4.4. All copper twisted pair aerial communications cable shall be 19 AWG minimum.
  - 4.5. All copper twisted pair aerial communications cable shall include Corrugated, copper shielding, applied longitudinally with a single overlapping seam.
5. Outside plant Fiber optic cable shall conform to PE-90 industry standard.
  - 5.1. Outside plant Fiber optic cable shall include filled buffer tubes containing PFM™ gel.
  - 5.2. Outside plant Fiber optic cable core shall be constructed by stranding the buffer tubes around a central member using a reverse oscillating lay (ROL).
  - 5.3. Outside plant Fiber optic cable core shall be wrapped with flexible strength members covered with a water-blocking tape then encased with a black inner jacket.
  - 5.4. Outside plant Fiber optic cable shall include a corrugated steel armor under a black outer jacket.

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# Video Detection

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# SafeWalk Specification

The system is a stereovision video detection sensor detecting pedestrians waiting to cross the street and pedestrians approaching the crossing. It generates a detection output to the traffic signal/midblock beacon controller whenever one or more pedestrians are waiting or approaching (moving in the direction of the crossing) in the predefined virtual pedestrian detection zone.

The system can ignore pedestrians that are not waiting and pedestrians that are not moving towards the pedestrian crossing.

The system is non-intrusive (i.e. above ground) and consists of 2 cameras for stereovision, a video detection module with video detection software, a mounting bracket with integrated connection box and a cable. The camera and video detection module are integrated in a single housing.

In a predefined virtual presence detection zone, the video detection software detects pedestrians waiting at the curbside or approaching the pedestrian crossing in a maximum zone of 13' x 19' when mounted 11.5' to 13' above the street's surface. Sensor shall have a maximum offset from detection area of 2'.

The housing is compact, esthetical, UV-resistant and waterproof to IP68. It has an integrated rain/sun shield and is made of fiber reinforced polycarbonate.

The mounting bracket allows horizontal and vertical mounting. To attach the sensor to a traffic light pole, 2 bolts or 2 stainless steel bands are used.

The cameras are a 1/3" CMOS with a resolution of 640x480 pixels (VGA). The frame rate is 25 FPS.

The video detection module provides an optically coupled dry contact detection output for the traffic signal/midblock beacon controller ( $U_{max}=48VDC$ ,  $I_{max}=50mA$ ,  $P_{max}=300mW$ ). A red detection LED is clearly visible from the ground and allows both the pedestrian(s) and maintenance personnel to see the video detection module status (detection, no detection, safe status). This LED can be switched off. Via Ethernet, MPEG-4 compressed streaming video is available. The video detection module is IP-addressable and operates at voltages of 12-48VAC/DC. Its power consumption does not exceed 4W during regular operations. The operational temperature range is  $-34^{\circ}C$  to  $+80^{\circ}C$ . The video detection module requires a minimum of maintenance and complies with CE directive 2004/108/EG.

A single Cat5e (rated for outdoor use) cable connects the detection module with the traffic signal/midblock beacon controller cabinet and is used for power supply, detection output generation and communications. Maximum distance for Ethernet cable is 300'.

The total mass of the pedestrian detection system (incl. mounting bracket, excl. cabling) is less than 2.2lbs.

The system has an Ethernet connection to communicate with a portable PC. The configuration of the system is done with software on a portable PC. The program can run on Windows XP/Vista/7. The program is user-friendly and uses the camera image (JPEG snapshot) to place the virtual pedestrian detection zone on the curbside's surface in a simple and accurate way. This zone can be made direction sensitive in any one single direction. There is MPEG-4 streaming video for viewing the detection. The configuration can be changed without disrupting normal operation.

It is possible to view, record and playback video sequences with dedicated software (e.g. VLC media player) that can be installed on a portable PC.

The mean time between failure (MTBF) or lifetime expectancy of the video detection module, mounting bracket and interface is a minimum 100,000 hours. The mean time to repair is less than 15 minutes, once a technician and the necessary equipment are on site.

The supplier of the video detection system has traffic video detection systems operational in at least 50 countries worldwide.

Assuming a good camera positioning, zone positioning, zone size and no optical occlusion, the system detects waiting and approaching pedestrians with  $\geq 98\%$  accuracy under normal weather conditions, both day and night (when the illumination level on the ground exceeds 10 LUX). In extreme weather (e.g. dense fog, heavy snow), the video detection module is able to switch to a safe status (i.e. permanent detection) until regular operations can be continued.

# Vehicle Presence Detection

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# TrafiCam Tender Document

**Following text describes in a neutral way the specifications of the TrafiCam 2<sup>nd</sup> Generation sensor (alu version) for vehicle presence detection. You can copy-paste this text in tenders.**

The vehicle presence detection system is non-intrusive (i.e. **above ground**) and consists of a mounting bracket, a camera and a video detection module with video detection software. The camera and video detection module are integrated in a single housing. In one or more predefined detection zones ("**virtual loops**"), the video detection software detects both **moving and stationary vehicles** on multiple lanes (when module is well-positioned, e.g. on a traffic light pole). The system generates detection outputs to the traffic light controller.

The **housing** is compact, esthetical, UV-resistant and waterproof to **IP67**. It has an integrated rain/sun shield and is made of aluminum.

The **bracket** allows **horizontal and vertical mounting** and is made of fiber reinforced polyamide (with an aluminum tube). To attach the video detection module on existing or new infrastructure, 2 bolts or 2 stainless steel bands are used.

The **camera** is a black & white or color 1/4" **CMOS** with a resolution of minimum **480x640 pixels**.

The **video detection module** has a version for detection at close range (0-20m) and one for medium range (15-60m). The module provides **4 optical coupled dry contacts** for the traffic light controller ( $P_{max}=300mW$ ,  $U_{max}=48VDC$ ,  $I_{max}=50mA$ ). A red **detection LED** is clearly visible from the ground and allows both the vehicle drivers and maintenance personnel to see the video detection module status (detection, no detection, safe status). The LED can be switched off. The video detection module operates at **12-26VAC/DC** and between **-34°C and +80°C**. Its power consumption does not exceed **1.5W** (or 65mA at 24V) during regular operations. The video detection module requires a minimum of maintenance and complies with CE directive 2004/108/EC; product standard EN 50293.

The total mass of the vehicle presence detection system (incl. mounting bracket, excl. cabling) is **less than 1kg**.

A DIN-rail clickable **interface** connects a portable PC with 1 or up to 4 video detection modules. The interface is used for system configuration, detection verification and provides **4-16** (i.e. 4 per video detection module) **optical coupled dry contacts** to a traffic light controller, intelligent signs or other devices ( $P_{max}=300mW$ ,  $U_{max}=48VDC$ ,  $I_{max}=50mA$ ). The interface has a USB or Ethernet connection to communicate with a **portable PC**.

The configuration of the system is done with **software** on a portable PC. The program can run on Windows XP, Windows Vista or Windows 7. The program is user friendly and graphical, with a top down menu structure and uses the camera image (JPEG snapshot) to place the detection zones ("virtual loops") on the road's surface in a simple and accurate way. It is possible to set-up, add, change, delete and combine (logical function AND/OR) for up to **8 virtual loops**. These zones can be made direction sensitive and linked to up to **4 detection outputs**. There is limited streaming video for visual verification of the detection performance. The color of the detection zones can be chosen (e.g. green when no detection, red when detection). The configuration can be changed while normal operation is not disrupted.

It is possible to **record and playback video sequences** with dedicated software that can be installed on a portable PC.

The **mean time between failure** and lifetime expectancy of the video detection module, mounting bracket and interface is a minimum **100.000 hours**.

The **mean time to repair** is less than **15 minutes**, once a technician and the necessary equipment is on-site. The system is **field proven** worldwide for at least 4 years. More than **25.000** vehicle presence detection systems are **operational** in at least **60** different **countries**.

Assuming a good camera positioning, zone positioning, zone size and no optical occlusion, the system detects vehicle presence with **≥98% accuracy** under non-extreme weather conditions, both day and night.

The time to detect is lower or equal to 100 milliseconds once the vehicle occupies at least 1/3<sup>rd</sup> of the detection zone. In extreme weather (e.g. dense fog, heavy snow), the video detection module is able to switch to a **safe status** (i.e. permanent detection) until regular operations can be continued.

# Ethernet Access Devices

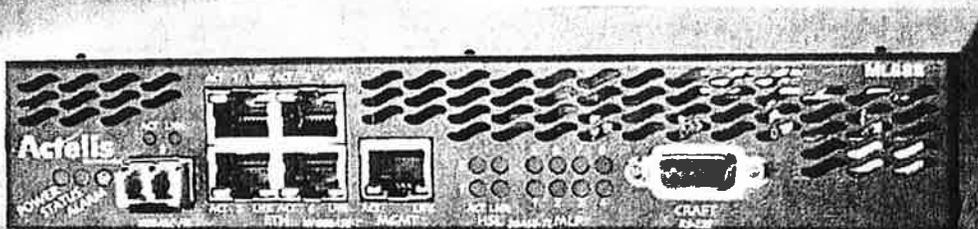
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# ML600

## Ethernet Access Devices

*Carrier Ethernet  
over Copper™*



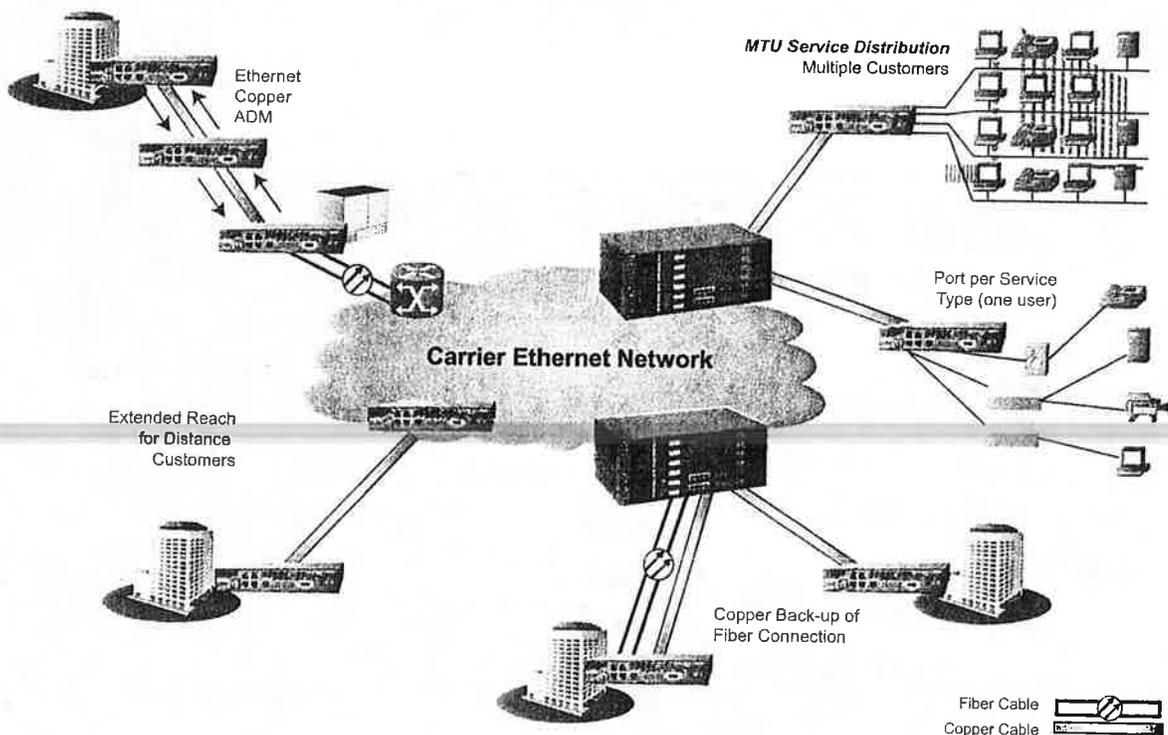
Ethernet Access Devices (EAD) from Actelis Networks enable delivery of high-speed Carrier Ethernet services over the existing copper and fiber infrastructure. The ML600s are a compact, cost-effective Ethernet in the First Mile (EFM) EADs that deliver up to 45 Mbps symmetrical Ethernet traffic at fiber quality over existing copper pairs.

Available in 1 to 8 copper pairs and fiber configurations, the ML600 EAD can be deployed in a Point-to-Point configuration, optional copper add-drop chain, or as the CPE in a Point-to-Multi-Point configuration with Actelis' EFM switches. With its superior performance, extensive functionality and low cost, the ML600 EAD platforms offer rapid service delivery and allow for complete utilization of the existing network infrastructure.

The ML600 EAD platform is interoperable with any standard Ethernet switch, router or hub. Compliant with Metro Ethernet Forum (MEF) specifications, ML600 EAD systems seamlessly integrate into Carrier Ethernet Networks. Equipped with four 10/100Base-T Ethernet interfaces and an optional 100Base-FX or 1000Base-FX Small Form Factor (SFP) port, the ML600 EAD platform allows assignment of a service or a customer per port. A DS3/E3 uplink can be used to connect to legacy networks in the 100Base-FX SFP version.

Implementing the standard IEEE 802.3ah-2004 (EFM) long reach Ethernet-over-copper specification, the ML600 EAD platform bonds up to 8 copper pairs together to create a 2Base-TL aggregated link. The systems support current and evolving Ethernet Quality of Service (QoS) requirements, and has the highest available packet throughput efficiency.

Powered by Actelis Networks' field-proven EFMplus™ technology, the rate and reach are increased significantly, using advanced Dynamic Spectrum Management (DSM) techniques. This technology ensures the best rate/reach performance and most resilient fiber-quality transmission ensuring carrier class service availability.



# Extended Rate and Reach

All ML600 EAD models provide 802.1q VLAN-aware wire-speed bridging, double tagging (VLAN stacking) for end-user VLAN transparency, L2 (Ethernet priority) and L3 (ToS/DiffServ) classification with four traffic classes, RSTP/STP, bandwidth monitoring and Multicast/Broadcast limiting.

The ML600 EAD platforms can be managed In- and Out-of-Band, by the MetaASSIST™ View graphical craft application and via the multi-platform Element Management System, MetaASSIST EMS. The management protocols include standard TL1 command line interface and SNMP, using standard MIBs for seamless integration with 3rd party Network Management Systems (NMS).

## Optional Features

### Optical Interfaces

Choice of optical interfaces accommodate short and long distances as needed with speeds of 100Mbps or 1000Mbps with connections over the existing copper and fiber infrastructure. These optical interfaces provide an evergreen investment by allowing a smooth migration to higher service speeds over fiber without changing the EADs at the customer premises.

### Copper Add-Drop EADs

The Copper Add-Drop EADs allow multiple nodes to be connected to each other over copper, in a linear chain or ring configuration. Each node has the full switching capabilities of the ML600 EAD and can drop and add Ethernet traffic at each location, while transferring the rest of the traffic through. With up to 22.8Mbps aggregated traffic, the copper Add-Drop EAD is a powerful tool for distribution of Ethernet traffic across linear/ring copper networks.

| Product Category                   | Product Group | Product Name | Number of Pairs | Description  |
|------------------------------------|---------------|--------------|-----------------|--|
| Ethernet Access Device (EAD)       | ML620         | ML622        | 2               | 4x10/100M copper Ethernet ports and a 100Base-FX optical (or DS3/E3) SFP* port |
|                                    |               | ML624        | 4               |  |
|                                    |               | ML628        | 8               |  |
|                                    | ML630         | ML638        | 8               | 4x10/100M copper Ethernet ports and a 1000Base-FX optical SFP* port            |
| Copper Add-Drop Multiplexer (CADM) | ML680         | ML688        | 8               | 4x10/100M copper Ethernet ports and a 100Base-FX optical (or DS3/E3) SFP* port |
|                                    |               |              |                 | *SFP modules - optional  |

## Highlights

- ◆ IEEE 802.3ah Ethernet in the First Mile (EFM) 2 Base-TL Solution
- ◆ Fiber Quality
- ◆ MEF compliant Carrier Ethernet Switching Features
- ◆ High Performance, Resilient Fiber-Like Experience
- ◆ Hard Quality of Service
- ◆ Rapid Service Deployment
- ◆ Superior Rate and Reach
- ◆ Low Delay and Jitter for Voice and Video Transmission
- ◆ Worldwide Spectral Compliance - NEBS III, FCC, UL, CE
- ◆ Environmentally Hardened

## Applications

- ◆ Metro Ethernet Extension
- ◆ Transparent LAN Service
- ◆ Fast Internet Access
- ◆ Private Campus Network Intra-Connection
- ◆ MDU/MTU Backhaul
- ◆ DSLAM Backhaul
- ◆ WiFi and Cellular Backhaul (Radio Access Network)
- ◆ Leased Lines Replacement

## Markets Served

- ◆ RBOC's, PTT's, Independent Operators, Competitive Operators
- ◆ Federal, State and Local Government Agencies
- ◆ Education, Health Care, Utilities, Private Campuses

# Ethernet Solutions

# High Quality

## Specifications

### Interfaces

#### Ethernet (Network/User)

- 10/100Base-T  
Connector: 4 ports  
RJ45, Auto-MDIX
- 100Base-FX/1000Base-FX  
Connector: 1 port (option)  
SFP based, MSA compliant

#### High Speed Link (Bonded Copper Pairs)

- Protocol IEEE 802.3ah 2Base-TL
- Line code ITU-T G.991.2 rev. 2
- Bandwidth 1-45 Mbps (symmetrical)
- Number of Copper Pairs 1-8  
Connector: RJ45 (per modem/pair)
- End-to-end Delay 2-4 ms (typical)
- Spectral Compliance ITU-T G.991.2 (Annex A, B, F)  
ETSI TS 101 524 (Annex E)  
ANSI T1.417, T1.426  
NICC ND1602 (ANFP)  
BIPT BRUO 2005  
48VDC/4mA nominal



- Sealing Current

#### Management

- 10/100Base-T  
Connector: RJ45, Auto-MDIX
- Craft  
Connector: EIA RS-232 (DCE)  
DB9



#### LAN Protocols

- Dynamic Bridging IEEE 802.1, 8K MAC addr.
- VLAN Tagging IEEE 802.1Q
- Double Tagging Q-in-Q, VMAN
- MSTP, RSTP, STP IEEE 802.1d
- OAM/CFM IEEE 802.3ah, 802.1ag

#### Quality of Service

- Classes of Service 4
- Scheduler WFQ, SP
- Classification L2 802.1p/Q priorities  
L3 ToS/DiffServ

#### Management

##### Protocols

- SNMP SNMP v1 and v2c
- Command Line Interface TL1
- Remote Access Telnet
- Secure Access (option) SSH v2
- Time Synchronization SNMP v3
- Web Access HTTP
- File transfer FTP, TFTP

#### Applications

- EMS MetaASSIST EMS
- Craft GUI MetaASSIST View

### Front Panel Indicators (LEDs)

- Power
- Alarm
- MLP per modem/pair
- ACT (Activity)
- Status
- LNK (Link) per Ethernet/HSL port

### Alarm Contacts

- Terminal Block 2 Input, 1 Output

### Physical

- Dimensions Height: 1.6" / 40mm (1U)  
Depth: 11.0" / 280mm  
Width: 8.4" / 213mm
- Weight 3.75 lbs / 1.7 Kg
- Mounting Rack: 2 units in 19", 23" or ETSI racks  
Desktop, Wall Mount
- Power DC: -48/-60 VDC nominal,  
14-26 Watt (per model)  
AC: 90-264 VAC, 47-63 Hz,  
17-30 Watt (per model)

### Environmental

- Operating Temp. -40° to +65°C
- Storage Temp. -40° to +70°C
- Relative humidity Up to 95%, non-condensing

### Regulatory Approval/Certifications

#### Metro Ethernet Forum

- MEF 9 Compliant



#### Safety

- UL 60950, CSA C22.2 60950
- ETSI EN 60950, IEC 60950

#### EMC

- FCC Part 15 Class B
- ICES-003 Class B
- ETSI EN 300 386 Class B
- ETSI ETS 300 132-2
- ITU-T K.21

#### NEBS

- Level III (GR-1089-CORE, GR-63-CORE)

#### CE

- EMC and Safety

#### Environmental

- GR-63-CORE
- ETSI ETS 300 019



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# Video Image Processing System

## **VIDEO IMAGE PROCESSING SYSTEM**

### **INTENT:**

The intent of the following specification is to describe the **minimum** requirements for providing a complete Video Detection System. The system shall be capable of providing presence vehicle detection and traffic data collection at selected intersections. The video system shall be expandable without removing or replacing existing units.

### **OVERVIEW:**

Acceptable systems include that of any manufacturer, provided such equipment meets **all** qualifying specifications identified herein. Using standard image sensor optics and in the absence of occlusion, the system shall be able to detect vehicle presence with 98% accuracy under normal conditions (days and nights), and 96% accuracy under adverse conditions (fog, rain, snow).

All items and materials furnished shall be new, unused, current production models installed and operational in a user environment and shall be items currently in distribution. The detection and data collection algorithms shall have a proven record of field use, with a minimum of three (3) years of service.

## VIDEO VEHICLE DETECTION SYSTEM

### **GENERAL:**

These technical specifications describe the minimum physical and functional properties of a video detection system. The system shall be capable of monitoring all licensed vehicles on the roadway, providing video detection for areas outlined in the construction drawings. The entire video detection system shall consist of the following:

- Single Slot Video Image Processing unit(s).
- Single Slot H.264/MPEG-4/MJPEG Video system communications module.
- Video camera(s) with IR filter enclosure and sunshield.
- Camera lens.
- Surge suppressor.
- All other necessary equipment for operation.

### **1.0 HARDWARE**

- 1.0 The Video Image Processor (VIP) shall be modular by design and housed in either a self-contained stand-alone unit or fit directly into NEMA TS1 & TS2 type racks as well as Type 170/179 input files. The VIP shall be interchangeable between a shelf or rack mount installation without replacing or modifying existing VIP units.
- 1.1 The VIP shall allow for 1 or 2 camera inputs and shall only occupy a single detector file slot. The VIP shall be 1.1" (w) x 4.5" (h) x 7" (l)
- 1.2 The system shall control from 1 to 4 VIP boards allowing for 1 to 8 image sensors.
- 1.3 The system shall be designed to operate reliably in the adverse environment of roadside cabinets and shall meet or exceed all NEMA TS1 and TS2, as well as Type 170/179 environmental specifications.
- 1.4 Ambient operating temperature shall be from -35 to +75 degrees Centigrade at 0 to 95% relative humidity non-condensing.
- 1.5 The system shall be powered by 12-24 VDC and draw less than 2 amperes.
- 1.6 The system shall utilize cabinet 24 VDC for rack mount installations or external 24 VDC for stand-alone shelf installations.
- 1.7 Surge ratings shall be set forth in the NEMA TS1 and TS2 specifications.

- 1.8 Serial communications shall be through an RS232 serial port. This port can be used for communications to a modem or laptop to upload/download detector configurations, count data and software upgrades. RS485 on the rear edge connector shall facilitate communications to other VIP boards.
- 1.9 Each VIP board shall have 4 opto-isolated open collector outputs. Twenty (20) additional outputs shall be available via the expansion port. An RJ-11 style port shall connect the VIP to the VIP expansion card.
- 1.10 Each VIP board shall allow for 20 digital inputs via the I/O Expansion port.
- 1.11 VIP expansion card shall allow for 2 or 4 outputs and shall occupy a single detector file slot.
- 1.12 The VIP shall have up to 24 presence detection zones and up to 8 data detection zones per camera.
- 1.13 The VIP shall provide a “Thermal On/Off” setting so the system can be optimized to work with the image from a thermal camera.
- 1.14 Data zones shall collect and store vehicle counts, volume, speed, gap time, headway, occupancy, and classification. Data shall be time-stamped and stored onboard (non-volatile memory) in intervals from 1-60 minutes.
- 1.15 Data and event alarms are generated for: queue, inverse direction, speed drop, no video, bad video communication error and other events.
- 1.16 Must be able to provide single or double loop emulation.
- 1.17 Presence hold time must have parameters that range from 10 to 600 seconds.
- 1.18 Each VIP board shall have error detection. An output contact will close if the video signal is bad or the VIP board is not functioning properly. A user defined quality level will automatically put the VIP into a recall state in cases of severe degraded visibility (i.e., fog, blizzard, etc.). Normal detection resumes when visibility improves above the user defined quality level.
- 1.19 Operator selectable recall shall be available via the VIP front panel. Holding the recall toggle switch for 5 seconds shall activate this function.
- 1.20 Operator shall be able to view each camera on a single VIP card by using the toggle switch on the VIP front panel.

- 1.21 The VIP board shall have 1 or 2 video inputs (RS-170 NTSC or CCIR composite video) and two video outputs (one on the front panel and one on the edge connector). The video inputs shall be through the VIP board's edge connector.
- 1.22 The VIP board shall have a reset toggle switch on the front panel to reset video detectors to "learn" the roadway image. During "relearn", selectable recall can be enabled or disabled for immediate operation. Learning time of video detectors shall be less than 5 minutes.
- 1.23 External surge suppression, independent of the VIP board shall separate the VIP from the image sensor.
- 1.24 The VIP board shall have separate light emitting diodes (LEDs) that indicate:

|                        |   |
|------------------------|---|
| <b>POWER</b>           | Red to verify power supply.                           |
| <b>I/O COMM</b>        | Red to indicate communications to expansion boards.   |
| <b>VIDEO 1 &amp; 2</b> | Red to verify the presence of video input 75 Ohm.     |
| <b>TX &amp; RX</b>     | Red to indicate communications via the serial port.   |
| <b>OUT1- OUT4</b>      | Green if the corresponding detection group is active. |

The VIP board shall also have a toggle switchfor:

|                     |                                    |
|---------------------|------------------------------------|
| <b>VIDEO SELECT</b> | Toggle between camera images.      |
| <b>RECALL</b>       | Manually places call on detectors. |
| <b>RESET</b>        | Manually reboots the VIP board.    |

- 1.25 The video detection system shall be capable of being programmed locally with a handheld keypad. Keypad and monitor must be separate units. A PC mouse will not be allowed. The monitor is to have a 9 inch, LCD color screen.
- 1.26 The VIP board shall have a video out female RCA style connector, DB9 female Service port and RJ-11 I/O Expansion port
- 1.27 The VIP Expansion board shall also have separate LEDs that indicate:
- |                   |   |
|-------------------|---|
| <b>POWER</b>      | Red to verify power supply.                           |
| <b>COMM</b>       | Red to indicate communications to VIP board.          |
| <b>I/O1- I/O4</b> | Green if the corresponding detection group is active. |

The VIP Expansion board shall have 8 dip switches that define inputs and outputs used (range: 1-12 or 13-24).

- 1.23 Event Log Database

The VIP module shall have an onboard database capable of time stamping and storing 500 events. The Event Log Database can be viewed or downloaded to a selected spreadsheet. Erasure of the Event Log Database shall not alter programmed configurations. As a minimum, the VIP shall log and time stamp the following events;

- Firmware upgrade.
- Loss of video signal.
- Resumption of video signal.
- Configuration change.
- Bad video quality.
- Reboot
- Recall activated.

