

## Design Guidance for Pervious Pavement Utilizing Permeable Pavers

4/1/2019

### Considerations when determining proposed locations:

- Suitable on Priority 3 streets (Snow/ice treatment considerations).
- Suitable for “protected” parking lanes only on Priority 1 & 2 streets (Protected meaning the parking areas include bump outs/curb extensions on each end of parking area).
- Permeable paver areas shall extend for the full length of each block where added.
- Pavers are not permitted within intersections (including alleys) and should not encroach into crosswalks.
- Existing brick streets shall not be removed and replaced with permeable pavers.
- Permeable pavers cannot be installed as sidewalks in ROW.
- Private projects cannot use ROW for private BMP's, including pervious pavements.
- Installation of pervious pavement utilizing permeable pavers will place the street into a “No open cut for 5 years after completion” category. Consider any possible future work in pavement and expected future development.

### Considerations for areas adjacent to proposed locations:

- Standard Construction Drawing 2179 requirements will dictate what is allowed immediately adjacent to pervious pavement section- influence line of pavement will need to be maintained.
- Consideration of root barriers shall be made where tree root system may be likely infiltrate the stone storage portion of the pervious pavements.
- Tree lined streets are not ideal due to leaf debris clogging pervious pavements creating need for excessive cleaning to keep system functioning as intended.

### Requirements:

- Permeable paver systems must be designed to meet structural (traffic loading) and hydraulic requirements with the thicker of the sections used for the project. Pavement structural design calculations must be submitted for non-residential streets. The pavement structural design shall use the AASHTO equations (ODOT's pavement design methodology preferred) or approved method. See below for specific structural design parameter information. The structural design shall be submitted for review and approval by the Department of Public Service, whereas, the hydraulic design shall be reviewed and approved by the Department of Public Utilities, Division of Sewage and Drainage. The minimum structural design thickness for the aggregate sub-base (No. 2 or 4 Stone) is 27 inches for residential and non-residential streets.

## Typical Permeable Pavement Design Parameters:

### a. Permeable Paver Design-Recommended Structural Layer Coefficients:

- i. Paver and No. 8, 9, or 89 stone bedding layer = 0.30/inch
- ii. No. 57 Stone Base = 0.09/inch
- iii. No. 2 or 4 Stone Base = 0.06/inch

- Pavement calculations shall be submitted to DPS for review. Refer to residential and non-residential pavement design policies to determine the minimum thickness of pavement section. Where guidance for permeable pavement minimum thickness is not found in those policies, use a minimum of 27" of No.2 or No.4 stone storage below the Cellular confinement system.
- Typical line items needed for permeable pavement in addition to SS 1525/SS 1501- CMSC 204 and 203.
- Perimeter of permeable pavers shall be restrained on all sides. Curb, Straight 18" may be used on the longitudinal edge of pavement. Concrete edge restraints as detailed in the SS-1525 "Design Information" shall be used on transverse and longitudinal separations between conventional and permeable pavement within the roadway.

## Consider Scoping