**VIP Communications Module (VIEWCOM/E MAX+)**

- 1.24 The VIEWCOM/E MAX+ board shall be modular by design and housed in either a self-contained stand-alone unit or fit directly into NEMA TS1 & TS2 type racks as well as Type 170/2070 input files.
- 1.25 The VIEWCOM/E MAX+ shall only occupy a single detector file slot. The VIEWCOM/E MAX+ shall be 1.1" (w) x 4.5" (h) x 7" (l)
- 1.25 The VIEWCOM/E MAX+ board shall control from 1 to 4 VIP boards allowing for 1 to 8 image sensors. And 2 Auxiliary video inputs shall be available for connecting PTZ or other cameras.
- 1.26 The VIEWCOM/E MAX+ shall be designed to operate reliably in the adverse environment of roadside cabinets and shall meet or exceed all NEMA TS1 and TS2, as well as Type 170/2070 environmental specifications.
- 1.27 Ambient operating temperature shall be from -34 to +74 degrees Centigrade at 0 to 95% relative humidity non-condensing.
- 1.28 The VIEWCOM/E MAX+ shall be powered by 12-24 VDC and draw less than 2 amperes.
- 1.29 Serial (Programming Keypad) and Ethernet (TCP/IP) communications shall be through respectively a 3.5mm Stereo Jack port and Ethernet port (RJ-45 connection). These ports can be used for local programming of the VIEWCOM/E MAX+, communication to upload/download detector configurations, traffic data, technical events, send software upgrades and do remote setup of detectors. RS485 on the rear edge connector shall facilitate communications to VIP boards.
- 1.30 Surge ratings shall be set forth in the NEMA TS1 and TS2 specifications.
- 1.31 The Communication board shall have separate light emitting diodes (LEDs) that indicate:

**POWER**                      Red LED to verify power supply.

|                  |  |
|------------------|--|
| <b>SERIAL</b>    | RS232 communications to third party devices.             |
| <b>VIDEO OUT</b> | Female RCA style connector.                              |
| <b>RESET</b>     | Manual reboot to re-initialize board.                    |
| <b>KEYPAD</b>    | 3.5mm Stereo Jack port for setup of communication board. |
| <b>LAN</b>       | RJ-45 port for Ethernet communication.                   |

## 2.0 FUNCTIONAL CAPABILITIES

### 2.1 Real Time Detection

- 2.2 Each VIP shall be capable of processing one (1) or two (2) separate video signals per VIP board. The video signal shall be analyzed in real time.
- 2.3 The system shall be expandable up to 8 cameras that may be connected to different VIP units and programmed independently.
- 2.4 The system shall be capable of displaying detectors on the video image with associated outputs. Outputs/Inputs status will be indicated on the screen. Parameters will also include the ability to view raw video without any verbiage and/or detectors for surveillance purposes.
- 2.5 Each VIP board will detect within the view of the connected camera the presence of vehicles in user defined zones. Detectors available shall be presence, count, queue, delay, extension, or pulse mode of either arrival or departure of vehicles. Delay and extension shall be defined between 0.1 – 99.9 seconds and pulse mode between 0 – 166 ms in 33ms increments if NTSC is used. Each VIP board shall also detect and collect traffic data of passing vehicles in user-defined zones within the view of the connected camera.

Collected traffic data by direction shall include:

- Volume (absolute numbers) per length class and per lane.
- Average speed (km/h or mph) per length class and per lane.
- Average gap time (1/10 sec) per length class and per lane.
- Average headway (m or feet) per lane.
- Occupancy (%) per lane
- Concentration (vehicles/km or mile) per lane.
- Average length (m or feet) per lane.
- Confidence level (0-10) per lane.

- 2.6 The VIP board shall be programmed without the use of a supervisor computer. A standard CCTV monitor and handheld keypad plugged into the VIP serial port will facilitate detector programming. The handheld keypad shall include the following keys and respective functionalities:

| Keys              | Functionality   |
|-------------------|---|
| Enter Key         | <ul style="list-style-type: none"> <li>To enter a menu, a submenu or an item within a submenu.</li> <li>To select a value for a parameter and exit the topic.</li> </ul>  |
| Escape Key        | <ul style="list-style-type: none"> <li>To exit the menu or submenu.</li> <li>To exit the main menu and save the settings in the current configuration.</li> </ul>   |
| Arrow Keys        | <ul style="list-style-type: none"> <li>To scroll through a menu.</li> <li>To scroll through the values of a parameter.</li> <li>To select a submenu.</li> <li>To make a presence zone direction sensitive.</li> </ul> |
| F1 Next Key       | <ul style="list-style-type: none"> <li>To proceed to the next detection zone.</li> </ul>  |
| F2 Prev Key       | <ul style="list-style-type: none"> <li>To move to the previous detection zone.</li> </ul>   |
| F3 Add Key        | <ul style="list-style-type: none"> <li>To add a detection zone.</li> </ul>  |
| F4 Del Key        | <ul style="list-style-type: none"> <li>To delete a detection zone.</li> </ul>   |
| Dir Key           | <ul style="list-style-type: none"> <li>To make a data zone direction sensitive.</li> </ul>  |
| Help Key          | <ul style="list-style-type: none"> <li>To display help text for an item.</li> </ul>   |
| Output Number Key | <ul style="list-style-type: none"> <li>To assign an output number to a detection zone.</li> </ul>   |
| Operate Key*      | <ul style="list-style-type: none"> <li>To put the board in operation mode.</li> </ul>   |
| Edit Key          | <ul style="list-style-type: none"> <li>To change settings while starting from default values for all parameters.</li> </ul>   |
| Modify Key*       | <ul style="list-style-type: none"> <li>To change settings while starting from the last saved settings for all parameters.</li> </ul>  |

\* The functionality of this key is only for the video system communications modules

- 2.7 The VIP shall store up to 4 detector configurations per video input. It shall be possible to switch between detector configurations manually, automatically by time of day or remote input.
- 2.8 Via the serial port, detector configurations can be uploaded to a laptop and stored on disk.
- 2.9 Detectors may be linked to 24 outputs and 20 inputs using Boolean Logic features: AND, OR, NOT. It will be possible to generate conditional outputs based upon inputs from a controller.

- 2.10 It shall be possible to make a detector directional sensitive. Options will include an omni-directional detector or a detector that only senses movement: from right to left, left to right, up to down or down to up as you look at the monitor.
- 2.11 All detectors and parameters can be changed without interrupting detection. For example: when one detector is modified, all existing detectors continue to operate, including the one that is being modified. When the new position is confirmed, the new detector will enter a learning phase. Once the new detector is in function, it will take over the job of the old one. In this way, the detector is always fully operational with no interruption on any detector, even during modification.
- 2.12 Four data detection zones per camera on a two camera input VIP may be used for collection of vehicle count, speed, classification, occupancy, density, headway, and gap time. These detectors will detect and store traffic data at user-defined intervals of 1, 2, 3, 5, 6, 10, 15, 30 & 60 minutes. It shall be possible for each VIP board to store data in non-volatile memory.
- 2.13 Six detectors per camera may be used as queue detectors. Using on screen calibration, queue detectors will detect queue delays and display the queue length in feet or meters. A queue may also generate an output alarm from the VIP board.
- 2.14 Associated software shall be used with a PC to download count data and export to a spreadsheet. The software shall also be used to upload/download detector configurations, traffic data, technical events and update software versions of the VIP board.
- 2.15 The VIP board shall have an internal clock with daylight saving time system, which can be enabled or disabled.
- 2.16 The VIP board shall provide overlaid tool tips for each individual menu- and submenu-items.
- 2.17 The VIP board shall have an optional password implementation. Different user-levels shall be available each having different rights.  
All equipment must be capable of having a minimum of 10 users that can be defined for each user-level.
- 2.18 The VIP board shall be able to delay or extend a detector zone output in combination with an input from the controller.
- 2.19 The VIP board shall detect wrong-way drivers and shall provide an alarm/event via communication board and/or output.

- 2.20 The VIP board shall provide an alarm and/or output when the user selected queue detection threshold of occupancy is exceeded for more than a user selected time threshold.
- 2.21 The VIP board shall distinguish five classes of detected vehicles based upon user selectable vehicle length thresholds.
- 2.22 The VIP shall be able to emulate loop emulation with user selectable loop dimensions.
- 2.23 The VIP shall have a Detection Hold Time function. The timing parameters shall be 10 – 600 seconds.
- 2.24 The VIP board shall provide advanced settings to optimize detection to avoid cross-lane traffic occlusion. Directional detectors shall be able to be programmed depending on the severity of the occlusion.
- 2.25 The VIP shall be programmable for Wrong Way Suppression Delay. The timing parameters shall be 1 – 30 seconds.
- 2.26 The VIP board shall utilize advanced shadow rejection algorithms. It shall be possible to place detection zones over lane markings without affecting the shadow rejection accuracy from adjacent vehicle (moving) shadows.
- 2.27 The VIP board shall utilize an advanced Tree Shadow Suppression algorithm to suppress false detection of moving shadows (non-vehicular, i.e. trees) within a detection zone. It shall be possible to enable or disable this feature.
- 2.28 The VIP board shall have a Camera Movement Suppression algorithm that provides reliable detection when there is movement of the camera due to severe wind or other severe weather conditions.
- 2.29 The VIP board shall provide integrated image quality diagnostics eliminating the need for users to manually place quality detection zones on the image. Advanced diagnostic information shall display both the quality of the video images (Qim) as well as the quality of detection (Qdet). The Qim and Qdet shall be displayed on the image separately. Each quality diagnostic (Qim, Qdet) will be based on a 1 (poor quality) to 10 (excellent quality) scale.
- 2.30 The VIP board shall provide the capability to enter a “recall” state if the quality threshold falls inside a user-defined range. The range shall be defined by the Quality Level (1-10) and a timeout range of 1 to 99 minutes. For example, if the quality drops to level 5 for 2 minutes, the VIP shall enter a “recall” mode. Once the quality rises above level 5 for 2 minutes, the VIP resumes normal operation. The VIP shall also provide a contact closure output during this condition.

**VIP Communications Module (VIEWCOM/E MAX+)**

- 2.31 The VIEWCOM/E MAX+ shall control from 1 to 4 VIP boards allowing for 1 to 8 cameras.
- 2.32 The VIEWCOM/E MAX+ shall provide a 3.5mm stereo jack port (for programming keypad) and Ethernet interface and communication to provide traffic data and allow remote configuration from the Traffic Operations Center.
- 2.33 The LAN port shall meet IEEE 802.3 with a RJ-45 connector and meet the following specification:
- Data rates for Ethernet via LAN port: 10/100Mbps  
TCP/IP based protocol
- 2.34 The communication shall support all functions of the video detection system.
- 2.35 All data transmissions shall be protected by CRC (cyclic redundancy checking) or an equivalent error detection method.
- 2.36 The communication board shall be programmed without the use of a supervisor computer. A standard CCTV monitor and keypad plugged into the communication serial port will facilitate board programming.
- 2.37 The communication shall support H.264/MPEG-4/MJPEG dual streaming video over Ethernet with the following programmable parameters:
- Dual Video Encoder selection (per video encoder):
    - Video encoding: H.264, MPEG-4 or MJPEG
    - Views: Single, Quad, PiP (Picture in Picture) and Compass View

- Frame rate programmable from 1 to 30 frames/second
  - Programmable bit/data rate of up to 8 Mbps
  - Resolutions: Full D1, VGA, QVGA, CIF, QCIF
  - Video Stream:
    - Network Protocol: RTP/UDP, IP unicast or multicast IPV4
    - Transport Protocol: RTSP over TCP
    - Supported players: VideoLAN VLC, Apple©Quicktime
- 2.38 Password protected remote setup (configuration upload/download, setup of detectors and detector parameters, setup of communication board parameters, firmware updates for Communication and VIP module) and monitoring of every connected VIP module shall be possible.
- 2.39 The VIEWCOM/E MAX+ shall log traffic data and events provided by the VIP module(s) and transmit data and events to the HOST computer.
- 2.40 The VIEWCOM/E MAX+ shall send the traffic data from the VIP boards at a programmable interval from 10 seconds to 60 minutes.
- 2.41 RS485 communication to every VIP card shall be established via the Edge connector.
- 2.42 A (via Ethernet) connection with any standard Internet browser shall be possible to communicate with the VIEWCOM/E MAX+ for remote set-up, monitoring and real-time traffic data (count, speed, occupancy) of the VIP modules.
- 2.43 Password protection shall be provided on the VIEWCOM/E MAX+ for remote operations.
- 2.44 Remote VIEWCOM/E MAX+ and VIP firmware upgrades shall be possible via Ethernet communication.
- 2.45 The VIEWCOM/E MAX+ supports SNMP management per RFC 1213.
- 2.46 The VIEWCOM/E MAX+ shall have the option to connect to an NTP server for date and time synchronization where available.
- 2.47 If no NTP server is available, the user shall be able to remotely send a time synchronization via the VIEWCOM/E MAX webserver page. This will synchronize date and time to the communication modules and also the VIP connected boards automatically.

### **3.0 IMAGE SENSOR- THERMAL CAMERA**

- 3.1 The Thermal Traffic Camera shall not depend on any visible or invisible (infrared) illumination or image intensifier to “see” i.e. produce images. The Thermal Traffic Camera shall be totally passive and not produce any energy or emit light in any bandwidth. The Thermal Traffic Camera shall allow the user to clearly identify images in the total absence of light.
- 3.2 The Thermal Traffic Camera shall allow the user to see through smoke and light fog and to view the thermal patterns and contrast in the scene.
- 3.3 The Thermal Traffic Camera shall utilize a Vanadium Oxide (VOx) uncooled microbolometer responding in the LWIR (Long Wave Infrared) spectral range of 7.5 – 13.5  $\mu\text{m}$ , which is beyond what is visible to the human eye.
- 3.4 The Thermal Traffic Camera shall be based on Vanadium Oxide (VOx) microbolometer detector technology, and shall not be susceptible to permanent damage after imaging the sun. This is in contrast to some systems based on amorphous silicon detector technology, which can be permanently damaged when viewing the sun or even reflections of the sun.
- 3.5 The Thermal Traffic Camera shall not utilize shutters to prevent damage from the sun, but rather the Thermal Traffic Camera shall provide uninterrupted video which shall be required for traffic and ITS installations.
- 3.6 The Thermal Traffic Camera shall not utilize dynamic apertures to protect the image sensor because these mechanisms reduce sensitivity for an extended period of time, thus

reducing the Thermal Traffic Camera performance, which shall not be acceptable for traffic installations.

- 3.7 The Thermal Traffic Camera shall provide a thermal optics that automatically adjust to background thermal changes, and therefore do not require re-adjustment and/or thermal refocusing.
- 3.8 The Thermal Traffic Camera shall not be susceptible to “image blooming” caused by bright lights as are image intensifiers and visible spectrum cameras.
- 3.9 The camera shall be factory configured with the following fixed anti-reflection coated Germanium lenses with the Field of View (FOV) and resolutions as indicated:

| Device  | Lens  | Resolution (pixels) | FOV           |
|---------|-------|---------------------|---------------|
| FC-334T | 13 mm | 320 x 240           | 34° H x 28° V |
| FC-324T | 19 mm | 320 x 240           | 28° H x 18° V |
| FC-348T | 9 mm  | 320 x 240           | 48° H x 37° V |

- 3.10 The Noise Equivalent Temperature Difference (NETD) is the measure of the smallest object temperature that can be detected by the thermal image sensor relative to the system noise. The measurement is usually quantified as an mK value. This is the most common Figure of Merit of a thermal imaging system and a true measurement of the thermal camera’s sensitivity. The Thermal Traffic Camera image sensor shall provide a NETD of < 75mk, <50mK f/1.0 or lower.
- 3.11 The Thermal Traffic Camera shall include Auto Digital Detail Enhancement (Auto DDE) which is an advanced non-linear image processing algorithm. The Auto DDE function is fully automatic and requires no input or adjustment from the user. The Auto DDE shall enhance the image detail to match the total dynamic range of the original image allowing details to be visible to the user even in scenes with low or high thermal contrast. Auto DDE will increase the probability of detection of low contrast images. These settings shall be optimized for performance with Traffic Video Detection.
- 3.12 The Thermal Traffic Camera shall utilize Non-Uniformity Correction (NUC) which is a set of compensation factors for each pixel. NUC shall enable the following features and benefits:
- 3.13 Eliminate the need for FPA (Focal Plane Array) temperature stabilization.
- 3.14 Allow for near instantaneous camera turn-on.
- 3.15 Reduced system complexity and power consumption.
- 3.16 Allow for a wider operating temperature range.
- 3.17 The Thermal Traffic Camera shall include Automatic Gain Control (AGC) circuitry to compensate for scene variations, improve image quality by avoiding saturation and distortion, and to balance signal levels prior to display to maximize image quality.

- 3.18 The Thermal Traffic Camera shall feature both White-Hot and Black-Hot operating modes. In the White-Hot (default) mode warmer objects will be displayed in white or lighter shades than cooler or background areas. In the Black-Hot mode warmer images will be displayed as black or dark gray as compared to cooler background objects.
- 3.19 The Thermal Traffic Camera shall provide standard NTSC or PAL analog composite video output (factory configured) to allow it to function as a direct replacement for daylight camera and to connect directly to industry standard video detection software cards, and recording devices. The analog video signal shall be available via BOTH a BNC video output connector and a connector free terminal block. The video outputs shall be surge protected.
- 3.20 The Thermal Traffic Camera shall be furnished in an IP-66 rated outdoor enclosure with sunshield and mounting base. The mounting base shall be provided with 1/4x20 holes for mounting to a pedestal or wall mount. All cable connections shall be made inside of the enclosure. The enclosure shall be provided with liquid-tight sealed cable gland fittings for the video and power cables.
- 3.21 The camera enclosure shall include grounding and surge protection. A separate Earth ground connection shall be made inside the enclosure to a designated grounding lug. The Earth ground conductor may be run as part of the power cable bundle.
- 3.22 The Thermal Traffic Camera shall operate on surge protected 110/220 VAC.
- 3.23 The Thermal Traffic Camera shall include a 10-year warranty on the thermal detector.
- 3.24 The Thermal Traffic Camera shall have been installed and tested by the said agency.
- 3.25 The Thermal Traffic Camera shall be a FLIR FC Series Traffic Camera. Acceptable Models: FC-324T, FC-334T, FC-348T.
- 3.26 Technical Description
- 3.27 The Thermal Traffic Camera shall meet the following minimum requirements:

|                                     |  |
|-------------------------------------|--|
| Sensor Type                         | Long-life VOx Uncooled Microbolometer w/10-year warranty |
| Spectral Response                   | 7.5 to 13.5µm  |
| Sensitivity (Thermal Camera sensor) | < 75mk, <50mK f/1.0                                      |
| Pixel Pitch                         | 25 microns   |
| Video Output                        | Dual NTSC or PAL (BNC and Connector Free)                |

|                             |   |
|-----------------------------|---|
| Serial Control Interface    | RS-232 or RS-422  |
| User Interface              | Via Windows-based application program (Windows-based GUI)   |
| Input Voltage               | 90-240VAC Single Phase 50-60hz  |
| Power Consumption           | 90-240VAC: 1.7W w/110VAC<br>90-240VAC: 18W peak w/Heaters   |
| Operating Temperature Range | -50°C to 75°C (Continuous Operation)<br>-40°C to 75°C (Cold Start)  |
| Storage Temperature Range   | -55°C to 85°C   |
| NEMA TS 2                   | Environmental testing for FC Series was conducted by IAW w/Section 2.1 of MEMA TS 2-2003 and either meets or exceeds those requirements in the following categories: Operating Voltage, Operating Frequency, Ambient Temperature, Humidity, Vibration and Shock |
| Enclosure Rating            | IP-66   |
| Weight                      | 4.2 lb. w/sun shield  |
| Dimensions                  | 10.8" x 5.4" x 4.4" (w/sun shield)  |

- 3.28 The Thermal Traffic Camera shall be a FLIR FC-Series Traffic Camera. Model FC-334T, FC-348T, or FC-324T.

#### 4.0 SURGE PROTECTION

- 4.1 A video surge suppressor(s) shall be available for installation inside the traffic signal controller cabinet. The suppressor shall provide coaxial cable connection points to an EDCO CX06-BNCY or approved equal transient suppresser for each image sensor.

|                                |                     |
|--------------------------------|---------------------|
| Peak Surge Current (8 x 20 us) | 20KA                |
| Technology                     | Hybrid, Solid State |
| Attenuation                    | 0.1db @ 10Mhz       |
| Response Time                  | <1 nanosecond       |
| • Protection                   | Line to Ground      |

|                  |                           |
|------------------|---------------------------|
| Shield to Ground | (isolated shield modules) |
| • Clamp Voltage  | 6 volts                   |
| • Connectors     | BNC                       |
| • Impedance      | 75 Ohms                   |
| • Temperature    | -40 to +85 degrees C      |
| • Humidity       | 0-95% non-condensing      |
| • Dimensions     | 4.5" x 1.5" x 1.25"       |
| • UL Listed      | UL 497B                   |

## 5.0 IMAGE SENSOR- MOUNTING BRACKETS

- 5.1 Mast arm installations shall be mounted at a sufficient height to prevent occlusion from cross traffic between the stop bar and the mast arm on which the camera is installed. A 74" maximum length of internally reinforced, aluminum tube shall be attached to the mast arm bracket for camera mounting above the mast arm. Camera shall be mounted to the top of the tube with the camera manufacturers recommended bracket. Camera bracket shall provide adjustments for both vertical and horizontal positioning for the camera. Camera attachments shall be designed to securely fasten the camera to prevent the extension tube from falling into the path of vehicles and/or becoming loose. Mounting bracket must fasten to the Mast arm using a 64" or 82" aircraft cable. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.
- 5.2 Luminaire arm installations shall be installed on the luminaire arm, with the camera/video manufacturers recommended brackets. Camera luminaire brackets shall provide adjustments for both vertical and horizontal positioning of the camera. Camera attachments shall be designed to securely fasten the camera to the luminaire arm. Mounting bracket shall be made of aluminum. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.

## 6.0 IMAGE SENSOR- CABLE (COAXIAL & POWER)

- 6.1 Coaxial & Power cable (Siamese) shall be installed in conduits or overhead as indicated in the plans. Coaxial cable shall be suitable for exterior use and in direct sunlight. Power cable will have a minimum of six (6) conductors.

- 6.2 A junction box on the camera bracket arm shall provide access to video and power cable terminations. No soldering shall be required in the field. Coaxial cable will terminate with a “barrel” style BNC connector and power shall be terminated via a small terminal strip or via “wire nuts.”
- 6.3 Coaxial cable will be terminated in the surge suppressor before being connected to the VIP boards.
- 6.4 Power cable will be terminated into a circuit breaker panel provided by the manufacturer and connected to 120 VAC in the controller cabinet.
- 6.5 Description of cable: Composite, 6 Conductors 2 elements: 18awg 6 conductors 7/26 bare copper, .016” polyethylene, 20awg 1 conductor, solid bare copper, 056” foam polyethylene jacket black, overall .030” PVC jacket black.

**ELEMENT 1**

**ELEMENT 2**

|                          |                             |                |
|--------------------------|-----------------------------|----------------|
| CONDUCTORS/PAIR COUNT:   | 6 CONDUCTORS                | 1 CONDUCTOR    |
| GAUGE & STRANDING:       | 18AWG 7/26 BC               | 20AWG SOLID BC |
| PRIMARY INSULATION TYPE: | POLYETHYLENE                | FOAM PE        |
| INSULATION THICKNESS:    | .016”                       | .056”          |
| COLOR CODE:              | WHITE,RED,BLUE,BLACK,BROWN. | NATURAL        |
| SHEILD:                  | N/A                         | N/A            |
| TAPE:                    | N/A                         | N/A            |
| DRAIN WIRE:              | N/A                         | N/A            |
| BRAID:                   | N/A                         | 95% BC         |
| CAPACITANCE:             | N/A                         | N/A            |
| PRINT LEGEND:            | N/A                         | N/A            |
| JACKET TYPE:             | N/A                         | POLYETHYLENE   |
| JACKET COLOR:            | N/A                         | BLACK          |
| JACKET THICKNESS:        | N/A                         | .035”          |
| NOMIMAL OD:              | N/A                         | .242”          |

**OVERALL ASSEMBLY OF WIRE**

|                   |       |
|-------------------|-------|
| JACKET THICKNESS: | .030” |
| JACKET COLOR:     | BLACK |
| JACKET MATERIAL:  | PVC   |
| RIPCORD:          | YES   |
| NOMINAL OD:       | .512” |
| VOLTAGE RATING:   | 300V  |
| TEMP. RATING:     | 75C   |
| UL TYPE OR STYLE: | N/A   |
| PRINT LEGEND:     | TBD   |

|                  |               |
|------------------|---------------|
| PACKAGING:       | TBA           |
| COPPER WEIGHT:   | 39.87 LBS/MFT |
| SHIPPING WEIGHT: | 100 LBS/MFT   |

## **7.0 INSTALLATION & TRAINING**

- 7.1 The product supplier of the video detection system shall supervise the installation and the testing of the video equipment. A factory certified representative from the manufacturer shall be on-site during installation. The factory representative shall install, make fully operational, and test the system as indicated on the intersection drawings and this specification.
- 7.2 Two days training shall be provided to personnel of the contracting agency in the operation, setup, and maintenance of the video detection system. Instruction and materials shall be produced for a maximum of 10 persons and shall be conducted at a location selected by the contracting agency. The contracting agency shall be responsible for travel, room and board expenses for its own personnel.

## **8.0 WARRANTY**

- 8.1 The video detection system shall be warranted against manufacturing defects in materials and workmanship for a period of three years from date of installation. The video detection supplier shall provide all documentation necessary to maintain and operate the VIP system.

## 3rd Street Tunnel CIP Camera System Restoration and Maintenance

### SCOPE OF WORK

Services requested as a minimum include frequent inspection and cleaning of cameras, maintenance of servers, all work stations residing at Homeland Security Emergency Management Agency (HSEMA), DDOT Traffic Management Center (TMC) and the Tunnel Control Room (TCR), network switches, fiberoptic cable and all associated components of the 3<sup>rd</sup> Street tunnel Critical Infrastructure Protection (CIP) security/surveillance camera system.

It is also a requirement for the Contractor to conduct coordination with DCnet regarding fiber backbone related bandwidth and connectivity issues, the TCR staff regarding shafting lane closures for maintenance activities requiring lane closures (both long and short term) closures and DDOT's IT Staff.

- (1) The Contractor shall keep the CIP system maintained free of deficiencies at all times by making both repairing and/or replacing all intermittently malfunctioning or non functional fixed and PTZ cameras, encoders, media converters, power supplies, video display monitors in the TCR, UPS, fiber optic cable assembly (both in the TCR and in local equipment cabinets within the tunnel).
- (2) The Contractor shall keep the fiber optic cable, splices, connectors, patch panels and all related components maintained free of communications interruptions. Should any components fail to operate for any reason at any part of the CIP system, the affected component must be replaced and the system restored to its original state.
- (3) Currently, a few of the fixed cameras around the six portals do not provide clear images due to sun glare in combination with smoke inside the tunnel around the portals. The contractor shall examine all PTZ cameras and consider replacing them with infrared cameras. The Contractor shall safe keep the removed cameras to be served as spares. The Contractor shall submit to DDOT a catalog cut sheet to the DDOT Project Manager for approval before acquiring infrared cameras.
- (4) When a non-functional camera is encountered, and can't be revived back, the manufacturer shall be contacted by the Contractor for availability of warranty on the camera. After determining the cameras to be replaced, the Contractor shall in writing proof to DDOT how the determination was reached for each camera.

- (5) The Contractor shall analyze and determine the intermittent (sleep mode state) of the two large camera display monitors in the TCR and make all the necessary repairs for continuous display of cameras.
- (6) If a camera is considered non-repairable, is out of warranty and all spare cameras are used up, the Contractor shall replace and bring the camera back to a full operational state.
- (7) The Contractor shall repair and/or replace as necessary all servers, storage vaults, DVRs, routers and network switches. Prior to repairing servers, The Contractor shall create a back up file of the CIP system.
- (8) Maintain configuration and calibration of video analytics and control systems such as by adjusting detection zones and reducing number of alarms caused due to for examples traffic congestion.
- (9) The Contractor shall provide a detailed training to all users and administrators on how to fully operate and utilize the system.
- (10) The Contractor shall refine and finalize the in-house drafted Standard Operating Procedure (SOP) pertaining to the CIP system after improvement of the information sharing functions of the CIP system takes place.

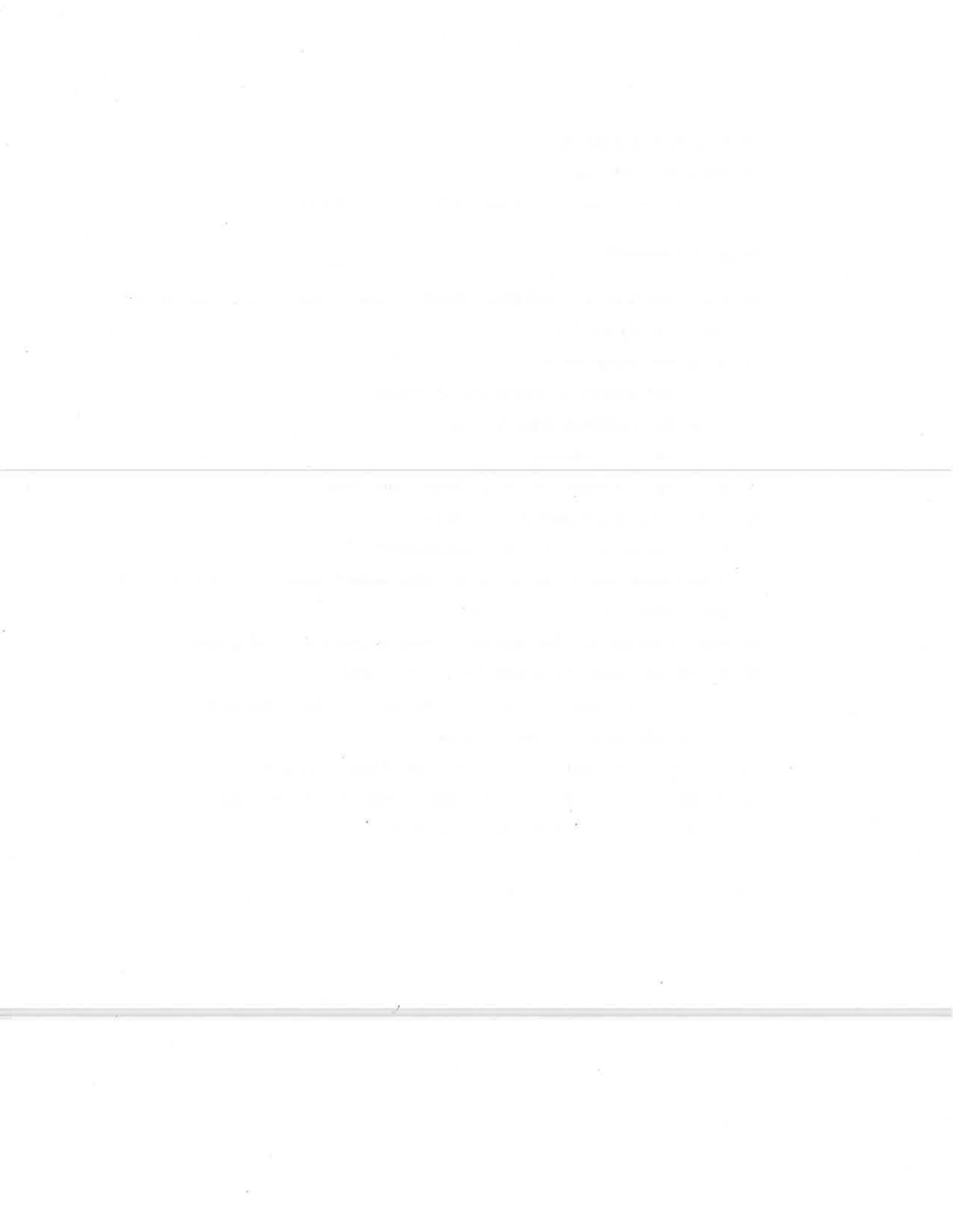
**Key system components**

1. 14 PTZ cameras (including mounting)
2. 70 fixed cameras (mounting)
3. 84 video to fiber media converters
4. 84 video encoders, and associated chassis rack
5. Fiber optic feeds to each camera
6. Video analytics server and software
7. Video management and control server and software
8. Client work station, monitors and software locations
  - i. HSEMA Operations Center
  - ii. DDOT TMC at Reeves Center
  - iii. Tunnel Control Room
9. Network video recorders
10. Data storage vault

11. Network routers and switches
12. Rack mounted UPS systems
13. Fiber optic based network feed to the DC WAN system(DCNET)

**Key project deliverables**

1. Monitor the health and optimization of network based video recording, video analytics and control systems (Daily)
2. Operational backup system
  - i. Backup Video analytics server and software
  - ii. Backup Network video recorders
  - iii. Backup Data storage vault
3. Repair/replace fiber optic to camera (Within 8 hours of failure)
4. Restore failed camera (Within 4 hours of failure)
5. Conduct camera cleaning (Quarterly and as needed)
6. Replace/repair servers, storage vaults, DVRs, routers, network switches, operating systems (Within 4 hours and as needed)
7. Maintain configuration and calibration of video analytics and control systems
8. Provide a 24-hour remote systems maintenance response
9. Provide on-site support during special events (July 4, presidential inauguration)
10. Provide system operational training for DDOT personnel
11. Consider replacing existing 14 PTZ cameras with thermal imaging cameras
12. Maintain 10 percent of spare Fixed and PTZ cameras, encoders, media converters, power supplies (UPS) and fiber optic cable assembly



**DETECTABLE WARNING PAVERS ON NEW  
AND EXISTING SIDEWALK RAMPS; SPECIAL  
PROVISIONS AND DRAWING**

## DETECTABLE WARNING PAVERS ON NEW SIDEWALK RAMPS:

This S.P. supplements 609.

**A. DESCRIPTION.** This work consists of furnishing and installing detectable warning pavers (truncated domes) in the construction of new wheelchair ramps. Furnishing and placing of materials of detectable warning pavers in the construction of new wheelchair/bicycle ramps will be paid for under Pay Items 609 200 and 609 203.

### **B. DETECTABLE WARNING PAVERS/TRUNCATED DOMES**

**General** – Detectable warning pavers shall consist of a surface of truncated domes aligned in a square grid pattern.

**Dome Size** – Truncated domes in a detectable warning surface shall have a base diameter of 0.9 inches minimum to 1.4 inches maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 inches.

**Dome Spacing** – Truncated domes in a detectable warning surface shall have a center-to-center spacing of 1.6 inches minimum and 2.4 inches maximum, and a base-to-base spacing of 0.65 inches minimum, measured between the most adjacent domes on square grid.

**Size** – Detectable warning surfaces shall extend 24 inches in the direction of travel from the back of the curb for the entire width of the wheelchair ramp, landing, or blended transition.

**Rail Crossings** – The detectable warning surface shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.

**C. MATERIALS.** Pavers will meet Americans with Disabilities Act (ADA) requirements for detectable warning pavers (truncated domes) either ASTM C 902 Pedestrian and Light Traffic Paving Block, Class SX, Type 1; or ASTM C 936 Solid Concrete Interlocking Paving Units; or ASTM C 1272 Heavy Vehicular Paving Brick, Type R.

Listed below are the acceptable manufacturers and products or approved equal for detectable warnings and truncated domes pavers are:

| <b>Manufacturers</b>  | <b>Products</b>   |
|---|---|
| Whitacre-Greer Fireproofing Company,<br>1400 S. Mahoning Ave., Alliance, OH,<br>44601 | ADA Paver, 4" x 8" x 2-1/4"<br>Clear Red (Rustic) #30                     |
| Hanover Architectural Products<br>240 Bender Rd., Hanover, PA, 17331                  | Detectable Warning Paver, 11-3/4" x 11-<br>3/4" x 2"<br>Red or Quarry Red |
| Endicott Clay Product, PO Box 17,<br>Fairbury, NE, 68352                              | Handicap Detectable Warning Paver,<br>Nominal 4" x 8" x 2-1/4" Red Blend  |

Pavers will be laid in top of a 4" unreinforced concrete base. Setting bed and joints to be mortared in accordance with manufacturers instructions or with a maximum 1/2" thick setting bed of latex modified cement mortar. Mortar joints to a width not greater than 5/32" and not less than 1/16". Pavers shall not be directly touching each other unless they have spacing bars. Portion of concrete ramp that is thickened to 6" shall be extended such that a minimum 4" of concrete shall be beneath the brick pavers.

Joints are to be flush with top surface and struck so as to give a smooth surface. Pavers shall be laid such that joints are level with adjoining joints so as to provide a smooth transition from brick to brick and brick to concrete surface. The top surface of any two adjacent units should not differ by more than 1/8" in height for mortared brick paving. Bricks shall be placed in a running bond pattern. Pavers that do not conform to the smoothness requirement shall be removed and replaced at the expense of the contractor as determined by the Engineer. Face of all brick shall be clean of cement and protected so as to avoid chipping during construction.

Stamping or imprinting systems when used must be capable of uniformly providing the specified texture and pattern, using the Department's standard class of concrete for sidewalks. The minimum dry static coefficient of friction, as defined by ASTM C-1028, shall be 0.80.

D. CONSTRUCTION. The Contractor shall submit literature describing the following to the Engineer at least 30 days prior to the proposed installation:

- The detectable warning paving material
- All associated materials
- Preparation requirements
- In addition, a minimum 12" x 12" sample of the detectable warning material shall be submitted

The manufacturer shall demonstrate in writing and by providing references that the detectable warning paving materials have been satisfactorily used for roadway, path or flooring applications, in high pedestrian use and under weather conditions similar to those experienced in the District, for a minimum period of five years.

In no case shall the Contractor permit the application of any materials by untrained personnel or non-approved installers. The material manufacturer's certification of compliance with this requirement shall be provided to the Engineer.

Prior to the start of work, the Contractor shall show evidence of successful completion of similar installations and provide a job site sample for the approval of the Engineer.

The sample size shall be 4' x 2', minimum, and constructed at a location selected by the Engineer.

As many test panels will be constructed as are necessary to achieve a sample panel that meets the satisfaction of the Engineer. All work shall conform to the appearance of the approved sample to the satisfaction of the Engineer. The sample shall not be incorporated into the work and will be removed when ordered by the Engineer.

Follow all applicable manufacturer's requirements for environmental conditions, surface preparation, installation procedures, curing procedures, and materials compatibility. The Contractor is responsible for removing any material spatters from areas. The Contractor shall repair any damage that should arise from the installation or the clean-up effort.

**E. MEASURE.** No separate measure for DETECTABLE WARNING PAVERS ON NEW SIDEWALK RAMPS will be made.

**F. PAYMENT.** Payment for DETECTABLE WARNING PAVERS ON NEW SIDEWALK RAMPS will be included in the unit price for the Wheelchair/bicycle Ramps (Items 609 200 and 609 203), which payment will include furnishing and placing all materials, tools, equipment, all labor and incidentals necessary to complete the work. No payment will be made for job site sample(s) and clean-up.

**DETECTABLE WARNING PAVERS ON EXISTING SIDEWALK RAMPS,**  
**Item 609 003**

This S.P. supplements 609.

**A. DESCRIPTION.** This work consists of furnishing and installing detectable warning pavers (truncated domes) in existing wheelchair ramps as shown on the plans and as directed by the Engineer.

**B. DETECTABLE WARNING PAVERS/TRUNCATED DOMES**

**General** – Detectable warning pavers shall consist of a surface of truncated domes aligned in a square grid pattern.

**Dome Size** – Truncated domes in a detectable warning surface shall have a base diameter of 0.9 inches minimum to 1.4 inches maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 inches.

**Dome Spacing** – Truncated domes in a detectable warning surface shall have a center-to-center spacing of 1.6 inches minimum and 2.4 inches maximum, and a base-to-base spacing of 0.65 inches minimum, measured between the most adjacent domes on square grid.

**Size** – Detectable warning surfaces shall extend 24 inches in the direction of travel from the back of the curb for the entire width of the wheelchair ramp, landing, or blended transition.

**Rail Crossings** – The detectable warning surface shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.

**C. MATERIALS.** Pavers will meet Americans with Disabilities Act (ADA) requirements for detectable warning pavers (truncated domes) either ASTM C 902 Pedestrian and Light Traffic Paving Block, Class SX, Type 1; or ASTM C 936 Solid Concrete Interlocking Paving Units; or ASTM C 1272 Heavy Vehicular Paving Brick, Type R.

Listed below are the acceptable manufacturers and products or approved equal for detectable warnings and truncated domes pavers are:

| Manufacturers   | Products   |
|---|--|
| Whitacre-Greer Fireproofing Company,<br>1400 S. Mahoning Ave., Alliance, OH,<br>44601 | ADA Paver, 4" x 8" x 2-1/4"<br>Clear Red (Rustic) #30                    |
| Hanover Architectural Products<br>240 Bender Rd., Hanover, PA, 17331                  | Detectable Warning Paver, 11-3/4" x 11-3/4" x 2"<br>Red or Quarry Red    |
| Endicott Clay Product, PO Box 17,<br>Fairbury, NE, 68352                              | Handicap Detectable Warning Paver,<br>Nominal 4" x 8" x 2-1/4" Red Blend |

Pavers will be laid in top of a 4" unreinforced concrete base. Setting bed and joints to be mortared in accordance with manufacturers instructions or with a maximum 1/2" thick setting bed of latex modified cement mortar. Mortar joints to a width not greater than 5/32" and not less than 1/16". Pavers shall not be directly touching each other unless they have spacing bars. Portion of concrete ramp that is thickened to 6" shall be extended such that a minimum 4" of concrete shall be beneath the brick pavers.

Joints are to be flush with top surface and struck so as to give a smooth surface. Pavers shall be laid such that joints are level with adjoining joints so as to provide a smooth transition from brick to brick and brick to concrete surface. The top surface of any two adjacent units should not differ by more than 1/8" in height for mortared brick paving. Bricks shall be placed in a running bond pattern. Pavers that do not conform to the smoothness requirement shall be removed and replaced at the expense of the contractor as determined by the Engineer. Face of all brick shall be clean of cement and protected so as to avoid chipping during construction.

Stamping or imprinting systems when used must be capable of uniformly providing the specified texture and pattern, using the Department's standard class of concrete for sidewalks. The minimum dry static coefficient of friction, as defined by ASTM C-1028, shall be 0.80.

D. **CONSTRUCTION.** The Contractor shall submit literature describing the following to the Engineer at least 30 days prior to the proposed installation:

- The detectable warning paving material
- All associated materials
- Preparation requirements
- In addition, a minimum 12" x 12" sample of the detectable warning material shall be submitted

The manufacturer shall demonstrate in writing and by providing references that the detectable warning paving materials have been satisfactorily used for roadway, path or flooring applications, in high pedestrian use and under weather conditions similar to those experienced in the District, for a minimum period of five years.

In no case shall the Contractor permit the application of any materials by untrained personnel or non-approved installers. The material manufacturer's certification of compliance with this requirement shall be provided to the Engineer.

Prior to the start of work, the Contractor shall show evidence of successful completion of similar installations and provide a job site sample for the approval of the Engineer. The sample size shall be 4' x 2', minimum, and constructed at a location selected by the Engineer.

As many test panels will be constructed as are necessary to achieve a sample panel that meets the satisfaction of the Engineer. All work shall conform to the appearance of the approved sample to the satisfaction of the Engineer. The sample shall not be incorporated into the work and will be removed when ordered by the Engineer.

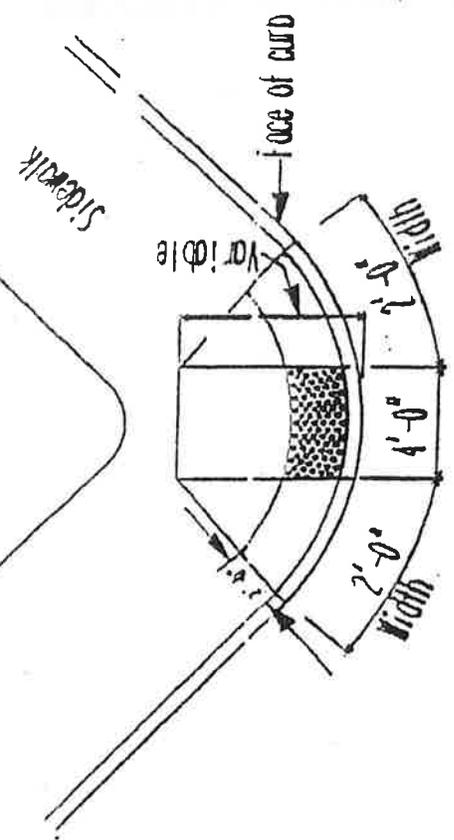
Follow all applicable manufacturer's requirements for environmental conditions, surface preparation, installation procedures, curing procedures, and materials compatibility. The Contractor is responsible for removing any material spatters from areas. The Contractor shall repair any damage that should arise from the installation or the clean-up effort.

E. **MEASURE.** The unit of measure for **DETECTABLE WARNING PAVERS ON EXISTING SIDEWALK RAMPS** will be per each ramp. No separate measure for **DETECTABLE WARNING PAVERS ON NEW SIDEWALK RAMPS** will be made.

F. **PAYMENT.** Payment for **DETECTABLE WARNING PAVERS ON EXISTING SIDEWALK RAMPS** will be paid for at the contract unit price for each ramp, which payment will include furnishing and placing all materials, tools, equipment, all labor and incidentals necessary to complete the work. No payment will be made for job site sample(s) and clean-up.

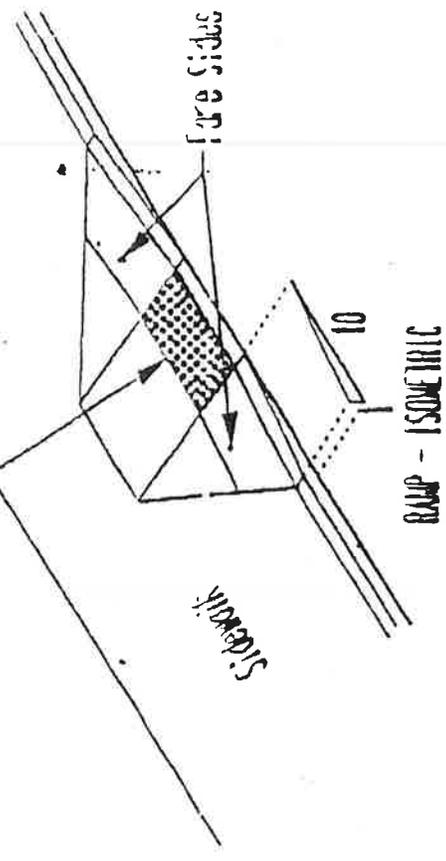
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| DATE | STATUS | PROJECT | SHEET |
|      |        |         |       |

Walking surface with truncated domes

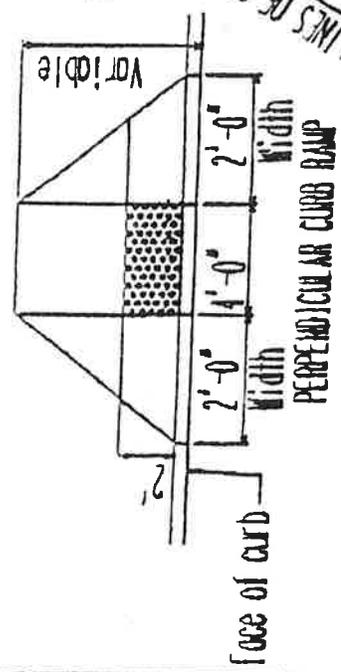


DIAGONAL CURB RAMP

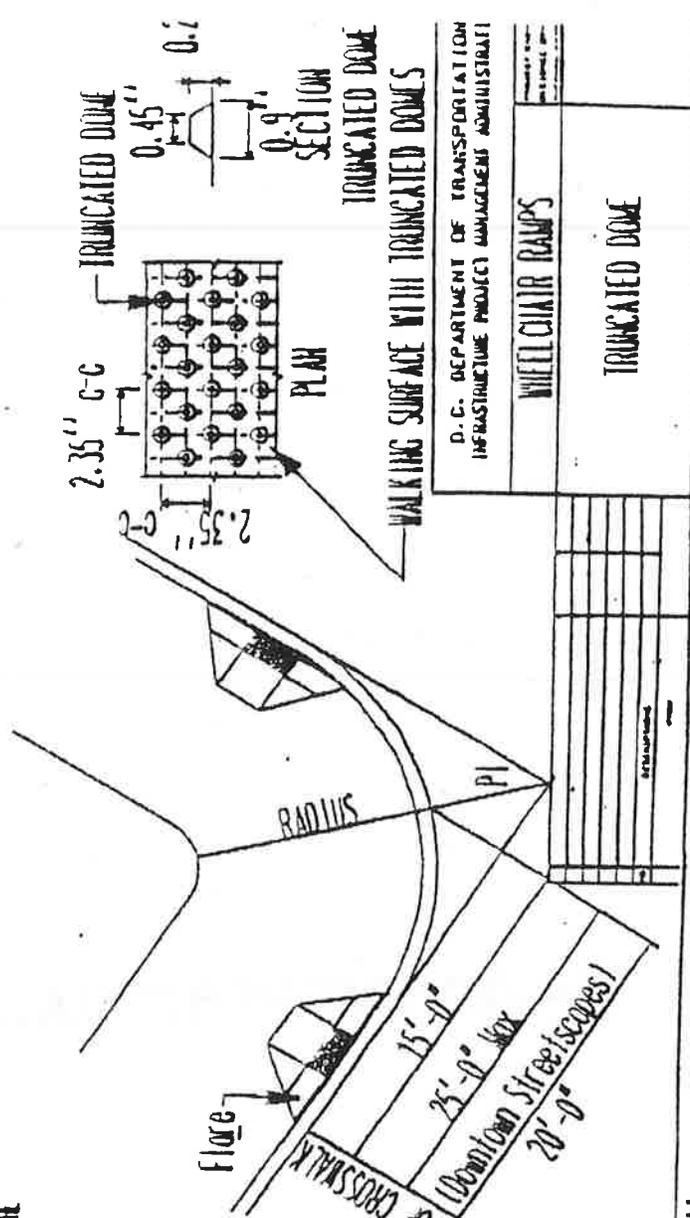
NOTE: DIAGONAL CURB RAMP WILL BE CONSTRUCTED ONLY WHEN APPROVED BY TRAFFIC SERVICES ADMINISTRATION.



RAMP - ISOMETRIC



PERPENDICULAR CURB RAMP



TRUNCATED DOME SECTION

PLAN

WALKING SURFACE WITH TRUNCATED DOMES

D.C. DEPARTMENT OF TRANSPORTATION  
INFRASTRUCTURE PROJECT MANAGEMENT ADMINISTRATION

WHEELCHAIR RAMPS

TRUNCATED DOME

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**PAVEMENT RESTORATION REGULATIONS**

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## DEPARTMENT OF PUBLIC WORKS

## NOTICE OF FINAL RULEMAKING

The Director of the Department of Public Works, pursuant to the authority of sections IV(A) and V of Reorganization Plan No. 4 of 1983, 30 DCR 6428 (December 16, 1983), effective March 2, 1984; An Act to grant additional Powers to the Commissioners of the District of Columbia, and for other purposes, approved December 20, 1944 (58 Stat.819; D.C. Code § 1-337(d)(1999 Repl.)); and Mayor's Order 96-8, 43 DCR 615 (February 9, 1996), hereby gives notice of the adoption of amendments to the *District of Columbia Department of Public Works Standard Specifications for Highways and Structures* (1996) by adding a new section, Section 213, EXCAVATIONS AND RESTORATIONS (UTILITY LINES). The rules establish standards and procedures governing the excavation and restoration of the public space or public rights-of-way where that excavation or restoration is performed in conjunction with the placement or repair of utility lines. Notice of proposed rulemaking was published in the June 1, 2001, edition of the D.C. Register. Comments were received and considered, however, no changes were made. This rulemaking will be effective when published in the D.C. Register.

The *District of Columbia Department of Public Works Standard Specifications for Highways and Structures* is amended by adding a new section to read as follows:

**213 EXCAVATIONS AND RESTORATIONS (UTILITY LINES)**

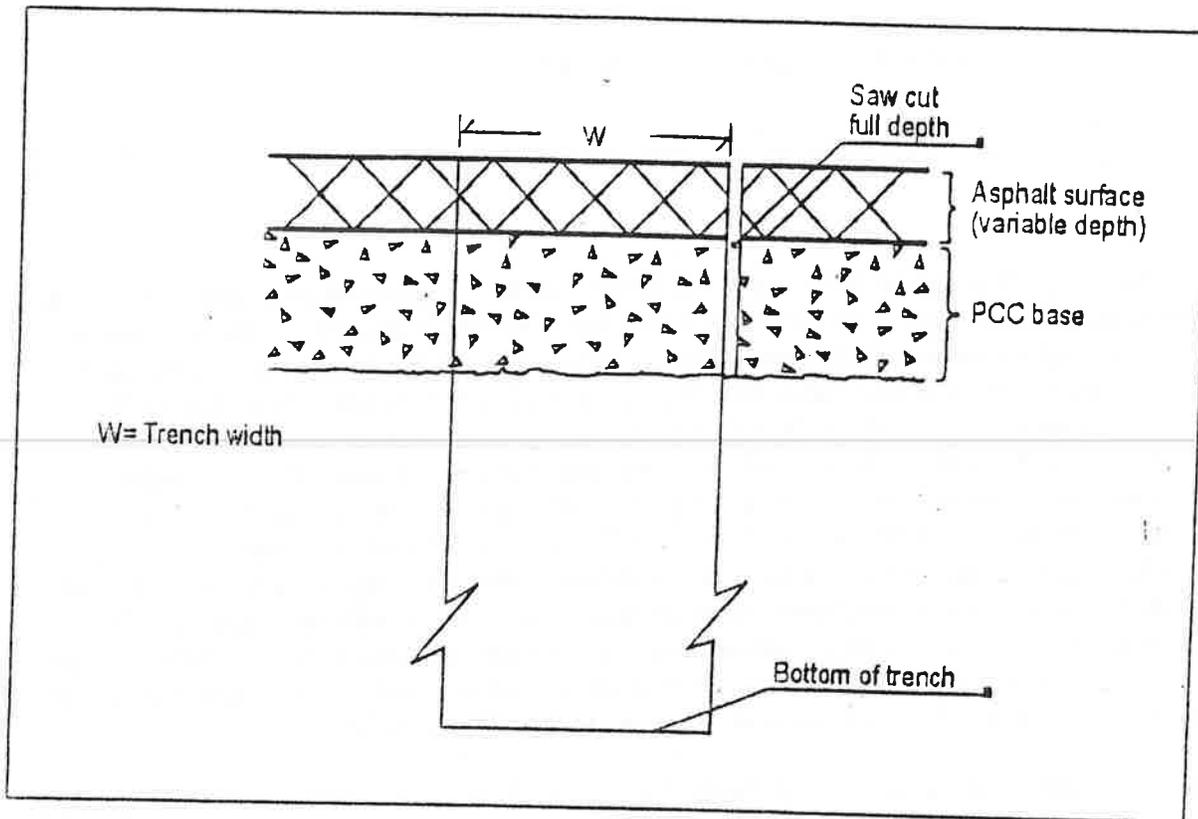
**213.01 DESCRIPTION.** The work – performed in conjunction with the placement or repair of utility lines – consists of trenching, shoring, subgrade replacement, base course replacement, surface course replacement, and pavement marking replacement for composite pavements, PCC pavements, and flexible pavements. The work is performed by utility companies or their contractors, herein referred to as the “Contractor”, and is subject to Chapter 34 of the Public Space Regulations (title 24, DCMR). In the event of any inconsistency with another provision of the *District of Columbia Department of Public Works Standard Specifications for Highways and Structures* and this section, the most stringent requirement shall govern.

**213.02 USE OF STEEL PLATES.** The Contractor shall place the appropriate notification signs if it uses steel plates at any point in the processes described herein. Further, the Contractor shall notify the Director of the District Division of Transportation or his or her designee before placing any steel plates in the Public Right-of-Way.

**213.03 COMPOSITE PAVEMENTS**

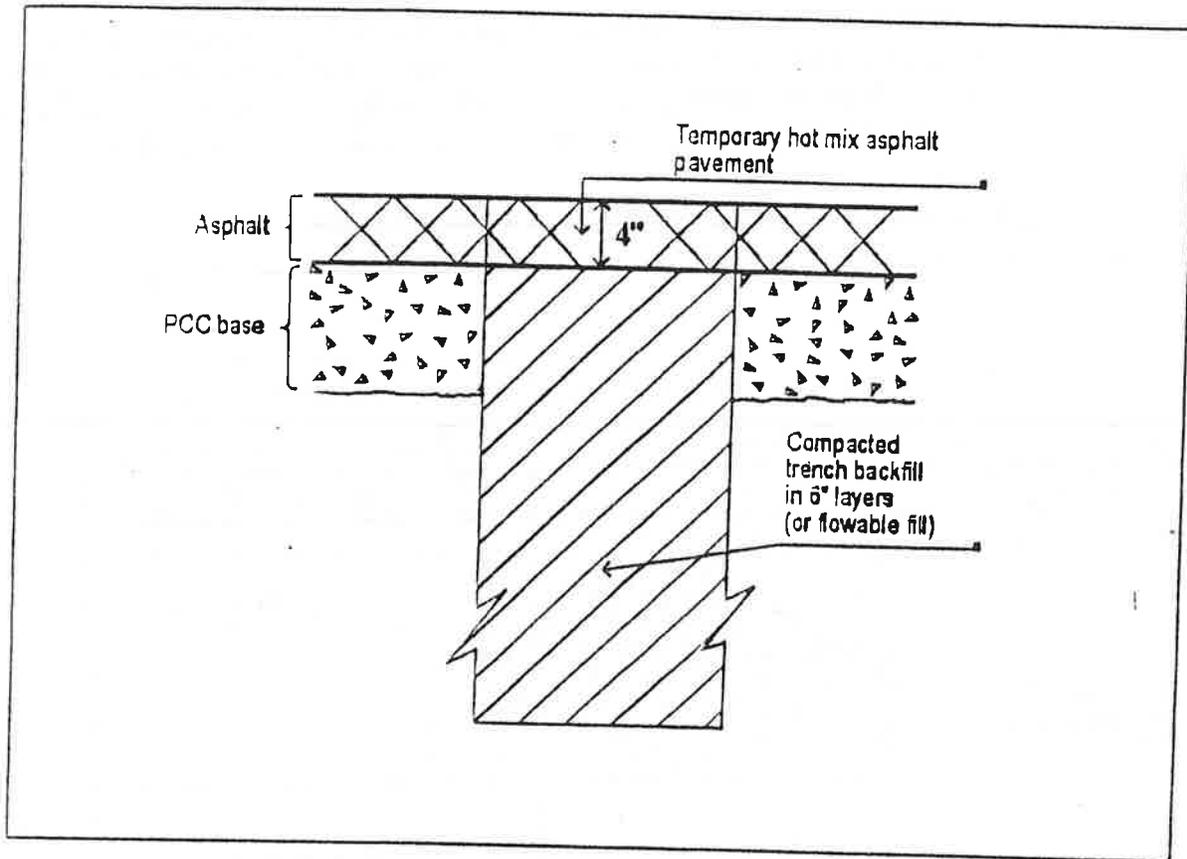
- (A) **TRENCH EXCAVATION.** The Contractor shall cut the full depth of the pavement to a neat line by means of a power saw. (See Figure 1)

Figure 1. Initial Trench



- (B) **TRENCH BACKFILL FOR TEMPORARY RIDING SURFACE.** The Contractor shall backfill with approved materials in 6 inches lifts to within 4 inches of grade. The Contractor may use flowable fill as a backfill. If it chooses this option, then (1) the 6 inches shoulder described in 213.03(D) is not required; and (2) the new base course described in 213.03(D) shall be anchored to the existing base on one side. (See Figure 2)
- (C) **TEMPORARY RIDING SURFACE.** The Contractor shall place 4 inches of Hot Mix Asphalt to grade. (See Figure 2)

Figure 2. Temporary Riding Surface

**(D) RESTORATION OF BASE COURSE**

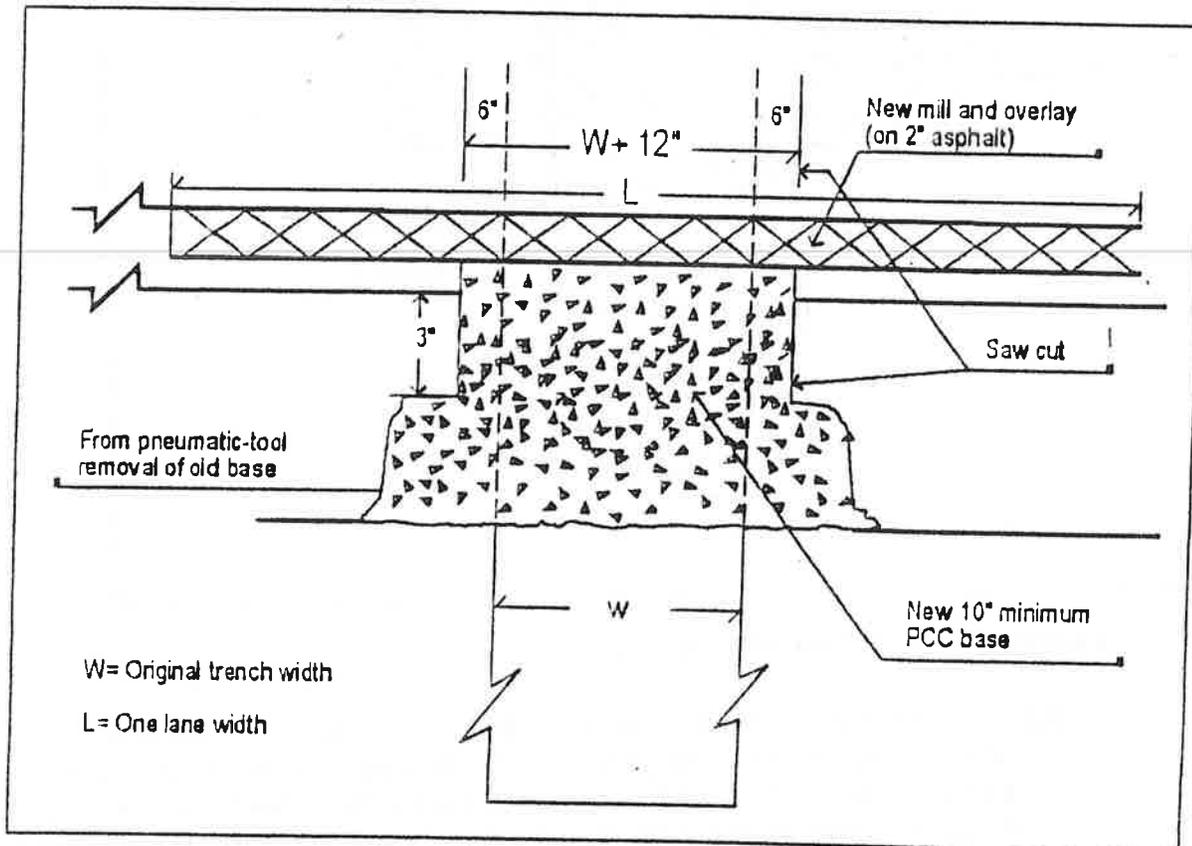
- (1) **RESTORATION CUT.** The Contractor shall cut the pavement parallel to the roadway's longitudinal joints, with a minimum of 6 inches of shoulder beyond the original cut. If this would place the restoration cut within 2 feet of a joint in the base course, the cut shall be extended to the joint. The asphalt surface course shall be cut full-depth to a neat line by means of a power saw. The base course shall be cut in the same manner to a depth of at least 3 inches. Pneumatic tools shall be used to remove the remaining portion of the base course. (See Figure 3)
- (2) **REPLACEMENT OF BASE COURSE.** The Contractor shall place Portland Cement concrete base course to a minimum depth of 10 inches. The bottom of the new base course shall be even with the bottom of the existing base course. The top of the new base course shall be 2 inches below the riding surface, so as not to be affected by the subsequent milling and overlaying process. (See Figure 3)

In the winter, the Contractor may bring PCC base course up to the grade of the roadway as a temporary measure, eliminating the need for a temporary asphalt patch. In this event, permanent restoration of the site in the manner outlined in

213.03(E) must be completed no later than the April 15<sup>th</sup> immediately following the winter months during which this measure was taken.

- (3) **TEMPORARY FEATHERING.** Between the time that a concrete base course has cured and the final asphalt surface is applied, the Contractor shall feather all edges from the existing pavement surface to the concrete base course with temporary Hot Mix Asphalt at a rate of 3 inches per inch of elevation.

Figure 3. Restoration of PCC Base and Asphalt Surface



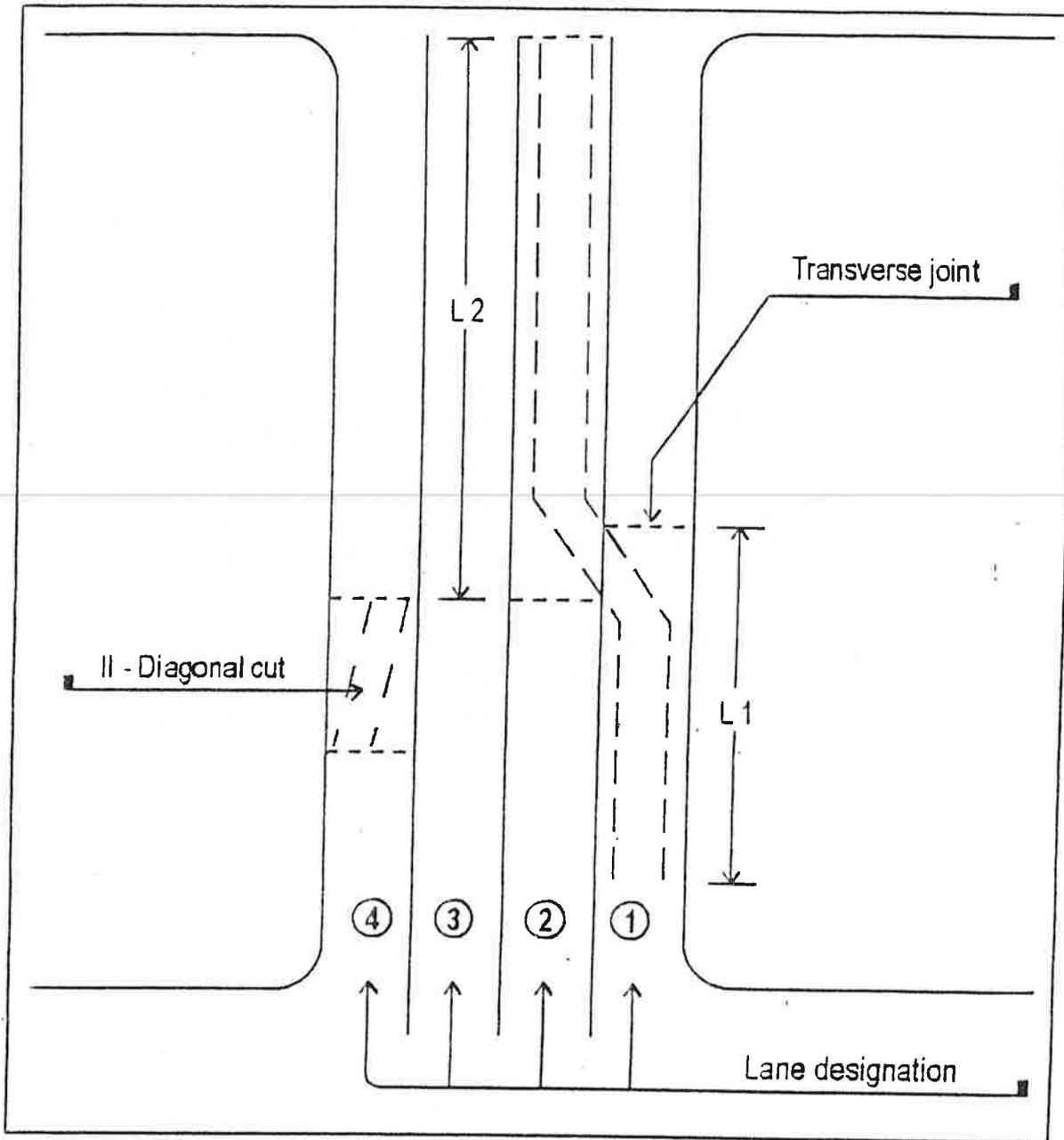
Note: Material under newly milled-and-overlaid asphalt is pre-existing asphalt at pre-existing depth (except for  $W + 12$  inch portion of PCC base which stops 2 inches below riding surface).

### (E) SURFACE COURSE RESTORATION – MILL & OVERLAY LIMITS

- (1) **Width.** The Contractor shall mill and overlay the entire width of the affected lane(s).
- (2) **Length.** If the utility cut is less than 30 feet long, the Contractor shall mill and overlay the length of the cut plus the sections from each end of the cut to the nearest transverse joints. If the cut is 30 feet or longer, the Contractor shall mill and overlay the entire length of the block.

- (a) **Special Case 1 – Utility Cut Crossing a Longitudinal Joint.** (See Lanes 1 and 2 of Figure 4)
- (i) If L1 is less than 30 feet, the Contractor shall mill and overlay Lane 1 the length of L1 plus the sections from each end of L1 to the nearest transverse joint. If L2 is less than 30 feet, the same applies.
  - (ii) If either L1 or L2 are longer than 30 feet, the Contractor shall mill and overlay it along the full length of the block.
  - (iii) In all cases, the Contractor shall make all cuts in the base course parallel to either longitudinal or transverse joints.
- (b) **Special Case 2 – Diagonal Utility Cut.** If the utility cut is diagonal, the Contractor must replace the base course slab(s) through which it runs from joint to joint. (See Lane 4 of Figure 4.) The previous rules on the length and width of milling and overlaying apply.
- (c) **Full Slab Replacement Option.** The Contractor may fully replace all base course slabs affected by utility cuts in lieu of the above option of partial replacement and milling and overlaying of the surface course.

Figure 4. Asphalt Surface Restoration - Mill and Overlay Limits



213.04 PCC PAVEMENTS

(A) **TRENCH EXCAVATION AND BACKFILL.** The Contractor shall excavate and backfill the trench according to 213.03(A) and (B). Note that flowable fill option is permitted.

(B) **RESTORATION OF PAVEMENT.** The Contractor shall replace from joint to joint each section of pavement that is affected by a utility cut.

**213.05 FLEXIBLE PAVEMENTS (See Figure 5)**

**TRENCH EXCAVATION AND BACKFILL.** The Contractor shall excavate and backfill the trench according to 213.03(A) and (B). Note that the flowable fill option is permitted.

**(A) RESTORATION OF SUBBASE**

**(1) RESTORATION CUT.** The Contractor shall cut the pavement with a 6-inch shoulder around the trench. All cuts shall be either parallel or perpendicular to the curb. All cuts shall be made to the pavement's full-depth and to a neat line with a power saw.

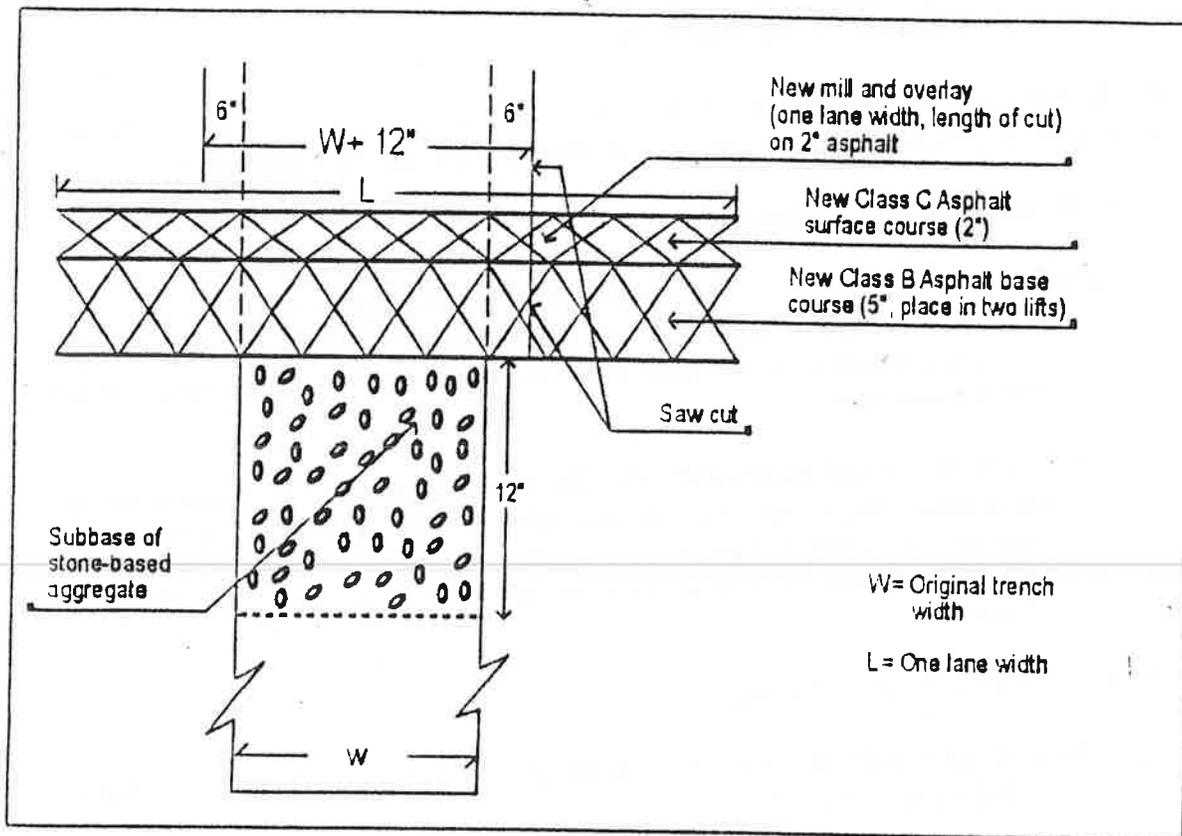
**(2) PLACEMENT OF SUBBASE.** The Contractor shall place 12 inches of stone-based aggregate, stopping at 7 inches below the riding surface. Note that if the Contractor chooses the flowable fill option, aggregate subbase is not needed. As with the aggregate, flowable fill should stop 7 inches below the riding surface.

**(B) RESTORATION OF PAVEMENT**

**(1) RESTORATION OF BASE COURSE.** The Contractor shall place 5 inches of Class B asphalt in 2 lifts.

**(2) RESTORATION OF SURFACE COURSE.** The Contractor shall place 2 inches of Class C asphalt to same grade as road.

Figure 5. Restoration of Flexible Pavement



### 213.06 CROSSWALKS AND SIDEWALKS

- (A) **CROSSWALKS.** If a utility cut intersects a crosswalk(s) of any material other than that of the surrounding roadway, the permanent restoration of the crosswalk(s) must restore it to its original condition, with materials identical to those of the original crosswalk(s).
- (B) **SIDEWALKS.** If a sidewalk(s) is affected by a utility cut, the Contractor must restore it to its original condition, with materials identical to those of the original sidewalk.

**213.07 PAVEMENT MARKINGS.** If any pavement markings are affected by a utility cut, the Contractor shall replace them with temporary pavement markings within 48 hours. Immediately upon the completion of a permanent repair, the Contractor shall replace temporary pavement markings with permanent ones.

**BITUMINOUS CONCRETE MIXTURE AND  
PERFORMANCE GRADE ASPHALT BINDERS  
(SUPERPAVE) SPECIAL PROVISIONS**

**BITUMINOUS CONCRETE MIXTURE AND PERFORMANCE GRADE ASPHALT BINDERS:**

This S.P. supplements and Modifies 818.

**CERTIFICATION.** The manufacturer and hauler shall furnish certifications as specified in DDOT Standard Specifications.

The manufacturer shall also certify:

- (a) Date and time of loading.
- (b) Tank or blending system
- (c) Identification of hauling unit.
- (d) Binder grade, temperature, and quantity of materials.
- (e) Complete certified analysis.
- (f) Lot number, if applicable.
- (g) Mixing and compaction temperatures when the binder is polymer modified.

The hauler shall also certify

- (a) Identification of hauling unit
- (b) Binder grade and source of last delivery.
- (c) The date of the last delivery using this hauling tank and volume of material remaining in the tank at the time of current loading.

**A.) Performance Graded Asphalt Binders.** For mixes containing all virgin materials shall conform to AASHTO MP Table 1, for PG 70-22 binder (Interstates, Other Freeways and Expressway, Principles, and Minors) or PG 64-22 (Local and Collectors). The asphalt binder recovered from the final plant mixed material will be considered Rolling Thin Film Oven (RTFO) material and shall conform to AASHTO MP1, Table I for the specified performance grade.

The PG binder shall be pre-approved by DDOT.

The Contractor shall submit a certificate of analysis showing conformance with the PG Binder Specification AASHTO MP1 and the critical cracking temperature as described in the Binder ETO Draft, Standard Practice for Determination of Low-Temperature Performance Grade (PG) of Asphalt Binder, for the binders specified in the Contract Documents.

The PG binder for HMA mixes shall be achieved by the use of Neat Asphalt with elastomer polymer modifications when needed.

**B.) Aggregates.** Aggregates shall conform to Section 803.03, 803.04 and AASHTO MP2 with the exception that the aggregate retained on the 4.75 mm sieve shall be tested for flat and elongated particles in conformance with ASTM D 4791.

**C.) Mix Design.** The Contractor shall develop a Superpave mix design in conformance with AASHTO PP 28. HMA Superpave mixes – i.e., 9.5mm (when surface course is less than 1.5 inches) 12.5mm (when surface course is greater than 1.5 inches) Surface Course, 9.5mm Leveling Course, and 19.0mm Base or as directed by the Engineer, shall conform to the specification for Superpave Volumetric Mix Design, AASHTO MP 2, and shall be designed for a thirty (30) million Equivalent Single Axle Loading (ESAL).

The Contractor shall not use crushed, recycled asphalt pavement (RAP) material, crushed glass roofing shingles from manufacturing waste.

**D.) Mix Design Approval.** Documents containing the data from the Contractor's laboratory study shall be submitted to the Engineer for tentative approval at least two weeks prior to paving operations using DDOT approval AASHTO software, and shall include the following.

- (a) Mix designation and Contract number shall be on the Contract documents.
- (b) Source and percentage of aggregate.
- (c) Source, percentage, and grade of performance graded asphalt binder.
- (ii) Anticipated gradation and proportion of each component aggregate.
- (1) Plant where HMA mix will be produced.
- (g) Plant target mixing temperature based on viscosity of 0.22 Pascal.
- (h) Percent passing No. 200 sieve removed by dust collecting system.
- (i) Ratio of dust to binder material on effective asphalt.
- (j) Maximum specific gravity at the target binder content.
- (k) Mix design grading plotted on 0.45 power gradation chart.
- (l) Tensile strength ratio and worksheets
- (m) The gyratory compaction curve for Nmax.
- (n) The bulk specific gravity at Ndesign gyrations.
- (o) The air void content (percent Va) at Ninitial, Ndesign, and Nmax gyrations
- (p) The voids in the mineral aggregate (percent VMA) and the voids filled with asphalt (percent VFA) at Ndesign gyrations (TP4).
- (q) The slope of the gyratory compaction curve.

**E.) All consensus and source properties.**

- (1) Coarse aggregate angularity.
- (2) Flat and elongated
- (3) Sand equivalent
- (4) Un-compacted void content of fine aggregate.
- (5) Bulk and apparent specific gravity of coarse and fine aggregate.
- (6) Absorption of coarse and fine aggregate.

Mix designs submitted to the Engineer for approval shall be accompanied by a quantity of job mix formula aggregate and appropriate amount of required PG binder for ignition oven calibration.

If previous construction or performance experience has shown the proposed mix design to be unsatisfactory, the Engineer may require the Contractor to submit a more suitable design.

If the Contractor proposes to change the source of aggregate used in the mix, a revised Mix design shall be submitted with the information required. The conditions set forth above relative to initial submission shall apply. If a change in the Performance Grade binder source becomes necessary, DDOT requires an anti-stripping additive test in conformance with ASTM D 4867 before giving the final approval; a DDOT approved anti-stripping is required in all AC mixtures.

F.) **Field verification of Mix design:** After receiving the tentative approval for the mix design from the Engineer, the Contractor shall conduct a field verification of the mix at the beginning of production of each plant. The certified personnel shall perform Field verification. The verification samples shall be prepared as specified in PP28. The Contractor shall notify the Engineer at least two working days in advance of the scheduled verification.

G.) **Verification Evaluation:**

- (a) Initial verification shall consist of four samples tested for the parameters of the approved mix design. These samples shall be randomly drawn from the first day's production. If the first day of production is less than 500 tons, the Contractor may choose to spread verification testing over the number of days needed to accumulate 500 tons. The verification testing shall be completed on the day when production has reached 500 tons. The Contractor shall evaluate the verification test results.
- (b) If the mix produced by the plant conforms to the parameters, production may proceed without any changes. If the Contractor has submitted mixes with identical aggregate combinations and differing asphalt contents associated with changes in ESAL loads, verifications will be limited to volumetric analysis at the Engineer's discretion.
- (c) If the mix produced by the plant does not conform to the parameters, then an adjustment to the asphalt content or gradation may be made to bring the mix design requirements within acceptable levels.

Permissible adjustment limitations between the approved Mix design and Adjusted Mix Design are as follows:

| TEST PROPERTY<br>%(*)                            | PERMISSIBLE ADJUSTMENT |
|--|------------------------|
| Larger than 1/2 in. (12.5 mm) sieve:             | + 5                    |
| 1/2 in. (12.5 mm) through No.4 (4.75 mm) sieves: | + 4                    |
| No.8 (2.38 mm) through No.100 (1.50 mm) sieves:  | + 3                    |
| No.200 (75 um) sieve:                            | + 1.0                  |
| Binder Content:                                  | + 0.20                 |

\* The permissible adjustment for all mixes shall establish a job mix formula having targets outside the restricted zone. Additionally, Superpave mixes shall be within control points.

When an adjustment is made to the mix design, a second verification shall be performed to ensure that the modified mix conforms to all design requirements. The time and tonnage limitations shall be as specified in (a) above. Material produced during this verification will be subject to removal as specified in DPW Standard Specifications if it does not conform to Specifications.

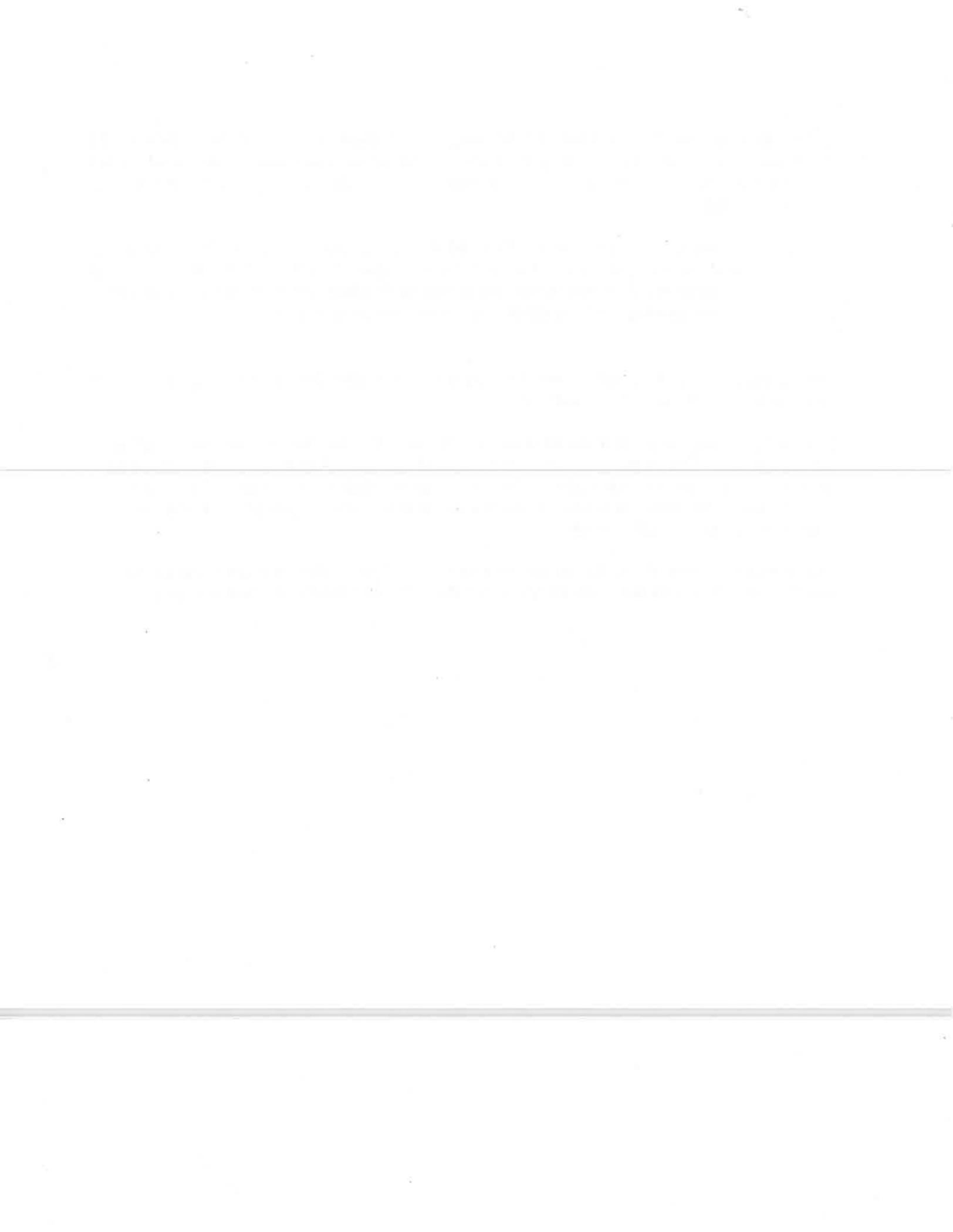
If the adjusted mix conforms to the mix design parameters, production may proceed; if it does not conform, production shall be suspended and a new mix design shall be submitted to the Engineer for approval. The new mix design shall be designed as specified in AASHTO PP28:

- d) Subsequent mix designs submitted due to nonconformance will be subject to removal as specified in DPW Standard Specifications. If the mix does not conform to (b) above during the initial verification, production for the mix shall be suspended until the Engineer takes corrective action.

The Contractor shall obtain pavement cores at the direction of the engineer within twenty-four (24) hours after lay-down.

The unit of measure for Hot Mixed Asphaltic Concrete of the Superpave mix specified will be the ton. The number of tons will be actual number of tons complete in place as weighed on approved truck scales. The Engineer will deduct the weight of all material lost, wasted, damaged, rejected, or applied in excess of the Engineer's direction or contrary to these specifications.

The number of tons of the Superpave mix will be paid for at the contract price per ton, which payment will be full compensation for the work specified complete in place.



**PERMIT PROCESSES**

**APPLICATION FOR PUBLIC SPACE PERMITS**  
(PRINT IN INK OR TYPE; DO NOT WRITE IN SHADED AREAS)

**(A) ALL APPLICANTS MUST COMPLETE ITEMS 1 THRU 18**

|  |  |                  |                     |              |            |   |                        |                                       |
|--|--|------------------|---------------------|--------------|------------|---|------------------------|---------------------------------------|
| 2. Address of Premise for which Public Space Work is Proposed: |  |                  |                     | 3. Lot:      | 4. Square: | 5. Type of Application:<br><input type="checkbox"/> New<br><input type="checkbox"/> Renewal | 1. Date of Application | 9. Previous Permit Number if Renewal: |
| 7. Owner of the Premise:                                       |  |                  | 3. Owner's Address: |              |            | 3. Phone:   |                        |                                       |
| 10. Authorized Agent (if applicable):                          |  | 11. Firm's Name: |                     | 12. Address: |            | 13. Phone:  |                        |                                       |

14. Check all proposed work; indicate the specific street of work and the names of boundary streets; and specify the length and width of the work area.

| Check | Proposed Work  | Located on the following Street (or Alley) | Between (Street Name) | And (Street Name) | Length of Work (ft) | Width of Work |
|-------|--|--|-----------------------|-------------------|---------------------|---------------|
|       | A. Temporary Use for:<br>1. Crane  |  |                       |                   |                     |               |
|       | 2. Truck: <input type="checkbox"/> Dump <input type="checkbox"/> Concrete<br><input type="checkbox"/> Construction Equipment |  |                       |                   |                     |               |
|       | 3. Dumpster  |  |                       |                   |                     |               |
|       | 4. Hoists/Scaffolds  |  |                       |                   |                     |               |
|       | 5. Use of Sidewalk for:  |  |                       |                   |                     |               |
|       | 6. Use of Roadway for:   |  |                       |                   |                     |               |
|       | B. Excavation for:   |  |                       |                   |                     |               |
|       | C. Sheet piling and Shoring  |  |                       |                   |                     |               |
|       | D. Driveway Construction   |  |                       |                   |                     |               |
|       | E. Sidewalk Construction   |  |                       |                   |                     |               |
|       | F. Curb and Gutter Construction  |  |                       |                   |                     |               |
|       | G. Alley Construction  |  |                       |                   |                     |               |
|       | H. Grading: <input type="checkbox"/> Street <input type="checkbox"/> Alley<br><input type="checkbox"/> Trees                 |  |                       |                   |                     |               |
|       | I. <input type="checkbox"/> Hedges <input type="checkbox"/> Planter Boxes  |  |                       |                   |                     |               |
|       | J. <input type="checkbox"/> Fence <input type="checkbox"/> Wall  |  |                       |                   |                     |               |
|       | K. Other (specify):  |  |                       |                   |                     |               |

|                                   |                 |
|-----------------------------------|-----------------|
| 15. Description of Proposed Work: | 16. Start Date: |
|                                   | 17. End Date:   |

18. APPLICANT'S SIGNATURE: I have read and I understand the conditions set forth on this application. I further understand that penalties are provided for furnishing false information.

AGENT'S SIGNATURE: ..... DATE: .....

OWNER'S SIGNATURE: ..... DATE: .....

## CONDITIONS OF ALL PUBLIC SPACE APPLICATIONS AND PERMITS

The applicant, or the applicant's authorized agent, in affixing his or its signature hereto and in accepting any permit on the basis of this application, agrees that the applicant and any person, firm or corporation employed by the applicant, when working on or occupying public space as authorized by the said permit, whether such work or occupancy is on, or above the surface of such space, will comply with the following conditions:

- (1) That the performance of such work or the occupancy of such space shall be strictly in accordance with the conditions set forth herein and on both sides of the permit authorizing such work or occupancy of public space.
- (2) That the performance of such work or the occupancy of such space as authorized by the said permit shall be in full compliance with all applicable laws and regulations of the District of Columbia.
- (3) That the applicant, at the risk and expense, guarantees that the public space occupied by the applicant or required for the performance of the work authorized by the said permit, at all times will be kept in a safe condition, and where the work aforesaid results in any excavation in any street, alley, sidewalk, or other public space, the applicant will insure that such excavation is kept in a safe condition until such street, alley, sidewalk, or other public space has been repaired or resurfaced by the District of Columbia. The repair or resurfacing of the street, alley, sidewalk or other public space made necessary by the excavation, will be performed by the District of Columbia at the expense of the applicant.
- (4) That the applicant guarantees that if, in the opinion of the Director of the Department of Transportation or his representative, any work performed in, or occupancy of, public space by him or on his behalf, in any manner becomes dangerous to, or interferes with, pedestrian or vehicular traffic, the applicant will take such action as, in the opinion of the said Director or his representative is necessary to remove such dangerous condition or unnecessary interference with traffic.
- (5) That the applicant will save harmless, indemnify and keep indemnified the District of Columbia, its officers and employees from all claims, suits, charges, counsel fees, and judgments to which the said District, its officers and employees may be subject on account of injury to persons or damage to property, including property of the District of Columbia, due to negligence of the applicant or occasioned by work not authorized by said permit, or resulting from failure to observe and comply with terms and conditions of this application.
- (6) That the applicant agrees that the backfilling of any excavation made by him or on his behalf will be performed in the manner prescribed below and should any settlement or sinking resulting from backfilling occur within two (2) years after the District of Columbia at the applicant's expense, has repaired or resurfaced the surface of the public space in which excavation was made, the applicant's representative will save harmless, indemnify and keep indemnified the District of Columbia from any injury, loss, cost, or damage occasioned by a physical change in such repaired or resurfaced public space.

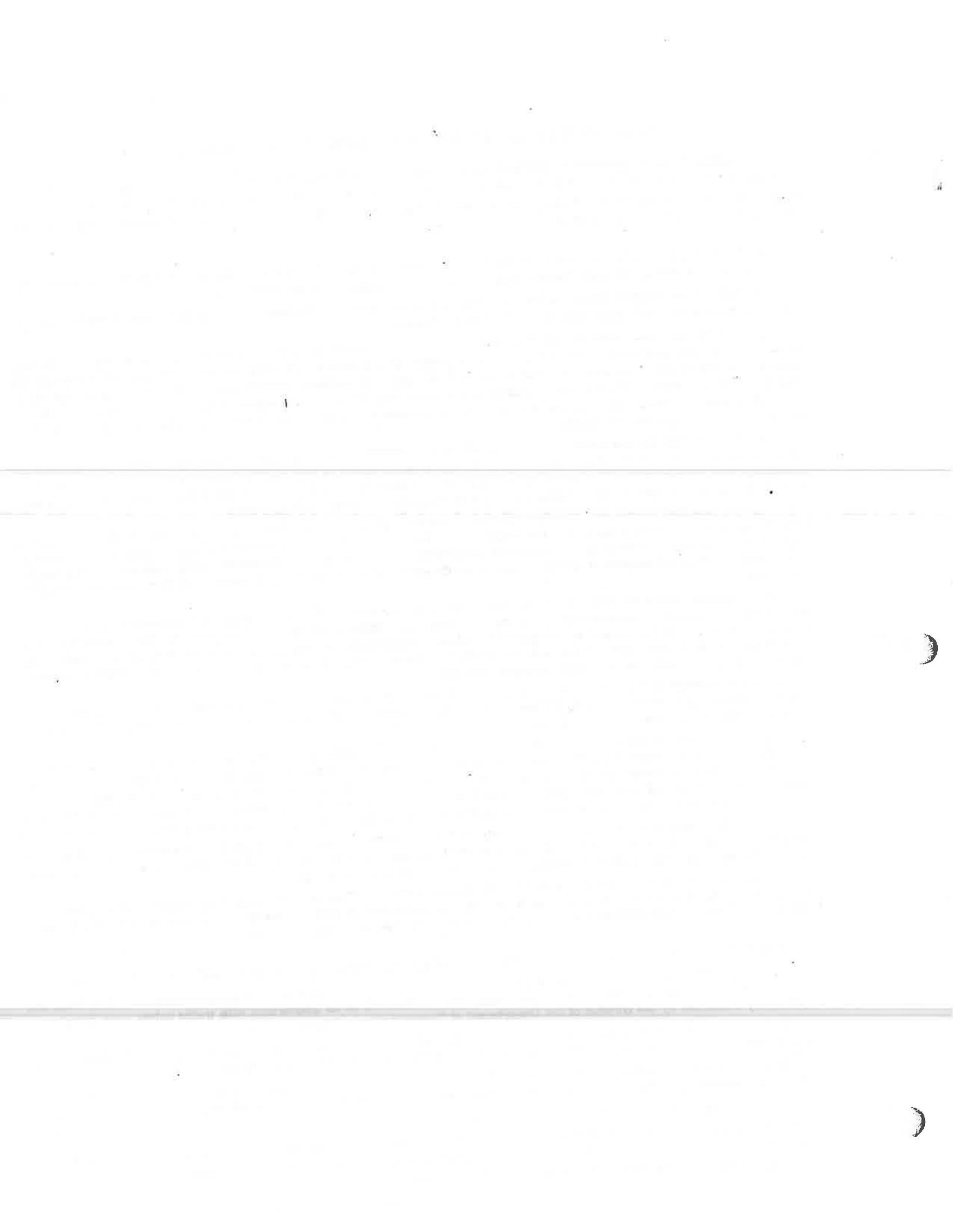
Should repairs become necessary over said excavation during the aforementioned period due to settlement of said excavation occasioned by improper excavation work or backfilling, the necessary re-excavation and repair shall be done by the District of Columbia and the cost thereof shall be charged to the applicant.

- (7) That the applicant agrees that all portions of the street excavated will be put in as good condition as before the excavation was made and that such excavation will be backfilled within twenty-four (24) hours after approval by the District (if required) of the construction, connections or repairs installed or made therein, such backfilling not to extend more than two inches (2") above the adjoining pavement or surface and to be thoroughly compacted in such manner as to avoid any sinking or settlement either of the backfill or of any pavement laid thereon for a period of two (2) years after the area over such excavation has been repaired or resurfaced by the District.
- (8) That the applicant agrees that on each day any work is to be performed under the authority of this permit, he will notify the Office of Coordinator of Underground Construction, prior to the commencement of such work, of all locations at which any of the said work is to be performed, and whether such work is new work or work already in progress.

**SPECIAL ATTENTION.**—In addition to the requirements of Standard Specifications of the Department of Transportation regarding work on Saturdays, Sundays, or legal holidays, the permittee is advised that no work shall be performed under the permit on Saturdays, Sundays, or legal holidays except with the consent of the Department of Transportation.

## CONDITIONS OF EXCAVATION IN PUBLIC SPACE AND TREATMENT OF TREES IN PUBLIC SPACE

- (1) No cut will be made in a roadway or alley unless material to complete the job is on hand or immediately available, that work will be carried to completion in the shortest possible time, and that there will be no interference with traffic unless such interference is specifically authorized by the Director of the Department of Transportation or his representative.
- (2) A clear, safe pedestrian passageway not less than 6 feet wide, in line with any existing sidewalk, will be provided at all times unless otherwise authorized by the Director of the Department of Transportation or his representative.
- (3) The applicant will not cut or injure trees, or pile earth or other material within 3 feet of trees unless such trees are properly protected in a manner approved by the Director of the Department of Transportation or his representative.
- (4) No existing underground construction will be interfered with.
- (5) All pipes and conduits except as otherwise specified in Section 408-2 of D. C. Plumbing Code, will be laid not less than 30 inches below any roadway, not less than 24 inches below grade on other public space, except that street light conduits may be laid not less than 18 inches below any approved grade, unless otherwise authorized.
- (6) Surface (lawns, grass, shrubs, sidewalks, etc.) will be restored upon completion of work.



### CONDITIONS OF TREATMENT OF TREES IN PUBLIC SPACE

- (1) All material, equipment, surplus excavated material, debris, etc., will be removed from public space as soon as possible, consistent with working hours and conditions, within three working days following the completion of the work authorized by the permit.
- (2) In the event the District of Columbia, as a consequence of any failure of the applicant to maintain the public space in a safe condition, is required to repair said public space, such repair by the District of Columbia shall be at the applicant's expense and the applicant agrees to reimburse the District of Columbia for all costs of such repair and shall not be relieved of responsibility for maintaining said public space in safe condition, by reason of any such repair.

### CONDITION OF ERECTING OR REPAIRING RETAINING WALLS, FENCES, COPINGS, LEADS AND STEPS, PLANT HEDGES, OR PAVED PARKING IN PUBLIC SPACE:

The fence, wall, copings, leads, steps, or hedges will not obstruct entrance to any accessible parking area required by the Zoning Regulations of the District of Columbia.

### CONDITIONS OF GRADING STREETS OR ALLEYS:

- (1) All trees, stumps and underbrush are to be removed from the sub-grade.
- (2) The alley or street when graded will be left in a safe, smooth, and well-drained condition so that no water will be impounded.
- (3) Notify Grading Engineer of the Street Division at least ten (10) days prior to starting this grading work. Notify the Chief Inspector of Street Division twenty-four (24) hours in advance of starting the work. The permit will be delivered on the job by the inspector.

### CONDITIONS OF CONSTRUCTING SIDEWALK, CURB & GUTTER, ALLEY OR DRIVEWAY:

- (1) The work will be done at the whole risk and cost of the property owner, in accordance with Standard Specifications of the District of Columbia, and under the supervision of the Department of Transportation, Street Division, and will conform to line and grade furnished by the said Department, and the owner will assume responsibility for all damages to persons or property occurring as a consequence of the use of public space.
- (2) The permit is to be delivered by a District representative, to the applicant or his agent at the site of the work, and, until so delivered, no operations thereunder, other than the necessary grading of the sidewalk, may be performed by the applicant or his agent. The applicant or his agent will notify the Engineer of Streets not less than twenty-four hours prior to the scheduled commencement of the work authorized by the permit, of the time when construction operations are to commence, in order that the District representative may deliver the said permit.

### CONDITION OF CONSTRUCTING OR REPAIRING DRIVEWAY:

In the event the District of Columbia, as a consequence of any failure of the applicant to maintain the public space comprising applicant's driveway in a safe condition, is required to repair said public space, such repair by the District of Columbia shall be at the applicant's expense and the applicant agrees to reimburse the District of Columbia for all costs of such repair and shall not be relieved of responsibility for maintaining said public space in safe condition, by reasons of any such repair.

### CONDITIONS OF RENTAL OF PUBLIC SPACE AND SIDEWALK CAFE:

- (1) The applicant understands that the rental of public space is temporary and that no right, title, or interest in such public space is conveyed by the permit.
- (2) The Director of Department of Transportation may, by written notice, require the permittee to vacate all or part of the rented public space at any time. Upon demand to vacate such public space, the permittee will promptly remove any personal property on the rented space, or reimburse the District for the cost of moving such property.
- (3) The permittee shall have no recourse against the District of Columbia, the United States, the officers or agents of District of Columbia, the officers or agents of the United States for any loss or damage occasioned by the permittee being required to vacate all or any part of the surface space which he had been granted permission to use.
- (4) All provisions of Article 43 of the D.C. Police Regulations will be strictly adhered to.
- (5) Plans, permits and letters of approval from the Public Space Committee must be kept on the rented public premises at all times.

**ATTENTION ALL USERS**

**APPLICANTS MUST SUBMIT THE FOLLOWING  
INFORMATION WHEN APPLYING FOR A PERMIT.  
THIS REQUIREMENT HAS CHANGED FROM  
PREVIOUSLY.**

**2 COPIES OF APPLICATION  
4 SETS OF PLANS STAMPED BY A  
CERTIFIED CIVIL ENGINEER**

**MUST BE TO SCALE DRAWINGS  
SHOWING STREET CURB LINES, PROPERTY LINES, PROPOSED INSTALLATION  
INCLUDING DIMENSIONS FROM CURB LINES TO THE PROPOSED CONDUIT,  
MANHOLES, POSTS AND ECT.**

**3 SETS OF TRAFFIC CONTROL PLANS**

**d.**

As of 9/9/00

**HOW TO APPLY FOR A  
DEPARTMENT OF TRANSPORTATION  
PUBLIC SPACE PERMIT**

**DEPARTMENT OF TRANSPORTATION  
ADMINISTRATIVE ISSUANCE SYSTEM**

**DEPARTMENTAL ORDER NO. 2000-01      DATE; NOVEMBER 23, 1999**

**SUBJECT: Department of Transportation supplemental requirements for subsurface public space permit applications and the restoration of the public right-of-way.**

**PURPOSE:** To ensure the Department of Transportation ("Department") efficient review and issuance of subsurface public space permits; to specify guidelines for the expedient installation of transmission facilities underground in the public right-of-way; and to require prompt and safe restoration of the public right-of-way.

**Supplemental Permit application Requirements**

Applicants shall ensure that each subsurface public space permit application includes all the requisite information. The following documentation also shall be submitted along with the subsurface public space permit application:

- Three (3) sets of drawings exhibiting the relationship of its proposed installation to all other existing underground utilities, conduits, ducts, pipes, mains, manholes, installations, street curb lines, and property lines. The applicant shall submit such drawings to ensure that its proposed installation can be constructed in a manner that does not negatively impact the current occupants of the public right-of-way. The drawings submitted by the applicant shall be certified by a professional engineer attesting to the accuracy of the drawings. All applicants shall, at a minimum, depict on their drawings information from the local gas, electric, and telephone companies. A list of the name, addresses, and phone/facsimile numbers of company representatives is attached hereto;
- A construction plan which specifies the start and completion dates for underground construction in the public right-of-way, the estimated number of cuts, and the dimension of each street cut(s);
- A proposed traffic control plan to be utilized for the term of the permit. The traffic control plan shall exhibit the lanes to be occupied during the period of underground construction and the traffic control devices to be installed by the applicant to ensure the safe movement of vehicles and pedestrians. The traffic control plan shall be submitted in accordance with the *District of Columbia Department of Transportation Standard Specifications for Highways and Structures (1996)* and the *Manual on Uniform Traffic Control Devices*; and
- A proposed pavement restoration plan for temporary and permanent repairs. This plan shall include the pavement restoration materials and specify the dates when the work will be started and completed.

**Prompt and Safe Completion of Underground Construction  
In The Public Right-of-Way**

Permittees shall ensure all underground construction work is completed on a timely basis. To facilitate this outcome, the Department imposes the following conditions after or upon the issuance of subsurface public space permits:

- o Permittee shall commence underground construction within thirty (30) days of permit issuance or the issued permit shall expire;
- o Permittee shall contact (via phone or fax) the DPW Investigations and Inspections Division not less than two (2) business days prior to commencing underground construction in the public right-of-way;
- o Permittee shall complete all underground construction within sixty (60) days of permit issuance, unless the applicant requests a waiver in writing when the application is submitted. In order to receive a waiver, the applicant shall demonstrate why the work to be authorized cannot be completed within sixty (60) days. A permittee may seek a renewal of its permit for major utility construction projects;
- o Permittee shall notify the DPW Investigations and Inspections Division within twenty-four (24) hours of the completion of underground construction in the public right-of-way to expedite the inspection of temporary and permanent repairs;
- o Permittee shall complete the permanent repairs within forty-five (45) days of the installation of its facilities;
- o Permanent repairs shall include at least the complete restoration of each driving lane impacted by the underground construction; and
- o Where a permit authorizes more than 1,200 feet of excavation, no more than 1,200 feet may be excavated at one time. Permanent repairs shall be performed within each area excavated before further excavations can be made.

Note: The Holiday Moratorium on street excavations shall be in effect from November 24, 1999 - January 3, 2000. Permittees who are currently authorized to excavate in the moratorium area shall complete the permitted work prior to the time restriction and make all permanent restorations expeditiously. The restricted area is delineated on a map that is attached hereto.

**EFFECTIVE DATE**

This order is effective immediately.

  
Vanessa Dale Burns

Director of DPW

## **DEPARTMENT OF PUBLIC WORKS PUBLIC SPACE PERMIT AND RECORDS BRANCH PERMIT APPLICATION PROCESS**

The permits required to perform construction, maintenance or rental of public space in the District of Columbia is the responsibility of the Department of Public Works. The section responsible for permitting such work within the District is the Public Space Permit and Records Branch (PSRB). The fees and rules governing the submission and requisite attachments are governed by Title 24, District of Columbia Municipal Regulations.

Application for the use of public space shall be made at one of two offices of the District. The type of permit you are applying for determines where you are to apply for your permit and whether or not you will need to submit requisite drawings. Each application shall be on the form prescribed for that purpose. Each applicant shall complete the requisite parts of the application in full and submit it to the proper office.

Some permits may be issued on the spot, however, there are other categories of permit applications that may require field investigations and coordination with various DPW offices and possibly the utility companies. Once the review process is completed the applicant will be notified and allowed to come in for payment of permit fees and to pick up the permit.

If you are applying for a surface permit you make application at 941 North Capitol Street, N.E., Room 2300. If you should need an aerial or underground permit, the application is submitted to the PSRB intake counter located at 2000 - 14<sup>th</sup> Street N.W., 5<sup>th</sup> Floor. Call the appropriate office for any questions you may have.

### **THE APPLICATION PROCESS**

- 1) Submit the required application at the listed location.
- 2) Applications that require drawings should include certified engineering maps of the proposed use which shows in detail the proposed new installation and all existing facilities in the perimeter of the proposed construction zone.

Note: Depending on the type of permit requested, the applicant may be required to submit up to a maximum of four (4) copies of engineering drawings.

- 3) Traffic control plans if necessary.
- 4) Construction plans if necessary

# DEPARTMENT OF TRANSPORTATION PUBLIC SPACE PERMIT AND RECORDS BRANCH PERMIT APPLICATION PROCESS

- 5) Payment of applicable permit and application fees.
- 6) Posting of the appropriate bond, deposit or letter of credit.

## TYPES AND CATEGORIES OF PERMITS

Surface Permits Apply at 941 North Capitol Street, N.E., Room 2300, or call (202) 442-4575.

- Hauling
- Landscaping
- Overweight/Oversize Vehicles
- Tree Planting & Removal
- Planter Boxes
- Retaining Walls
- Church Bulletin Signs
- Water Fountains on Public Space
- Display & Sale of Merchandise on Public Space
- To Place Benches or Trash Receptacles on Public Space
- Art Sculptures/Christmas Decorations
- Alley Construction
- Curb & Gutter Construction
- To Install Payphones, Pedestals & Cabinets
- For Annual Dump Truck Tags
- Plumbing Work
- Sidewalk Cafes
- Temporary Occupancy of Public Space (Cranes, Trucks, Construction Equipment, Hoist & Scaffolds and Dumpsters)
- To Hang Banners
- To Reconstruct and Pave Sidewalks and Roadways
- To Install Construction Fences Around Work & Storage Areas
- For Fences Exceeding 42 Inches in Height
- Temporary Occupancy of Public Space that Affect Pedestrians and/or Traffic

## LIST OF UTILITY COMPANIES

PEPCO ELECTRIC POWER CO.  
MR JAMES SLAYTON 202-388-2662  
3400 BENNING ROAD N.E.  
WASHINGTON D.C. 20019

BELL ATLANTIC TELEPHONE CO.  
MR RAY DODD 301-595-6057  
3901 CALVERTON BLVD 3<sup>rd</sup> FL  
BELTSVILLE MD. 20705

WASHINGTON GAS CO.  
MR RAVI GUPTA 703-750-4556  
6801 INDUSTRIAL ROAD  
SPRINGFIELD VA. 22151

AT & T  
MS ANGELA LEE 202-457-2160  
1120 29<sup>th</sup> STREET NW  
WASHINGTON D.C. 20011

NEXT LINK COMMUNICATIONS  
MR TROY JOHNSON 202-274-4621  
4301 CONN. AVE. NW  
WASHINGTON D.C. 20010

WILLIAMS LOCAL NETWORK  
MS DEBBIE WILES 703-444-1400  
MR CRAIG HILGENDORF  
918-573-3587  
ONE WILLIAMS WAY  
TULSA OKLAHOMA

WATER & SEWER AUTHORITY  
MR LONDRA WATSON 202-787-2057  
MR CHARLES JOHNSON 2-787-2367  
5000 OVERLOOK AVE. SW  
RM. 203 WASHINGTON D.C.

W.M.A.T.A (METRO)  
MR ROYCE DRAKE 202-962-1345  
600 5<sup>th</sup> STREET NW  
WASHINGTON D.C.

MCL WORLD COM.  
MR SHAWN OLSON 703-386-2473  
12379-A SUNRISE VALLEY DRIVE  
RESTON VIRGINIA 20191

DISTRICT CABLE  
MR ROBERT COX 202-635-5681  
MR SEREKE ASMEROM 2-635-5641  
900 MICHIGAN AVENUE N.E.  
WASHINGTON D.C. 20017

## LIST OF UTILITY COMPANIES

**STAR POWER COMMUNICATIONS**  
**MR BOB BARLEY 301-531-2761**  
**10000 DEREKWOOD LANE**  
**LANHAM MD. 20706**

**U.S. SECRET SERVICE**  
**MR BOB BAER 202-395-9222**  
**950 H STREET NW**  
**WASHINGTON D.C.**

**ADSHEL BUS SHELTERS (C.S.C.)**  
**MS. MITCHALL 202-638-0766**  
**1511 K STREET NW**  
**WASHINGTON D.C. 20010**

**LEVEL 3 COMM. INC.**  
**MR ANISH PATEL 703-762-0128**  
**1755 OLD MEADOW ROAD**  
**MCLEAN VIRGINIA 22102**

**METROMEDIA FIBER NETWORK**  
**MR JUDD STEELE 703-847-4320**  
**8201 GREENSBORO DRIVE**  
**SUITE 700 MCLEAN VA. 22102**

**QWEST COMMUNICATIONS**  
**MR MANNY BARRERA 703-803-8770**  
**14101 SULLYFIELD CIRCLE**  
**SUITE 340 CHANTILLY VA. 20151**

**ESPIRE COMMUNICATIONS**  
**MR DONALD CARTER 703-386-2473**  
**22685 HOLIDAY PARK DRIVE**  
**SUITE 80 STERLING VA. 22166**

**M.F.S. (METRO FIBER SYSTEM)**  
**MR PRYGOCKI 703-995-1662**  
**2802 MERRILEE DRIVE SUITE 220**  
**FAIRFAX VIRGINIA 22031**

**3 SETS OF PLANS  
STAMPED BY PROFESSIONAL ENGINEER.**

**MUST BE TO SCALE DRAWINGS  
SHOWING STREET CURB LINES, PROPERTY LINES, PROPOSED INSTALLATION  
INCLUDING DIMENSIONS FROM CURB LINES TO THE PROPOSED CONDUIT,  
MANHOLES, POSTS AND ECT.**

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**3 SETS OF TRAFFIC CONTROL PLANS REQUIRED.**

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- **Effective immediately DPW-Transportation will require a Traffic Control Plan {TCP} submitted with all permits. This includes all current permit holders.**

**For Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations all contractors shall refer to PART VI of the manual of uniform traffic control devices (MUTCD).**

**Attached are 9 standard TCP's from the MUTCD.**

**WORK ZONE AND PUBLIC SAFETY BRANCH  
TRAFFIC CONTROL PLAN (TCP) SUBMITTAL GUIDELINES  
5<sup>TH</sup> EDITION ( APPLICATIONS FOR PUBLIC SPACE PERMIT ONLY)  
March 17, 2004**

The following are plan details that allow for faster TCP approval:

1. All traffic control shall conform to the standards set forth in 2003 Edition Manual on Uniform Traffic Control Devices (MUTCD) and/or DDOT Work Area Traffic Control Manual.
2. Adhere to DDOT Standards Specifications for Highways and Structures [red book]. Reference section 104.02 Maintenance of Traffic, 614.02 PCC Barrier and 616.01 – 616.23 Traffic Control.
3. Provide Address of Premise for which Public Space Work is Proposed.
4. Provide Lot(s) and Square(s) number.
5. Specify the MUTCD number, and size of all temporary signs utilized on MOT/TCP project.
6. Specify North.
7. Specify Street Names for all adjacent streets to Work Zone.
8. Specify scope and sequence of work in narrative.
9. Specify location and length of work (Advanced Warning Area, Transition Area, Buffer Area, Active Work Zone, and Termination Area).
10. Specify duration of work.
11. Specify schedule of work hours.
12. Specify limits of work.
13. Show advance warning area, where the advance warning signs shall be located at proper intervals to inform motorists of what to expect.
14. Specify direction of travel, number of lanes, lane widths and posted speed limit.
15. Must provide all adjacent intersections of the street under construction or under utility work (independent of the area of the street under construction).
16. Specify street geometry, median, curb and gutter lines, existing street dimensions, and orientations; existing location and width of Right-Of Way for the street under construction or utility work and its intersecting streets.
17. Specify if parking is to be restricted and if bus zone will need to be relocated.
18. Specify placement of all devices. [Arrow board panels, signs, cones, drums, attenuators, barricades, etc.]
19. Specify spacing of devices. [Arrow board panels, signs, cones, drums, barricades, etc.]
20. Specify taper and tangent lengths.
21. When submitting MUTCD typicals, make sure to specify street geometry, existing street dimensions, street names, etc. Each typical Traffic Control Plan drawing should contain the list of locations for which this TCP is applicable.
22. Submit only those typicals that apply. The submitted typical TCPs should fit to the real street conditions. Otherwise, submit MOT/TCP individually by actual real street conditions and work zone location.

23. Specify if turning radius will impact bus and trash truck turns.
24. Orient sign and device symbols with directions of traffic.
25. Show work vehicle locations.
26. Notes are encouraged.
27. Show Key and/or Legend.
28. Show existing pavement markings and proposed temporary pavement markings. Make distinction between them.
29. Must provide temporary handicap ramps, and crosswalks, and signs to meet Americans with Disabilities Act (ADA) for all pedestrians within construction work zone area. (DDOT/TSA Note: The entire handicap ramp including side flares must be located within a crosswalk. The minimum crosswalk has a 15-foot width. The top and bottom of a ramp must have a five-foot clearance. Stop lines are located a minimum six feet before a crosswalk. Stop lines are twelve inches wide. If using a striped crosswalk, the stripes are two-foot wide, with two-foot spacing and make stripes parallel to curb line of street. Edge lines are required on all crosswalks.)
30. Restrict parking whether meters, or residential permit parking (RPP), and/or unrestricted.
31. Cannot place equipment of any type: in a NO PARKING ANYTIME ZONE, NO STANDING OR PARKING ANYTIME, NO STANDING OR PARKING METRO BUS ZONE.
32. Traffic Control Plan (TCP) must be tailored to fit contractors specific situation.
33. **PERMIT INVALID:** if all required dimensions are not shown on crane and dumpster applications that are processed at Public Space Management Administration.
34. **The Applicant must be minimum a certified TCT (Traffic Control Technician) that signs the Traffic Control Plan.**
35. **If any prohibiting signs (Regulatory) are used (NO Left Turn, No Right Turn; whether symbolic or text message), application must be directed to TSA for approval by the Work Zone and Public Safety Branch):**

Thank you for your cooperation!

Clarissa Byrd, Chief  
Work Zones/Public Safety Branch  
[202-671-2710]

ROAD  
CLOSED



ROAD CLOSED  
TO  
THRU TRAFFIC

**TCP-APPROVAL CONDITIONS  
DDOT-TSA  
WORK ZONES PUBLIC SAFETY BRANCH  
4<sup>th</sup> EDITION  
February 9, 2004**

1. CONTRACTOR SHALL HAVE, AT ALL TIMES, COPIES OF THEIR TCP'S & PERMIT ON SITE AND AVAILABLE FOR INSPECTOR REVIEW. UNLESS OTHERWISE AUTHORIZED BY DDOT, ANY PROJECT / CONTACTOR FAILING TO HAVE APPROVED PERMITS AND TCP'S ON SITE, OR ANY CONTRACTOR FAILING TO FOLLOWED THE APPROVED PERMITTED PLAN AND TCP, WITH BE SUBJECT TO FINES AND POSSIBLE IMMEDIATE SUSPENSION OF WORK.
2. ALL TRAFFIC CONTROL SHALL CONFORM TO PART VI OF THE 2003 EDITION MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND DDOT'S WORK ZONE MANUAL.
3. THE CONTRACTOR SHALL MAKE CERTAIN THAT THE PERSON OR PERSONS RESPONSIBLE FOR THE IMPLEMENTATION OF THE TRAFFIC CONTROL PLAN HAS SUCCESSFULLY COMPLETED TRAINING IN TEMPORARY TRAFFIC CONTROL AND HIS OR HER NAME AND QUALIFICATIONS SHALL BE SUBMITTED PRIOR TO WORK COMMENCING. ACCEPTED CERTIFYING ORGANIZATIONS ARE ATSSA, MDOT, VDOT OR EQUAL.
4. ALL FIELD PERSONNEL SHALL WEAR SAFETY VEST, HARD HATS AND OTHER REQUIRED PERSONAL PROTECTION EQUIPMENT.
5. CONTRACTOR SHALL PROVIDE FLAGGING OPERATIONS TO CONDITIONS DEEMED BY SELF OR DDOT. ALL FLAGGERS MUST BE CERTIFIED AND HAVE THEIR CERTIFICATION CARD IN THEIR POSSESSION WHEN FLAGGING. THEY SHALL BE EQUIPPED WITH SAFETY VESTS, HARD HATS, HAND SIGNALING DEVICES, AND ELECTRONIC DEVICES FOR COMMUNICATION.
6. ALL FLAGGING OPERATIONS SHALL USE A "STOP"/"SLOW" PADDLE OF 24 INCHES IN DIAMETER MOUNTED ON A 6FT. POLE WITH 6-INCH SERIES C LETTERS.
7. CONTRACTORS SHALL NOT CLOSE MORE THAN ONE LANE OF TRAFFIC IN ONE DIRECTION UNLESS OTHERWISE APPROVED.
8. ARROW PANELS ARE REQUIRED FOR LANE CLOSURES ON MAJOR ARTERIALS AND MAY BE DEEMED NECESSARY ON OTHER ROADWAYS.
9. 36" REFLECTIVE CONES ARE REQUIRED FOR MAINTENANCE OF TRAFFIC (MOT). 36" REFLECTIVE DRUMS SHALL BE USED FOR TAPERS ON FREEWAY SYSTEM OR WHEN INDICATED BY DDOT. ALL TRAFFIC SAFETY DRUMS USED FOR THE MAINTENANCE OF TRAFFIC SHALL BE OF A LOW DENSITY MATERIAL.
10. TYPE III BARRICADES SHALL BE USED FOR ROAD CLOSURES. ADEQUATE ROAD CLOSURE AND DETOUR SIGNAGE SHALL BE INSTALLED TO GIVE MOTORIST GUIDANCE. DETOUR DIRECTION SIGNS MUST BE ACCOMPANED BY MESSAGE SIGNS THAT INDICATE DETOUR STREET NAME. DO NOT USE ABBREVIATIONS ON MESSAGE SIGNS.
11. ALL LEADING ENDS OF THE TEMPORARY CONCRETE BARRIERS EXPOSED TO ON-COMING TRAFFIC SHALL BE PROTECTED WITH PORTABLE IMPACT QUADGUARD IMPACT ATTENUATOR. ALL ATTENUATORS SHALL HAVE "OM-3R, L" OBJECT MARKERS.
12. CONTRACTORS SHALL INSTALL "STEEL PLATE AHEAD" SIGNS WHENEVER PLATES HAVE BEEN INSTALLED.
13. TEMPORARY REFLECTIVE PAVEMENT TAPE OF THE APPROVED TYPE SHALL BE USED TO DESIGNATE TRAFFIC LANES. ALL MARKERS SHALL BE WHITE, EXCEPT FOR THE LEFT EDGE OF THE EFFECTIVE ROADWAY, WHICH SHALL BE YELLOW.
14. DAYTIME WORK HOURS ARE BETWEEN 9:30am-3: 30pm OR AS APPROVED.
15. NIGHTTIME WORK HOURS ARE BETWEEN 7:30pm-4: 30am OR AS APPROVED.

16. ADVANCE WARNING SIGNS SHALL BE 18" X 18" BLACK / ORANGE - FLUORESCENT ORANGE HIGH PERFORMANCE WIDE ANGLE RETRO-REFLECTIVE SHEETING. ROLL-UP SIGNS ARE APPROVED HOWEVER SIGN SHEETING SHALL BE FLUORESCENT ORANGE AND SHOULD NOT BE MESH.
17. CONTRACTOR SHALL USE AN) ADJUST SPRING-LOADED SIGN STANDS UP SO MOTORIST CAN SEE AND READ SIGN. SIGN STANDS SHOULD COMPLY WITH NCHRP 350 CRASH TESTING STANDARDS AND SHOULD HAVE MARKINGS OF COMPLIANCE ON THE STANDS.
18. ALL CONSTRUCTION VEHICLES OPERATING IN AND AROUND THE WORK ZONE SHALL OPERATE STROBE OR REVOLVING LIGHTS AT ALL TIMES. THESE LIGHTS SHOULD BE MOUNTED IN SUCH A MANNER THAT THEY ARE VISIBLE 360 DEGREES.
19. NO HOMEMADE Construction, REGULATORY, OR GUIDE SIGNS ALLOWED.
20. DAMAGED, DIRTY, OR DEFACED DEVICES, TO INCLUDE SIGNS, CHANNELIZERS, AND TRAFFIC CONTROL EQUIPMENT ARE NOT APPROVED AND SHALL NOT BE USED.
21. ANY WORK THAT REQUIRES TEMPORARY NO-PARKING RESTRICTIONS FOR A CONTRACTOR TO PERFORM THEIR WORK SHALL REIMBURSE THE DISTRICT OF COLUMBIA ALL LOST REVENUE FOR ALL SPACES OCCUPIED IF THE NO PARKING ZONE AFFECTS PARKING METERS DURING THE LIFE OF THE WORK (CURBSIDE MANAGEMENT TELEPHONE NUMBER IS 202-671-2020)
22. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO RECORD METER NOS. AFFECTED BY THEIR WORK AND REPORT THOSE METERS OCCUPIED TO PARKING SERVICES.
23. ALL CONTRACTORS SHALL MAINTAIN PEDESTRIAN CROSSWALKS AND WALKWAYS WHETHER PAVED OR UNPAVED UNLESS OTHERWISE INDICATED ON THE PLANS AND APPROVED BY DDOT. TEMPORARY WHEELCHAIR RAMPS SHALL ALSO BE INSTALLED AND MAINTAINED BY THE CONTRACTOR OR AS DEEMED NECESSARY BY DDOT. COMPLIANCE TO THE AMERICAN DISABILITIES ACT (ADA) IS REQUIRED. CONTRACTORS INVOLVED IN WORK ON SIDEWALKS AND RAMPS, BE IT NEW CONSTRUCTION OR RENOVATION, NEED TO HAVE THE APPROPRIATE SIGNAGE PRESENT OFFERING SAFE AND COMPLIANT ALTERNATIVE ROUTES FOR THE DISABLED AND PEDESTRIAN TRAFFIC.
24. A CONTRACTOR WITH VEHICLES AND EQUIPMENT IN PUBLIC SPACE REQUIRES A PERMIT. CONTRACTORS WISHING TO LEAVE EQUIPMENT OVERNIGHT IN PUBLIC SPACE ARE SUBJECT TO REIMBURSING THE CITY FOR THE SPACE BEING OCCUPIED, AS NOTED IN CONDITION 21, AND MUST HAVE A PERMIT ALLOWING OVER STORAGE ON CITY STREETS OR IN CITY SPACE. ALL ITEMS PERMITTED TO BE STORED OVERNIGHT ON CITY STREETS OR IN CITY SPACE MUST BE SECURED AND MUST GIVE CONSIDERATION TO PUBLIC SAFETY. IN THE EVENT OF AN EMERGENCY, THE CITY RESERVES THE RIGHT TO REMOVE ALL ITEMS THAT ARE PERMITTED BY ANY MEANS NECESSARY. EMERGENCY CONTACT INFORMATION SHOULD BE PROVIDED TO DDOT WITH 24-HOUR ACCESS IN THE EVENT SUCH AN EMERGENCY OCCURS.
25. ANY CONSTRUCTION IN RESIDENTIAL AND OR HOTEL ZONES REQUIRES A DAYTIME WORK HOURS PERMIT UNLESS OTHERWISE APPROVED BY DDOT.
26. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL DRIVEWAYS, GARAGES, ALLEYS AND LOADING DOCKS AT ALL TIMES, AS WELL AS ACCESS TO ALL BUSINESSES PRIVATE OR OTHERWISE.
27. CONTRACTOR MAY BE REQUIRED TO HIRE POLICE FOR PARKING AND WORK ZONE ENFORCEMENT.
28. CONTRACTOR SHALL NOTIFY APPROPRIATE ANC CHAIRPERSON IN WRITING, RESIDENTS AND/OR MERCHANTS OF PLANNED WORK/TCP THREE WEEKS PRIOR TO STARTING DATE. THE CONTRACTOR WILL BE REQUIRED TO FURNISH DDOT WITH ALL LETTERS AND RESPONSES IN WRITING CONCERNING THEIR PROJECT.
29. THE CONTRACTOR IS REQUIRED TO NOTIFY FIRE AND /OR POLICE DEPARTMENTS OF APPROVED ROAD CLOSURES. PERMITS WITH THEIR APPROVAL MUST BE ON SITE WITH ALL OTHER PERMITS.
30. ALL TRAFFIC CONTROL DEVICES NOT IN USE SHALL BE REMOVED FROM THE PUBLIC SPACE OR AS DIRECTED BY DDOT. WHEN APPROVED BY DDOT ALL REGULATORY SIGNS MUST BE COVERED SECURELY TO AVOID MISINFORMATION.

31. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) MAY BE REQUIRED TO GIVE THE MOTORING PUBLIC ADVANCE NOTIFICATION OF ROAD CONDITIONS, ROADWORK, AND/OR EVENTS. ARROW BOARDS MAY ALSO BE REQUIRED IN WORK ZONES TO AID IN LANE CLOSURES AND, WHERE WORK REQUIRES, TRUCK MOUNTED ATTENUATOR (TMA) CAN BE REQUIRED AS WORK DICTATES.
32. CONTRACTORS SHALL INSTALL COVERED WALKWAYS WHERE DDOT DEEM NECESSARY. CONTRACTOR MAY ALSO BE REQUIRED TO DEVELOP PROTECTED PEDESTRIAN PATHS AROUND THE WORK AREA THAT MAY PLACE PEDESTRIAN TRAFFIC IN THE ROADWAY TEMPORARILY. IN THIS SITUATION CONCRETE BARRIERS OR WATER FILLED BARRIERS WITH STEEL RIBBING WILL BE REQUIRED UNDER DDOT APPROVAL.
33. WHEN REQUIRED BY DDOT, IN THE WORKZONE, THE CONTRACTOR MAY BE REQUIRED TO LOWER THE POSTED SPEED LIMIT DURING THE LIFE OF THE PROJECT. ALL CHANGES TO REGULATORY SIGNS WILL BE INDICATED TO THE PUBLIC WITH THE ADDITION OF TWO ORANGE WORKZONE FLAGS, AND WHEN REQUIRED BY DDOT, A TYPE B LIGHT MAY BE REQUIRED.
34. "END CONSTRUCTION" AND ROADWORK AHEAD" SIGNS WILL BE REQUIRED AT THE ENDS OF THE WORK ZONE. THIS INCLUDES ANY STREETS AFFECTED THAT WILL LEAD INTO OR OUT OF THE WORK AREA.
35. CONTRACTORS FAILING TO USE APPROVED DEVICES REQUIRED OR REQUESTED BY DDOT WILL BE SUBJECT TO POSSIBLE FINES OR IMMEDIATE SUSPENSION OF WORK.
36. THE TEMPORARY SIGNS AND MARKINGS PLACED OR ADJACENT TO THE WORK ZONE SHALL BE CONSISTENT AND VISIBLE AT ALL TIMES.
37. NIGHT WORK - DURING NIGHTTIME HOURS, THE WORK SITE SHALL BE MADE SAFE FOR TRAFFIC. WARNING SHALL BE PROVIDED, BY INSTALLING ELECTRONICALLY ILLUMINATED TRAFFIC CONTROL DEVICES SUCH AS FLASHING ARROW PANELS AND WARNING LIGHTS. THESE DEVICES SHOULD BE USED IN CONJUNCTION WITH OTHER TRAFFIC CONTROL DEVICES, AND THEIR FLASHING SEQUENCE AND LIGHT INTENSITY SHALL MEET THE REQUIREMENTS CITED IN THE MUTCD. ALL TRAFFIC CONTROL DEVICES MUST REFLECTORIZE DURING NIGHTTIME HOURS.
38. THE CONTRACTOR SHALL COORDINATE HIS MAINTENANCE OF TRAFFIC WORK WITH OTHER CONTRACTORS AND UTILITY COMPANIES WORKING IN THE SAME GENERAL LOCATION TO MAINTAIN CONTINUITY OF TRAFFIC FLOW AND MINIMIZE CONGESTION.
39. PARKING IS TO BE PROHIBITED IN THE WORK AREA. PARKING IS TO BE RESTRICTED - 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
40. THE CONTRACTOR SHALL GIVE 72 HOURS PRIOR NOTICE TO THE DDOT/TSA WHEN MAKING A CHANGE IN TRAFFIC FLOW PATTERNS.



PSMA - ELEC  
(05-26-2005)

District Department of Transportation  
Public Space Management Administration

### APPLICATION TO INSTALL ELECTRIC WIRING IN PUBLIC SPACE

(PLEASE PRINT OR TYPE - DO NOT WRITE IN SHADED AREAS)



|   |   |            |                                   |                           |
|---|---|------------|-----------------------------------|---------------------------|
| 1. Address of Premise for Which Work is Proposed: |   | 2. Ward    | 5. Date of Application            | Permit Number:            |
|   |   | 3. Lots(s) |                                   | Total Fee:                |
|   |   | 4. Square  |                                   | \$                        |
| 6. Owner of the Premise:                          | 7. Owner Address                              |            | Surface: <input type="checkbox"/> | 3. Owner Telephone:       |
|   |   |            |                                   | 11. Contractor Telephone: |
| 9. Electrical Contractor's Name/Company Name      | 10. Electrical Contractor's Business Address: |            | 12 License No:                    |                           |
|   |   |            |                                   |                           |

13: Description of Work:

|  |  |
|--|--|
| <p>14. Type of Activity (circle corresponding letter):</p> <ul style="list-style-type: none"> <li>a. Extending electrical service</li> <li>b. Repairing electrical wiring</li> <li>c. Installing meter</li> <li>d. Connecting to public utility</li> <li>e. Street light installation</li> <li>f. Other</li> </ul> | <p>15. Location (circle corresponding letter):</p> <ul style="list-style-type: none"> <li>a. Roadway</li> <li>b. Sidewalk</li> <li>c. Parking</li> <li>d. Front Yard</li> <li>e. Rear alley</li> <li>f. Other</li> </ul> |
|--|--|

I have read and I understand the conditions set forth on this application. I further understand that penalties are provided for furnishing false information. I am hereby requesting to perform the work specified in this application and agree to all the conditions. Further, I agree to perform the work in accordance with all applicable laws, regulations, codes, standards, and specifications of the District of Columbia.

Master Electrician's Name, Address and Telephone Number:

Signature \_\_\_\_\_ License No. \_\_\_\_\_ Emergency contact number: \_\_\_\_\_

Permit Restrictions:

|                     |                |                        |
|---------------------|----------------|------------------------|
| Electrical Engineer | Transportation | Environmental Services |
| By/Date:            | By/Date:       | By/Date:               |

## CONDITIONS OF APPLICATION AND PERMIT

As a condition precedent to the issuance of such permit, and in consideration thereof, the Permittee expressly agrees to the following conditions which are incorporated in the application for such permit:

- (1) That the performance of such work or the occupancy of such space shall be strictly in accordance with the conditions set forth herein and on both sides of the permit authorizing such work or occupancy of public space.
- (2) That the performance of such work or the occupancy of such space as authorized by the said permit shall be in full compliance with all applicable laws and regulations of the District of Columbia.
- (3) That the applicant, at the applicant's risk and expense, guarantees that the public space occupied by the applicant or required for the performance of the work authorized by the said permit, at all times will be kept in a safe condition, and where the work aforesaid results in any excavation in any street, alley, sidewalk, or other public space, the applicant will insure that such excavation is kept in a safe condition until such street, alley, sidewalk, or other public space has been repaired or resurfaced by the District of Columbia. The repair or resurfacing of the street, alley, sidewalk or other public space made necessary by the excavation, will be performed by the District of Columbia at the expense of the applicant.
- (4) That the applicant guarantees that if, in the opinion of the Director of the Department of Transportation or his representative, any work performed in, or occupancy of, public space by him or on his behalf, in any manner becomes dangerous to, or interferes unnecessarily with, pedestrian or vehicular traffic, the applicant will take such action as, in the opinion of the said Director or his representative is necessary to remove such dangerous condition or unnecessary interference with traffic.
- (5) That the applicant will save harmless, indemnify and keep indemnified the District of Columbia, its officers and employees, from all claims, suits, charges, counsel fees, and judgments to which the said District, its officers and employees may be subject on account of injury to persons or damage to property, including property of the District of Columbia, due to negligence of the applicant, or occasioned by work not authorized by said permit, or resulting from failure to observe and comply with terms and conditions of this application.
- (6) That the applicant agrees that the backfilling of any excavation made by him or on his behalf will be performed in the manner prescribed below and should any settlement or sinking resulting from backfilling occur within two (2) years after the District of Columbia, at the applicant's expense, has repaired or resurfaced the surface of the public space in which excavation was made, the applicant nevertheless will save harmless, indemnify and keep indemnified the District of Columbia from any injury, loss, cost, or damage occasioned by a physical change in such repaired or resurfaced public space.  
  
Should repairs become necessary over said excavation during the aforementioned period due to settlement of said excavation occasioned by improper excavation work or backfilling, the necessary re-excavation and repair shall be done by the District of Columbia and the cost thereof shall be charged to the applicant.
- (7) That the applicant agrees that all portions of the street excavated will be put in as good condition as before the excavation was made and that such excavation will be backfilled within twenty-four (24) hours after approval by the District (if required) of the construction, connections or repairs installed or made therein, such backfilling not to extend more than two inches (2") above the adjoining pavement or surface and to be thoroughly compacted in such manner as to avoid any sinking or settlement either of the backfill or of any pavement laid thereon for a period of two (2) years after the area over such excavation has been repaired or resurfaced by the District.
- (8) That the applicant agrees that:
  - (a) No cut will be made in a roadway or alley unless material to complete the job is on hand or immediately available, that work will be carried to completion in the shortest possible time, and that there will be no interference with traffic unless such interference is specifically authorized by the Director of the Department of Transportation, or his representative.
  - (b) A clear safe pedestrian passageway not less than 6 feet wide, in line with any existing sidewalk, will be provided at all times unless otherwise authorized by the Director of the Department of Transportation, or his representative.
  - (c) He will not cut or injure trees, or pile earth or other material within 3 feet of trees unless such trees are properly protected in a manner approved by the Director of the Department of Transportation or his representative.
  - (d) No existing underground construction will be interfered with.
  - (e) All pipes and conduits except as otherwise specified in Section 408-2 of D. C. Plumbing Code, will be laid not less than 30 inches below any roadway, not less than 24 inches below grade on other public space, except that street light conduits may be laid not less than 18 inches below any approved grade, unless otherwise authorized.
  - (f) Surface (lawns, grass, shrubs, sidewalks, etc.) will be restored upon completion of work.
  - (g) All material, equipment, surplus excavated material, debris, etc., will be removed from public space as soon as possible, consistent with working hours and conditions, within three working days following the completion of the work authorized by the permit.
- (9) That the applicant agrees that covers placed on manholes be of an approved pattern.

## ELECTRICAL PERMIT APPLICATION PROCESS

1. FILL OUT AND HAVE A MASTER ELECTRICIAN SIGN TWO (2) APPLICATIONS
2. ATTACH PLANS OR DRAWING SHOWING LOCATION AND TYPE OF WORK PROPOSED
3. ATTACH "APPROVED" CATALOG CUTS SHOWING TYPE OF MATERIAL TO BE INSTALLED
4. THE PERMIT WILL BE GOOD FOR NINETY (90) DAYS OR THE DURATION OF THE PROJECT
5. THE PERMIT FEE WILL BE \$40.00 or "NO FEE" (For D.C. Contracts Only)
6. PAY PERMIT FEE AT 941 North Capitol St. NE, 2<sup>nd</sup> Floor

IF YOU HAVE ANY QUESTIONS OR CONCERNS CONTACT :

MARK HELTON, CHIEF ELECTRICAL INSPECTOR, DDOT  
202-698-3605

OR

BOB MONDAY, ELECTRICAL INSPECTOR, DDOT  
202-698-3607

# THE UNIVERSITY OF CHICAGO

PHILOSOPHY DEPARTMENT

PHILOSOPHY 101

LECTURE 1: INTRODUCTION

LECTURE 2: THE FOUNDATIONS OF LOGIC

LECTURE 3: THE THEORY OF SETS

LECTURE 4: THE THEORY OF NUMBERS

LECTURE 5: THE THEORY OF REAL NUMBERS

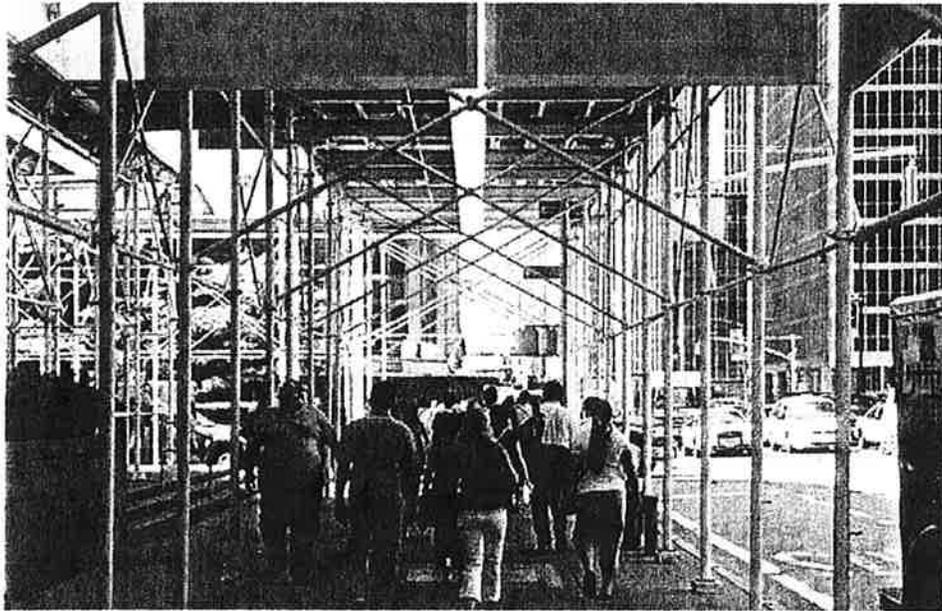
LECTURE 6: THE THEORY OF COMPLEX NUMBERS

LECTURE 7: THE THEORY OF GROUPS

1

# **PEDESTRIAN SAFETY AND WORK ZONE STANDARDS**

## **Covered and Open Walkways**





# **PEDESTRIAN SAFETY AND WORK ZONE STANDARDS**

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# DEPARTMENT OF TRANSPORTATION ADMINISTRATIVE ISSUANCE SYSTEM

DEPARTMENTAL ORDER NO. 2008-OD-02 DATE: December 14, 2007

**SUBJECT: District Department of Transportation Pedestrian Safety and Work Zone Standards**

**I. PURPOSE**

To provide guidance and standards to District Department of Transportation employees for reviewing construction of protected walkways on the sidewalks and roadways of the District of Columbia as part of a required traffic control plan and to provide guidance on the preferred methods for routing pedestrians safely through work zones occupying public space in the District of Columbia.

**II. AUTHORITY**

Sections 3b 5(3) and 5(4) of the Department of Transportation Establishment Act of 2002 (D.C. Official Code §§ 50-921.02(b), and 50-921.04(3), 50-921.04(4))

**III. POLICY**

The District Department of Transportation (DDOT) is responsible for regulating the temporary occupancy of public space during construction on both private property and public space. As a part of this responsibility, DDOT reviews and approves traffic control plans governing the safe routing of pedestrians and vehicles around the work zone in public space.

To ensure that work zones adjacent to sidewalks minimize disruption to the normal pedestrian pathways while providing adequate protection for pedestrians, DDOT shall review all traffic control plans that include a covered walkway on the sidewalk or the roadway or that include an open walkway on the sidewalk or in the roadway and are submitted with applications for public space permits to ensure that the plan is consistent with the standards in the District Guideline and Standards for Traffic Control: Work Zone Safety Pocket Guide and the District Temporary Traffic Manual: Work Zone Manual 2006 Edition.

It is the general policy of DDOT that, in accordance with the Manual on Uniform Traffic Control Devices, 2003 Edition, traffic control plans should replicate the existing pedestrian pathway as nearly as practical and that the pedestrian pathway should not be severed or moved for non-construction activities such as parking for vehicles or the storage of materials or equipment. All traffic control plans

submitted with applications for public space permits shall include a schedule of work. The proposed traffic control plan shall provide a pedestrian pathway consistent with the phase of work as outlined in the District Guideline and Standards for Traffic Control: Work Zone Safety Pocket Guide, the District Temporary Traffic Manual: Work Zone Manual 2006 Edition and the attached document titled Pedestrian Protections and Phases of Construction.

Modification from this policy is allowed based on site-specific conditions. Modification must be requested in writing when submitting the traffic control plan and public space permit application. The request must explain the nature of the modification requested and the site-specific conditions that require the modification.

**IV. ISSUANCE APPLICABILITY**

This Departmental issuance shall be distributed to each DDOT employee for his or her review based on the applicability of this policy to his or her job.

**V. EFFECTIVE DATE**

This policy shall take effect immediately upon the execution of this Order.

 (2/11/07)

Emeka Moneme

Date

## Covered Walkways on the Sidewalk

1. **Specifications and Drawings:** Specifications and drawings of the covered walkway must be submitted with the traffic control plan and the public space occupancy permit application. The drawings must show the side view, front view and cross section of the covered walkway and must be stamped and signed by a Professional Engineer licensed by the District of Columbia. If and when DDOT publishes specifications and standard drawings stamped and signed by the Chief Engineer, these drawings may be used with the application. A traffic control plan for the construction of the covered walkway must also be provided with the application.
2. **ADA Compliance:** All covered walkways constructed under this section must provide an accessible pedestrian route in accordance with the requirements of the Americans with Disabilities Act (ADA). This includes, but is not limited to: constructing structural floors when required (see number 3 below) that have a surface that is firm, stable and slip resistant, and that is compliant in slope, counter slope, vertical clearances, turning radii and surface discontinuities; providing compliant ramps connecting the structural floor to an existing pedestrian accessible route; and implementing sufficient measures to ensure the safety and welfare of the pedestrian(s) traversing the site. All ramps with a rise greater than six inches (6 in) shall be constructed with handrails on both sides of the ramp.
3. **Floor:** Structural floors are not required unless needed to cross an opening or an obstruction in the sidewalk, to comply with requirements of the ADA, or as directed by DDOT. Otherwise, the sidewalk may serve as the floor of the covered walkway. Any structural floor provided shall be constructed of planking closely laid and made tight. The floor shall be designed for a live load of three hundred pounds per square foot (300 psf), shall be treated with a non-slip coating, provide adequate drainage, and shall comply with the ADA requirements (see item 2 above).
4. **Roof:** Roofs of covered walkways shall consist of planking no less than the industry standard nominal thickness of two inches (2 in), closely laid, made water tight, and covered with exterior grade fire resistant plywood. All sill plates and posts shall be Ground Contact rated pressure-preservative treated material. All fasteners shall be galvanized steel. The roof shall be designed to carry a live load of at least 200 pounds per square foot (200 psf). For covered walkways adjacent to buildings 100 feet or less in height, the roof shall be designed to carry a live load of at least 150 pounds per square foot (150 psf).
5. **Height:** Covered walkways shall have a clear and unobstructed ceiling height of not less than eight feet (8 ft).
6. **Width:** Covered walkways shall have a clear unobstructed width of not less than eight feet (8 ft) in the Central Business District and six feet (6 ft) in all other areas. Width is to be measured from wall to wall and not from handrail to wall or handrail to handrail. Covered walkways shall not allow unprotected passage along the sidewalk on either side of the covered walkway.
7. **Lighting:** The interior of the covered walkway shall be lighted at all times. Lights shall be installed on the ceiling and the level of illumination shall be the equivalent of that produced by 100 watt, 1,700 lumen minimum, standard incandescent lamps enclosed in vandal-resistant fixtures and spaced fifteen feet (15 ft) apart and eight feet (8 ft) above the floor level. Lights must be left on overnight. Lighting shall be inspected nightly, and burned out or inoperative

lights shall be replaced or repaired by the next business day. Lighting shall comply with the National Electrical Code and the District of Columbia Electrical Code.

8. **Structural Members:** The structural members of the covered walkway shall be adequately braced and connected to prevent displacement or distortion of the frame work.
9. **Construction Facing Side:** The side of the covered walkway facing the construction area shall be completely enclosed with plywood, except that the side may have openings, at the discretion of the permit holder and adequately protected by screening, that allow pedestrians to view the work site.
10. **Roadway Facing Side:** The side of the covered walkway facing the roadway shall not be built within or on any tree box and shall be set back from the face of curb by a minimum of one (1) foot. The side of the covered walkway facing the roadway may be constructed of chain link, plywood (only to the height of 3' 6" from grade), or bracings. Within forty five feet (45 ft) of the intersection of two streets the side(s) facing the roadway shall be constructed to maintain an unobstructed line of sight for drivers in the roadway and pedestrians using the covered walkway. The intersection of two streets is the point of intersection of the curb lines extended. If the covered walkway is constructed with a structural floor, the side of the covered walkway facing the roadway shall be either continuous non-flexible material to a height of 3' 6" or it shall be provided with continuous upper and lower railings running the length of the covered walkway at heights sufficient to prevent pedestrians from straying off the structural floor.
11. **Building Entry:** If the building is actively in use while the covered walkway is in place, the covered walkway shall be designed to maintain ADA accessible entry to and exit from the building. It shall have signs or stenciling indicating the names of the stores or businesses that can be accessed directly from the covered walkway. Hand written signs are not to be used in a covered walkway.
12. **Hand Rail:** A continuous handrail shall be installed along at least one side of the covered walkway to aid pedestrians. The handrail shall comply with the requirements of ADA. Current requirements are that the top of the handrails shall be between thirty four inches and thirty eight inches (34 in-38 in) from grade; the clearance between the handrail gripping surface and the adjacent surface shall be a minimum of one and one half inches (1 ½ in); the rails cannot be obstructed along their top or sides; and handrails shall extend horizontally above the landing for twelve inches (12 in) minimum beyond the top and bottom of ramp runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous with an adjacent rail.
13. **Transit Access:** The covered walkway shall be designed to maintain ADA compliant access from the sidewalk to any Metrorail entrance, operating bus stop, or bus shelter.
14. **Directional Signs:** The covered walkway shall have signs or stenciling at all entry points, including those from a Metrorail entrance or operating bus stop, indicating the next intersection and street names in either direction of travel through the covered walkway. Hand written signs are not to be used in a covered walkway.
15. **Alternate Materials:** Steel or other materials having equivalent strength and suitability may be used in lieu of wood to construct covered walkways. If alternate materials are selected then they must satisfy the requirements of ADA in the application in which they will be used.

16. **Postings, Graffiti, Advertising:** Other than signs allowed under Title 12A section 3107.8 of the District of Columbia Municipal Code, the walls, roof, and floor of the covered walkway shall be maintained free of postings, graffiti or advertising of any type. Any such material shall be removed or appropriately covered by the permit holder within 24 hours or the next business day. Failure to remove or cover the material may result in suspension or revocation of the public space permit and/or a stop work order for the site until the covered walkway is brought into compliance.
17. **Sidewalk Fixtures:** The covered walkway shall be designed to incorporate any existing sidewalk fixture, such as fire hydrants, light poles, traffic signal devices, parking meters, trash receptacles, bus stops and bus shelters, and benches. The covered walkway cannot cover or obstruct in any way traffic operation signage and signals, including those related to parking. If the covered walkway cannot be constructed without the removal of an existing sidewalk fixture, the permit holder shall provide in writing to DDOT details about: which fixture(s) are to be removed; where they will be stored pending the completion of the work; and how they will be restored upon removal of the covered walkway. Approval by DDOT must be obtained in writing prior to the removal of any fixture.
18. **Tree Protection:** Under no circumstances shall a street tree be removed, pruned, or disfigured for the construction or razing of the covered walkway except under a valid tree removal permit issued by the District Department of Transportation. No trees shall be used as an attachment point to support the covered walkway. Damage to any tree caused by the construction or placement of the covered walkway subjects the permit holder to fines. The covered walkway shall be constructed to provide adequate tree and tree root protection as specified in DDOT's Standard Specifications for Highways and Structures.
19. **Removal:** The covered walkway shall be removed immediately upon completion of the building construction/repair work, or the end of any potential hazard to pedestrians. Removal of the covered walkway shall be done without damage to any tree or the tree canopy. A traffic control plan for the razing of the covered walkway must also be provided and approved by DDOT prior to removal of the covered walkway.
20. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. This request must be submitted in writing along with the traffic control plan and public space permit application; and must explain the modification and the site-specific conditions that require the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician within 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required then the superintendent or his or her designee must return the work zone to its original approved condition.

# Covered Walkways in the Roadway

1. **Specifications and Drawings:** Specifications and drawings of the covered walkway must be submitted with the traffic control plan and the public space permit application for occupancy of public space. The drawings must show the side view, front view and cross section of the covered walkway and must be stamped and signed by a Professional Engineer licensed by the District of Columbia. If and when DDOT publishes specifications and standard drawings stamped and signed by the Chief Engineer, these drawings may be used when applying for a public space permit. A traffic control plan for the construction of the covered walkway must also be provided with the application.
2. **ADA Compliance:** All covered walkways constructed under this section must provide an accessible pedestrian route in accordance with the requirements of the Americans with Disabilities Act (ADA). This includes, but is not limited to: constructing structural floors when required (see number 4 below) that have a surface that is firm, stable and slip resistant, and that is compliant in slope, vertical clearances, turning radii and surface discontinuities; implementing sufficient measures to ensure the safety and welfare of the pedestrian(s) traversing the site; and provide an ADA-compliant ramp from the curb to the covered walkway at both ends. All ramps with a rise greater than six inches (6 in) shall be constructed with handrails on both sides of the ramp.
3. **Floor:** If the floor (roadway surface) is uneven, the roadway shall be leveled using asphalt patching. Temporary metal plates are not to be used at any point as the floor of a covered walkway in the roadway. If temporary metal plates are required they must be covered with an ADA compliant platform.
4. **Roof:** The roof of the covered walkway shall consist of planking no less than the industry standard nominal thickness of two inches (2 in), closely laid, made water tight, and covered with exterior grade fire resistant plywood. All sill plates and posts shall be Ground Contact rated pressure-preservative treated material. All fasteners shall be galvanized steel. The roof shall be designed to carry a live load of at least 200 pounds per square foot (200 psf). For covered walkways adjacent to buildings 100 feet or less in height, the roof shall be designed to carry a live load of at least 150 pounds per square foot (150 psf).
5. **Height:** Roadway covered walkways shall have a clear and unobstructed ceiling height of not less than eight feet (8 ft).
6. **Width:** Roadway covered walkways in the must have a clear unobstructed width of 5 feet. When practical 6 feet is the DDOT preferred width.
7. **Lighting:** The interior of the covered walkway in the roadway shall be lighted at all times. Lights shall be installed on the ceiling and the level of illumination shall be the equivalent of that produced by 100 watt, 1,700 lumen minimum, standard incandescent lamps enclosed in vandal-resistant fixtures and spaced fifteen feet (15 ft) apart and eight feet (8 ft) above the floor level. Lights must be left on overnight. Lighting shall be inspected nightly, and burned out or inoperative lights shall be replaced or repaired by the next business day. Lighting shall comply with the National Electrical Code and the District of Columbia Electrical Code.
8. **Structural Members:** The structural members of the covered walkway shall be adequately braced and connected to prevent displacement or distortion of the frame work.

9. **Construction Facing Side:** The side of the covered walkway facing the construction area shall be completely enclosed with plywood, except that the side may have openings, at the discretion of the permit holder and adequately protected by screening, that allow pedestrians to view the work site. When there is no hazard to pedestrians in the covered walkway from material in the construction site, the construction side of the covered walkway may be constructed of chain link fencing, with light debris mesh when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.
10. **Roadway Facing Side:** The side of the covered walkway facing the travel lanes of the roadway must have either jersey barriers or equivalent NCHRP 350 certified water filled barriers. The wall of the covered walkway facing the travel lanes may be attached to the top of the jersey/water filled barriers or may rest on the roadbed inside of the jersey/water filled barriers. Barriers are to have reflectors placed in accordance with DDOT traffic control standards
11. **Building Entry:** If the building is actively in use while the covered walkway is in place, the covered walkway shall be designed to maintain ADA accessible entry to and exit from the building. It shall have signs or stenciling indicating the names of the stores or businesses that can be accessed directly from the covered walkway. Hand written signs are not to be used in a covered walkway.
12. **Hand Rail:** A continuous handrail shall be installed along at least one side of the covered walkway to aid pedestrians. The handrail shall comply with the requirements of ADA. Current requirements are that the top of the handrails shall be between thirty four inches and thirty eight inches (34 in-38 in) from grade; the clearance between the handrail gripping surface and the adjacent surface shall be a minimum of one and one half inches (1 ½ in); the rails cannot be obstructed along their top or sides; and handrails shall extend horizontally above the landing for twelve inches (12 in) minimum beyond the top and bottom of ramp runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous with an adjacent rail.
13. **Transit Access:** The covered walkway shall be designed to maintain ADA compliant access from the sidewalk to any Metrorail entrance, operating bus stop, or bus shelter.
14. **Directional Signs:** The covered walkway must provide proper signage (Manual on Uniform Traffic Control Devices (MUTCD) compliant) that directs pedestrians to a particular pathway. The covered walkway shall have signs or stenciling at all entry points, including those from a Metrorail entrance or operating bus stop, indicating the next intersection and street names in either direction of travel through the covered walkway. Hand written signs are not to be used in a covered walkway.
15. **Alternate Materials:** Steel or other materials having equivalent strength and suitability may be used in lieu of wood to construct covered walkways. If alternate materials are selected then they must satisfy the requirements of ADA in the application in which they will be used.
16. **Postings, Graffiti, Advertising:** Other than signs allowed under Title 12A section 3107.8 of the District of Columbia Municipal Code, the walls, roof, and floor of the covered walkway shall be maintained free of postings, graffiti or advertising of any type. Any such material shall be removed or appropriately covered by the permit holder within 24 hours or the next business day. Failure to remove or cover the material may result in suspension or revocation of the public space permit and/or a stop work order for the site until the covered walkway is brought into compliance.

17. **Sidewalk Fixtures and Catchbasins:** The covered walkway shall be designed to incorporate any existing sidewalk fixture, such as fire hydrants, light poles, traffic signal devices, parking meters, trash receptacles, vaults and manholes, bus stops and bus shelters, and benches. The covered walkway cannot cover or obstruct in any way traffic operation signage and signals, including those related to parking. The covered walkway cannot block access or drainage to catchbasins. If the covered walkway cannot be constructed without the removal of an existing sidewalk fixture, the permit holder shall provide in writing to DDOT details about: which fixture(s) are to be removed; where they will be stored pending the completion of the work; and how they will be restored upon removal of the covered walkway. Approval by DDOT must be obtained in writing prior to the removal of any fixture.
18. **Tree Protection:** Under no circumstances shall a street tree be removed, pruned, or disfigured for the construction or razing of the covered walkway except under a valid tree removal permit issued by the District Department of Transportation. No trees shall be used as an attachment point to support the covered walkway. Damage to any tree caused by the construction or placement of the covered walkway subjects the permit holder to fines. The covered walkway shall be constructed to provide adequate tree and tree root protection as specified in DDOT's Standard Specifications for Highways and Structures.
19. **Removal:** The covered walkway shall be removed immediately upon completion of the building construction/repair work, or the end of any potential hazard to pedestrians. Removal of the covered walkway shall be done without damage to any tree or the tree canopy. A traffic control plan for the razing of the covered walkway must also be provided and approved by DDOT prior to removal of the covered walkway.
20. **Roadway Occupancy:** DDOT shall consider requests for occupancy of additional roadway lanes and/or the shifting of roadway lanes on a case-by-case basis.
21. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

## Open Walkways on the Sidewalk

1. **Construction Facing Side:** The open walkway must be separated from the adjacent work zone by a chain link fence or other similar barrier. Any gate in the fence must swing inward toward the work zone. The fence must be properly anchored but cannot be bolted or attached in any similar manner into the sidewalk. Light debris mesh shall be used when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.
2. **Width:** Must maintain a minimum of 8 feet unobstructed sidewalk width in the Central Business District, 6 feet in all other areas.
3. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved, no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

## Open Walkways in the Roadway

1. **Construction Facing Side:** The open walkway must be separated from the work zone by a chain link fence or other similar barrier. Any gate in the fence must swing inward toward the work zone. The fence must be properly anchored but cannot be bolted or attached in any similar manner into the roadway. Light debris mesh shall be used when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.
2. **Roadway Facing Side:** Must have either jersey barriers or equivalent NCHRP 350 certified water filled barriers on the roadway side. Barriers are to have reflectors placed in accordance with DDOT traffic control standards.
3. **Width:** Must maintain a minimum of 5 feet unobstructed width; where practical DDOT's preference is 6 feet unobstructed width.
4. **ADA Compliance:** Must provide ramp to comply with ADA access requirements. The ADA requirement for pitch side-to-side does not have to be met in the case of temporary open walkways in the roadway.
5. **Floor:** If required due to an uneven surface, the roadway shall be leveled using asphalt patching. Temporary metal plates are not to be used at any point as the floor of an open walkway in the roadway.
6. **Directional Signs:** Must provide proper signage (MUTCD-compliant) which directs pedestrians to a particular pathway.
7. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

## Complete Closure of the Sidewalk

1. **Directional Signs at Crosswalks:** Provide MUTCD-compliant signs at nearest crosswalk on both sides of the work zone notifying pedestrians the sidewalk is closed ahead and directing them to cross.
2. **Signs at Ends of Work Zones:** Provide MUTCD-compliant signs at ends of work zone notifying pedestrians of sidewalk closure.
3. **Audible Signals:** DDOT encourages the contracting and development communities to use audible signals at the approach sides of a sidewalk closure. Audible signals alert pedestrians with visual impairments that the sidewalk is closed ahead. Audible signals are not a requirement of sidewalk closures.
4. **Special Approval:** When closing a sidewalk adjacent to a roadway with more than two travel lanes and where at least one end of the sidewalk closure is more than 150 feet from the nearest signalized crosswalk, the Traffic Control Plan showing the closure of the sidewalk requires the written approval of the District Department of Transportation Pedestrian Program Coordinator or work zone technician assigned to review the traffic control plan.
5. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

## Pedestrian Protection by Phase of Construction

| Phase of Construction                   | Pedestrian Protection         |                              |                            |                           |                  |
|---|-------------------------------|------------------------------|----------------------------|---------------------------|------------------|
|   | Covered Walkway<br>-Sidewalk- | Covered Walkway<br>-Roadway- | Open Walkway<br>-Sidewalk- | Open Walkway<br>-Roadway- | Sidewalk Closure |
| Raze                                    |                               |                              |                            |                           | P                |
| Facade Demolition                       | 2†                            | 2†                           |                            |                           | P                |
| Sheeting & Shoring<br>& Excavation      | P*                            | 2*                           | P*                         | 2*                        |                  |
| Concrete or Steel<br>Frame Construction |                               | P                            |                            |                           | 2                |
| Skin or Façade<br>Construction          |                               | P                            |                            |                           | 2                |
| Post Skin                               | P                             |                              | P                          | 2                         |                  |
| Sidewalk and<br>Streetscape Work        |                               |                              |                            | P**                       | 2**              |
| Utility Work or other<br>Work in ROW    |                               |                              |                            | P**                       | 2**              |

**P** = DDOT preferred method

**2** = Next alternative

\* For intermittent closures due to lifting overhead, a flagger should be used at both ends of the walkway

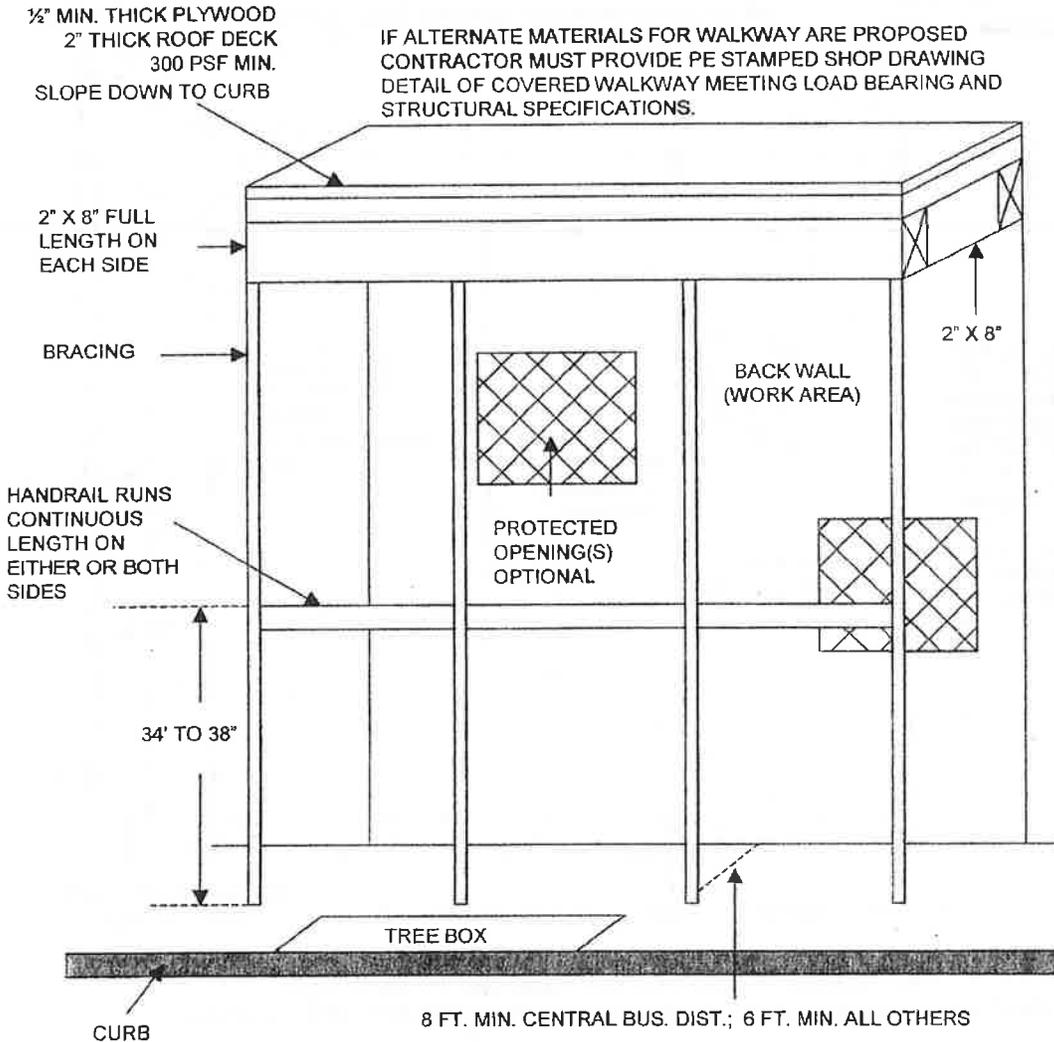
\*\* These closures are expected to last no longer than 4 to 8 weeks

† When minimal overhead danger is present, covered walkways are the preferred method

**Note:** This represents the general policy of the District Department of Transportation. A site-specific modification is allowed. This request must be submitted in writing along with the traffic control plan and public space permit application; and must explain the modification and the site-specific conditions that require the modification.

# Covered Walkway Standard Drawings

## COVERED WALKWAY STREET SIDE VIEW



IF A STRUCTURAL FLOOR IS INSTALLED THE WALKWAY MUST INCLUDE ADA-COMPLIANT CONTINUOUS RAILINGS AS PER COVERED WALKWAY STANDARDS



LIGHTS (NOT SHOWN) MUST BE INSTALLED ON EITHER THE ROOF OR BACK WALL IN VANDAL-PROOF FIXTURES 8 FEET MIN. FROM THE FLOOR

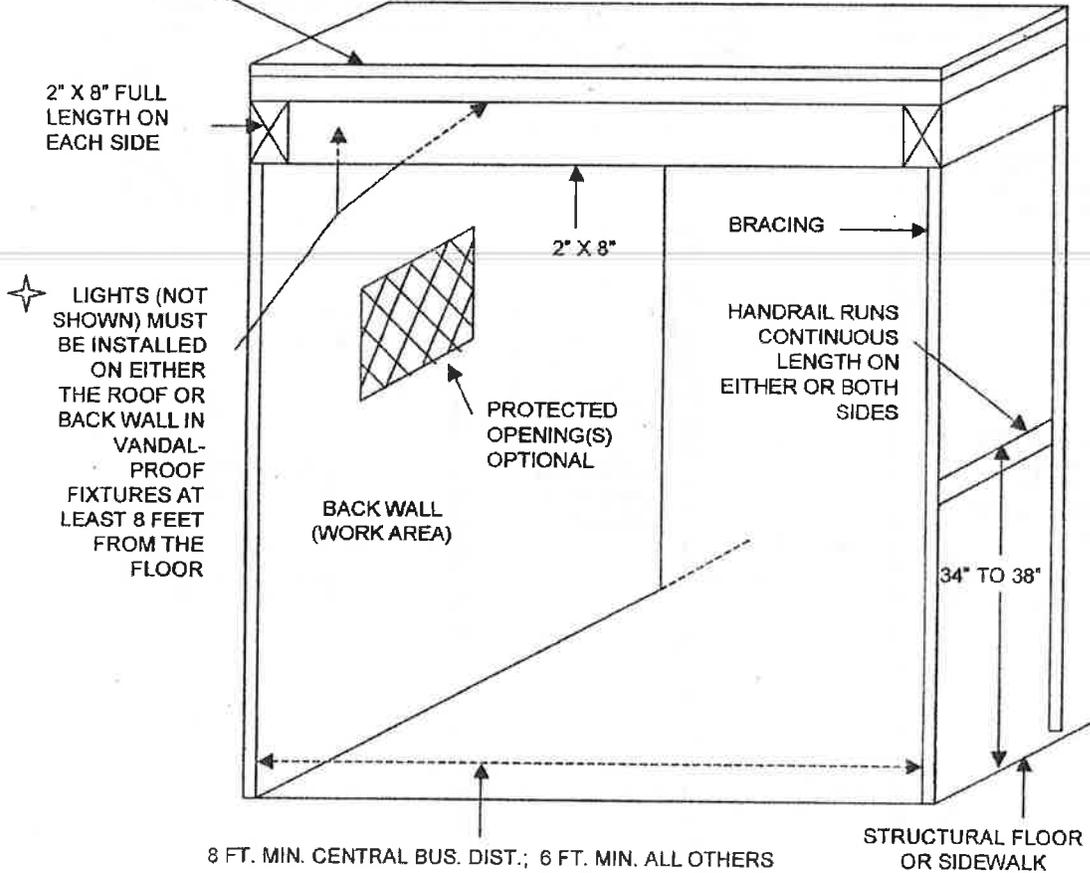
|                                    |
|------------------------------------|
| COVERED WALKWAY - STREET SIDE VIEW |
| APPROVED BY                        |
|                                    |

Ver. 05/07

**COVERED WALKWAY  
SIDEWALK END VIEW**

½" MIN. THICK PLYWOOD  
2" THICK ROOF DECK  
300 PSF MIN.  
SLOPE DOWN TO CURB

IF ALTERNATE MATERIALS FOR WALKWAY ARE PROPOSED  
CONTRACTOR MUST PROVIDE PE STAMPED SHOP DRAWING  
DETAIL OF COVERED WALKWAY MEETING LOAD BEARING AND STRUCTURAL  
SPECIFICATIONS.



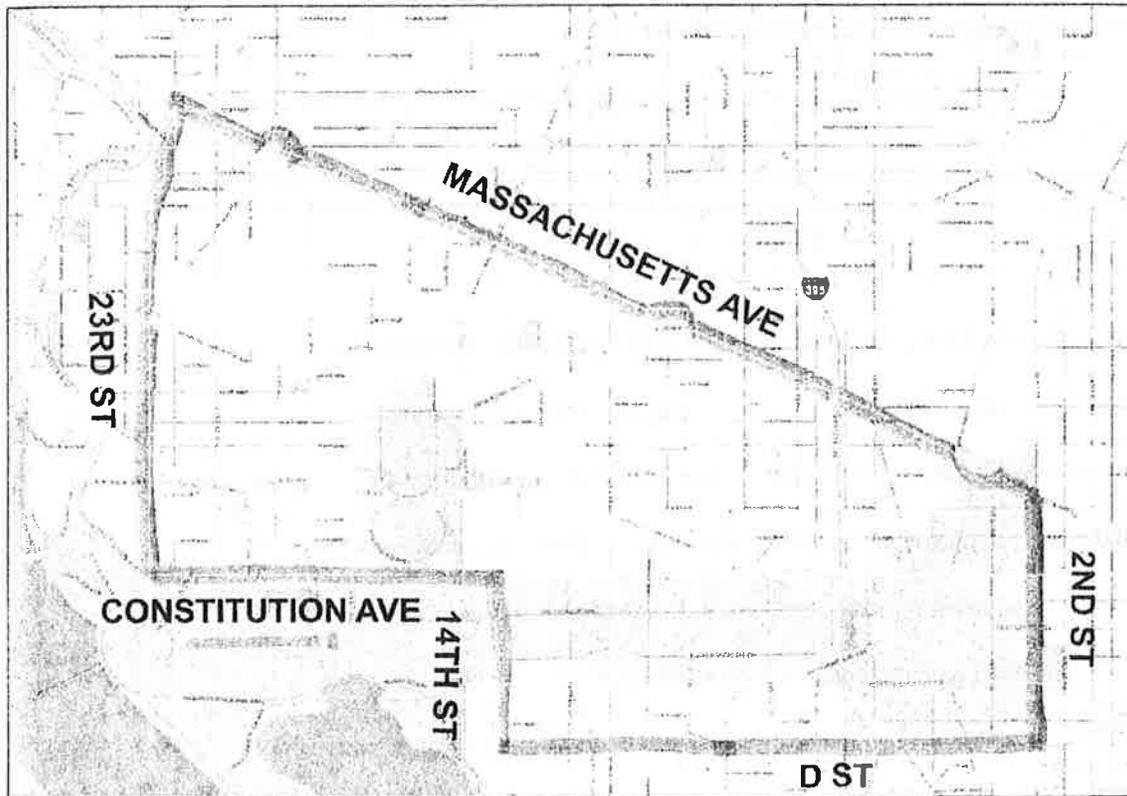
IF A STRUCTURAL FLOOR IS INSTALLED WALKWAY MUST INCLUDE  
ADA-COMPLIANT CONTINUOUS RAILINGS AS PER COVERED WALKWAY STANDARDS

|                                     |
|-------------------------------------|
| COVERED WALKWAY - SIDEWALK END VIEW |
| APPROVED BY                         |

Ver. 05/07

# Central Business District Map

## CENTRAL BUSINESS DISTRICT MAP



**Note:** Covered walkways on the sidewalk shall have a clear unobstructed width of not less than eight feet (8 ft) in the Central Business District and six feet (6 ft) in all other areas.

This section includes surface preparation and field application, of the anti-graffiti coating to the surfaces scheduled and the removal procedure of graffiti from the anti-graffiti coating.

**(A) SUBMITTALS**

**(1)** Technical data sheets, application instructions and material safety data sheets for each coat shall be submitted by the Contractor per the requirements of this section for review and approval from the Chief Engineer.

A color chip of the finish coat, of minimum size 4 inches by 6 inches

Volatile organic compounds, measured in in pounds per gallon.

**(2)** All products, including water repellents, adhesive promoters, base coats, top coats and removal agents for the complete system shall be supplied by the same manufacturer and shall be certified as compatible.

**(3)** All products shall be packaged in substantial containers with each bearing a label on

which shall be precautions for use. Each container shall

contain the date of manufacturer, the batch number and the product designation.

**(4)** The Contractor shall supply detailed written instructions from the coating

Manufacturer on repair procedures, including surface preparation, repair primer, repair intermediate coat, application methods, and any time restrictions. No work will be allowed until these written procedures are submitted to the Chief Engineer.

The written procedures shall be followed.

**(5)** The manufacturer shall have a technical service representative on hand to assist the Contractor the first time that these products are used by the Contractor.

**(C) LABELING AND PACKAGING**

**(1)** All containers shall be listed in accordance with ANSI Standard Z129.1.

**(2)** Label Requirements – The following information shall be listed in clear, legible type on the label of each container, for each product.

**(a)** Product name including component type if applicable.

**(b)** Color name or number of the particular product and component.

**(c)** The lot number or batch number of the product and component.

**(d)** The date of manufacturer of the product and component.

**(e)** The manufacturer's name and complete address.

(f) Shelf life expiration date.

(3) Summary mixing instructions shall be listed on the label of each component or reference the appropriate component which lists the mixing ratio:

(4) Any materials hazardous according to OSHA/EPA regulations shall be listed on the label if they exist in the product in amounts greater than one-tenth of a percent (0.1%) if carcinogenic.

#### **707.12 JOB PERFORMANCE**

(A) **GENERAL.** The coating of new or existing substrates with the anti-graffiti system work shall include complete preparation of the substrates, application and protection of the drying anti-graffiti coatings, protection of workers and the environment and furnishing all labor, materials, tools, scaffolding and other equipment, and incidentals necessary for proper execution of the work.

Elements (Concrete, metal and other surfaces as determined by the Chief Engineer) to be coated shall be indicated on drawings and or as scheduled in this specification section.

(B) **CAPABILITY OF WORKERS** – All shop and field coatings shall be performed by a Contractor / Subcontractor qualified for certification by the Anti-Graffiti Coating Manufacturer.

(1) The Manufacturer's certification shall be obtained and evidence submitted to the District as part of the required submittals for this work. Failure to provide the required Manufacturer's certification(s) shall be grounds for disqualification of the coating Contractor or fabrication shop.

#### **(C) WEATHER CONDITIONS FOR SURFACE PREPARATION AND ANTI-GRAFFITI COATING**

##### **APPLICATION**

(1) Without exception, no outdoor or field coating shall be performed if the ambient, surface and material temperature is below 45°F, or above 95°F without prior written approval of the Chief Engineer, and the Manufacturer.

(2) Surface preparation shall not be performed when the steel surface is below 45°F, within 5°F of the dew point or when anticipated weather conditions would preclude application.

(3) Should the manufacturer's requirements for a particular material be more stringent than this specification, the manufacturer's requirements shall prevail. Application of

coatings outside of normal temperature/humidity recommended ranges as established by the manufacturer shall be rejected as meeting this specification.

**(D) PAINTING SCHEDULE AND CONTRACTOR'S SUBMITTALS.** Before any coating operations begin the Contractor shall submit in writing to the Chief Engineer his proposed work schedule which shall include:

**(1)** A systematic procedure or plan for coating operations.

**(2)** The Contractor shall also submit a written program for worker protection.

**(3)** The type and method of protection against spatters drippings, and other disfiguring elements while coating over roadways, waterways and areas in vicinity of abutments and piers.

**(5)** The Contractor shall provide adequate, portable lighting equipment in fully functional condition, of a design approved by the Chief Engineer, and at no cost to the District Department of Transportation, to supply adequate illumination to the underside of structures while coating and for any inspection.

**(E) INSPECTION**

**(1)** All work shall be inspected by authorized personnel representing the Manufacturer. As each operation (each coat of Anti-Graffiti) is completed and prior to any succeeding operation on a section, the Contractor shall notify the Manufacturer's representative for approval before the beginning of the next operation. Chief Engineer shall have final inspection approval.

**(2)** Any work not meeting approval of the Manufacturer's representative inspectors shall be rejected and redone until it meets their approval. The method of correction shall be approved by the Manufacturer's representative prior to proceeding. Should any work be done which proceeds past the point where inspector approval is required, the Contractor shall, at the option of Manufacturer, remove said work back to that point at no additional cost to the District. The Contractor shall correct work or replace material which is found defective. The method of correction shall be approved by the Manufacturer's representative.

**(3)** Cleaning and surface preparation of each section shall be entirely completed and accepted before coating commences in that section. All coats shall be suitably dry throughout a full section and accepted before any succeeding coat of coating is applied

in that section. Any coating applied without the prior approval of the Manufacturer's representative to begin coating shall be removed as directed by the Manufacturer's representative. This corrective work shall be at the sole expense of the Contractor.

**(4)** When surface preparations are complete, surfaces shall be checked for cleanliness. Cleanliness shall meet the job sample previously established.

**(5)** Dry coating film shall be randomly measured for thickness, and shall be inspected for non-uniform areas, holidays, runs or sags. Areas not meeting specification requirements shall be corrected to the satisfaction of the Manufacturer's representative.

On masonry substrates a destructive test shall be performed.

Two (2) thermometers for measuring the surface temperature of Substrate will be supplied by coating contractor.

Upon completion of the contract, the equipment shall remain the property of the Contractor. Additional methods and equipment may be used for inspection procedures by and at the discretion of the Manufacturer's representative.

**(6)** The Contractor shall furnish all necessary apparatus such as ladders, scaffolds, platforms and lighting as required for the inspector to have reasonable and safe access to all work at times deemed necessary by the Manufacturer's representative for inspection. Rigging shall meet OSHA requirements.

#### **(F) REPAIRS**

**(1)** All defective or damaged areas shall be repaired, at the Contractor's expense. Said areas shall be coated with the full system as required in these specifications. Repair may be limited to touch up of damaged areas but in no way shall the number of coats, the required coating system, or the dry film thickness of each coat be modified because of the repair procedure. Should an area be damaged through to the steel substrate, said area shall receive the specified degree of surface preparation as well as the full coating system as a repair remedy.

#### **(G) MAINTENANCE AND PROTECTION OF HIGHWAY AND PEDESTRIAN**

**TRAFFIC AND ADJACENT PROPERTY.** The Contractor shall be responsible for

any disfigurement by splatters, smirches and splashes of coatings on vehicular traffic and pedestrians, adjacent property and on any portion of the structure or area under the structure. The Contractor shall also be responsible for damage to the structure and adjacent property through the use of scaffolding and other equipment.

Proper drop cloths shall be required to minimize splatters of coatings on concrete surfaces.

Any damage or disfigurement shall be replaced or cleaned at the sole expense of the Contractor.

### **707.13 ENVIRONMENTAL PROTECTION**

#### **(A) PROTECTION OF WORKERS AND THE ENVIRONMENT.**

**(1)** Protection of workers and of the environment shall be provided by the Contractor as an integral requirement of the performance of the work. The Contractor shall employ the best current methodology for protection of the worker/employee and the environment by containment of all hazardous material in consideration of the following:

The release of volatile organic compounds (VOC's) and isocyanates during painting.

Protection of workers to prevent exposure to hazardous waste, VOC's, isocyanates, and any other compound deemed hazardous by the jurisdictional agencies.

U.S. Environmental Protection Agency (EPA), U.S. Occupational and Health Administration (OSHA), and District of Columbia Department of Health (DOH) requirements and guidelines pertaining to all of the above.

**(2)** The VOC regulations on bridge projects in the District of Columbia are subject to the Federal Rules for National Volatile Organic Compound Emissions Standards for Architectural Coating, published September 11, 1998 by the Environmental

Protection Agency, and its subsequent amendments. The D.C. Department of Transportation will not restrict the application of coatings for architectural, industrial and maintenance purposes on bridge structures to the limits of Section 700 of 20 DCMR. Coatings and paints with VOC contents that comply with the Federal

Standards would not be subject to the limits of Section 700, 20DCMR.

The Contractor shall obtain all recent Federal Regulations and shall follow the restrictions therein for painting operations.

The Contractor, with the assistance of the D.C. Department of Transportation, shall obtain a permit from DOH to engage in blast cleaning and painting operations.

Applicable portions of DCMR Title 20 Section 605 are as follows:

#### *700 ORGANIC SOLVENTS*

The Contractor is encouraged to minimize organic solvents discharged by using low VOC rated coatings for the specified paint system.

It is recommended that the Contractor obtain a complete copy of DCMR 20 prior to preparation of bids. Publications may be purchased by mail or in person from:

D.C. Office of Documents and Administrative Issuances

One Judiciary Square, Room 520

441 4th Street, N.W.

Washington, D.C. 20001

**(F) CONTRACTOR'S METHODS.** The methods proposed by the Contractor shall be approved by the Chief Engineer before work may proceed. Approval by the Chief Engineer does not relieve the Contractor of any responsibility for meeting all Federal, State and local regulations on air quality, water quality, hazardous materials, hazardous waste, public health or the laws of any regulatory agency.

**(G) MEETINGS.** The Contractor, with the Chief Engineer in attendance, shall hold meetings to inform all workers of the potential safety and health hazards of this work and what steps are being taken to reduce the risk of contamination, and to give instructions in the use of protective equipment. The protection of the workers and the environment and the recovery, transportation and disposal of hazardous waste shall be of the utmost importance.

#### **707.14 COATING SYSTEMS**

##### **(A) DESCRIPTION**

- A. Non-Sacrificial Permanent Coating, Consisting of Primer/Base Coat (if required by Manufacturer), Intermediate Coat(s) (if required by Manufacturer) and Top Coat. The base coat shall be a transparent/clear coating, The Top Coat shall be available in a transparent/clear coating and available in a fully pigmented coating and available in dead flat, semi-gloss, and gloss finishes; the Colors and Sheen to be selected by the Chief Engineer. Top Coat shall be a two part A and B System.

**(B) QUALITY ASSURANCE**

- A. Applicator Qualifications: Engage Manufacturer to provide a Manufacturer's certified applicator who has completed anti-graffiti coating system applications similar in material and extent to those indicated for Project, and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain base coatings, top coatings, and removal agent from the same manufacturer.

**(C) ANTI-GRAFFITI PERFORMANCE REQUIREMENTS**

Anti-graffiti coatings shall comply with the following:

- A. Provide anti-graffiti coating system complying with the following:
1. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings. Coatings shall have capability of being applied to multiple surfaces (Metals, Masonry, Concrete).
  2. Show no signs of deterioration or change of appearance after graffiti removal, No ghosting staining or shadowing.
  3. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.
  4. Upon graffiti removal, no evidence of graffiti shall remain.
  5. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.
  6. Shall not increase dirt pick-up of substrate.
  7. Meet the following test results for the following chemicals:

|                        |                        |
|------------------------|------------------------|
| a. MEK                 | No effect after 5 days |
| b. Carboxylic Acid     | No effect after 5 days |
| c. 75% Phosphoric Acid | No effect after 5 days |
| d. 37% HCL             | 3 hours blister        |
| e. 50% Sulfuric Acid   | No effect after 5 days |
| f. 20% NIT             | 68 hours blister       |

**(C) GRAFFITI REMOVAL.** Provide Graffiti Remover from Manufacturer, Supply 5 Gallons per every 5,000 square feet. Package Graffiti material in unopened, factory sealed containers and identified with labels describing contents. Container sizes: 55 gallon drum, 5 gallon pals, 1 gallon pal, or 1 case (12, 16 ounce bottles).

**2.2 ANTI-GRAFFITI COATING MATERIALS**

- A. VOC Classification: Provide materials that comply with the South Coast Air Quality Management District's VOC classification. Top Coats shall have a VOC level less than 50.
- B. Coatings shall meet requirements of the following:
1. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours).
  2. ASTM D 530 (hardness)

3. ASTM D 412 (tensile strength and elongation)
4. ASTM D 522 (pass 3/8 inch mandrel)
5. ASTM 968 (abrasion test)
6. ASTM E 96 (vapor transmission)
7. Water clear, non-yellowing, free of waxes and urethanes.
8. Shall allow moisture vapor transmission.

- C. Primer/Clear Base Coat; a water-based high performance under coating used as sealer. Water Repellant Capable of blocking penetration of water, and intermediate coats capable of adding coating adhesion to substrate.
- D. Top coatings: Two Part A and B permanent anti-graffiti top coating.
1. Clear Finish: Clear Flat [Flat is defined as the finish of the top coating reading less than five degrees on a Gardner Gloss Meter] or Clear semi-gloss or Clear gloss.
  2. Pigmented Finish: Pigmented Flat or Pigmented semi-gloss or Pigmented gloss.
- E. Graffiti Remover: Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment.

**(D) PREPARATION OF PAINT.** All paint shall be used directly from original shipping

containers without any additions or thinning except Manufacturer's Water Repellents/Silane/Siloxane Series.

Sealers as directed by Manufacturer shall be clear: All ingredients in any container of paint shall be thoroughly field mixed before

use and agitated often enough during application to keep the pigment in suspension paint first shall be mixed in the original container and not transferred until all settled pigment is incorporated into the vehicle. However, a portion of the vehicle may be poured off temporarily to simplify mixing.

**CLEAR ANTI-GRAFFITI COATING APPLICATIONS**

NOTE: Prior to the application of the Top finish coat (s) a determination must be made by the Manufacture's representative concerning the base coatings required on the substrate (Metals, Masonry, Concrete, Etc).

Step 1: Apply Water Repellent and or adhesion alternatives to all Masonry Substrates (If required by Manufacturer).

Step 2: Apply Primer/ Base Coat (Barrier Coat) to create a Pin-Hole free substrate. Primer/Base Coat through bucket strainer. Any solid material captured in the staining process should reintroduce to the material by squeezing through the strainer. Box 5 to 7 times. Apply Primer/Base Coat with an air-less sprayer equipped with a 5-17 tip. When applying base coat ensure that enough material is applied sot that there is a bluish hue to the substrate. This insures (per coat) that enough of the Primer/Base product has been applied to the substrate. Back roll only to remove bluish hue, do not over work base coat. If second coat is required repeat the process only after first coat has dried leaving the substrate in its original aesthetic form. (Wet-look to be gone).

Step 3: Apply Top coat over Primer/ Base Coat no sooner than 24 hours and no longer than 48 hours after Primer/Base Coat application.

A: Prior to the application of the Top Coat(s) a determination must be made concerning the Primer/ Base coatings required on the substrate.

B: Once step A is complete mix Top Coat Part A to insure proper solution uniformity. Some solids in Part A may settle which need to be thoroughly mixed into a homogenous mixture before the introduction of the Part B component.

C: Pour contents of the Part B component in the container of Part A. Mix components for 3 to 5 minutes by drill blade at a slow steady pace until a homogeneous solution is achieved.

D: Apply one coat of Top Coat solution in a crosshatch pattern. One vertical pass and one horizontal pass are considered crosshatching and are considered one coat. When spraying, keep the spray gun 10 to 12 inches from the substrate and the application pressures just high enough to create an efficient fan. High pressure will result in over atomization of the product, possibly having negative effects, a reduced trans efficiency rate, and create unnecessary amount of over spray. Make sure to overlap the previous pass by 40% -50%. This will eliminate flash line and improve appearance. Back rolling of all coats of the Top Coat may be necessary.

E: After Step 4, allow coating to dry to the touch, yet still tacky, then apply second coat of finish coat if necessary.

F: Top Coat should be applied at a 3.5 mils - 4.0 mils dry (7.0 - 9.0 mils, wet) per coat to achieve optimal performance.

7: Do a test sample prior to application. The test sample will confirm appearance, compatibility coverage, and color. A sign off and approval sheet should be completed prior to final application. Chief Enigeer to sign off the Approval Sheet.

8: Allow Top Coat to cure for minimum of 7 days prior to removal of graffiti.

### **PIGMENTED ANTI-GRAFFITI COATING APPLICATIONS**

**NOTE:** Prior to the application of the Top finish coat (s) a determination must be made by the Manufacturer's representative concerning the base coatings required on the substrate (Metals, Masonry, Concrete, Etc).

Step: 1: Apply Water Repellent and or adhesion alternatives to all Masonry Substrates. (A Block Filler compatible with solvent based top coat may be required).

Step 2: Apply block filler compatible with solvent top coat as needed to create a pin-hole free substrate.

Step 3: Apply Pigmented Top Coat a minimum of 24 hours.

B: Once step A is complete mix Top Coat Part A to insure proper solution uniformity. Some solids in Part A may settle which need to be thoroughly mixed into a homogenous mixture before the introduction of the Part B component.

C: Pour contents of the Part B component in the container of Part A. Mix components for 3 to 5 minutes by drill blade at a slow steady pace until a homogeneous solution is achieved.

D: Apply one coat of mixed solution in a crosshatch pattern. One vertical pass and one horizontal pass are considered crosshatching and are considered one coat. When spraying, keep the spray gun 10 to 12 inches from the substrate and the application pressures just high enough to create an efficient fan. High pressure will result in over atomization of the product, possibly having negative effects, a reduced trans-efficiency rate, and create unnecessary amount of over spray. Make sure to overlap the previous pass by 40% -50%. This will eliminate flash lines and improve appearance

F: The Pigmented Top Coat should be applied at a 3.5 mils - 4.0 mils DMT (7.0 - 9.0 mils, WMT) per coat to achieve optimal performance.

7: Do a test sample prior to application. The test sample will confirm appearance, compatibility coverage, and color. A sign off and approval sheet should be completed prior to final application. Chief Enigeer to sign off the Approval Sheet.

8: Allow Pigmented Top Coat to cure for minimum of 7 days prior to removal of graffiti.

Mixing in open containers shall be done in a well-ventilated area away from sparks or flames.

All varsol, turpentine and any other solvents shall be stored at least 300 feet away from

any paint being stored in previously opened containers, paint being mixed, and paint

operations. Any paint which becomes mixed or contaminated with any such varsol,

turpentine, solvents, or any other foreign substance shall be rejected on this basis alone and immediately removed from the work area to the satisfaction of the Chief Engineer.

#### **707.15 SURFACE PREPARATION**

##### **(A) STANDARDS FOR SURFACE PREPARATION**

**(B) CLEANING OF PREPARED SURFACES.** Prior to application of each coat, the surfaces to be painted shall be cleaned as necessary so as to be dry and free of dirt, grease and oil or any other contamination.

#### **707.16 GENERAL REQUIREMENTS FOR PAINT APPLICATION**

**(A) GENERAL.** All paint shall be applied in accordance with the Manufacturer's Specifications and Application Instructions.

**(D) STORAGE AND MIXING OF PAINT.** All paint shall be stored, mixed, and applied in accordance with the manufacturer's recommendations. In cases when the manufacturer's recommendations differ from the requirements specified herein, those which are more stringent shall govern. In cases where manufacturer's recommendations are more lenient than the requirements in this specification, they shall govern only if specifically authorized by the Chief Engineer. All paint shall be mixed as recommended by the manufacturer.

##### **(I) APPLICATION METHODS.**

**(2) AIRLESS SPRAY APPLICATION.** The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied, and shall be equipped with suitable pressure regulators and gauges. The equipment shall be maintained in proper working condition. Paint ingredients shall be kept uniformly mixed in the spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary. Fluid tips shall be of proper orifice size and fan angle, and the fluid control gun of proper construction, as recommended by the manufacturer of the material being sprayed and the equipment being used. Fluid tips shall be of the safety type with shields to prevent penetration of the skins by the high pressure stream of paint. The air pressure to the paint pump shall be adjusted so that the paint pressure to the gun is proper for optimum spraying effectiveness. This pressure shall be sufficiently high to properly atomize the paint. Pressures considerably higher than those

necessary to properly atomize the paint should not be used.

Spraying equipment shall be kept clean and shall utilize proper filters in the high pressure line so that dirt, dry paint, and other foreign material are not deposited in the paint film. Any solvents left in the equipment shall be completely removed before applying paint.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern. During application, the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface.

The trigger of the gun should be released at the end of each stroke.

All runs and sags shall be brushed out immediately or the coating shall be removed and the surface repainted. Paint shall be suitable for the particular spray application method used.

Particular care shall be observed with respect to paint temperature and operating techniques in order to avoid deposition of paint which is too viscous, too dry, or too thin. Airless paint spray equipment shall always be provided with an electric ground wire in the high pressure line between the gun and the pumping equipment. Further, the pumping equipment shall be suitably grounded to avoid the build-up of any electrostatic charge on the gun. The manufacturer's instructions shall be followed regarding the proper use of the equipment.

**(3) BRUSH APPLICATION.** Brushes shall be of a style and quality that will enable proper application of coatings. The brushing shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Coatings shall be worked into all crevices and corners where possible. All runs or sags shall be brushed out. There shall be a minimum of brush marks left in the applied paint. Surfaces not accessible to brushes shall be painted by spray, daubers, or sheepskins.

**(4) ROLLER APPLICATION.** Roller application may be used on flat or slightly curved surfaces and shall be in accordance with the recommendations of the paint manufacturer and roller manufacturer. Paint rollers shall be of a style and quality that will enable proper application of paint having the continuity and thickness

required. Roller application shall not be used on irregular surfaces.

## **PERFORMACNE CRITEREAMEASURE AND PAYMENT**

### **707.17 MEASURE AND PAYMENT**

The unit of measure for Anti-Graffiti Coatings will be per Square Foot.

Anti-Graffiti Coatings will be paid for at the contract unit price per Square Foot for the accepted items in the Schedule of Prices, which payment will include all cleaning and preparation of the surfaces, application and protection of drying coats, repair of damaged or unsatisfactory coats, application of substrates, protection of all portions of structure or structures against any disfigurement and against any physical damage, protection of and access to adjacent property, environmental protection, and furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work as specified herein.

***END Section***

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structures against any disfigurement and against any physical damage,

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***END Section***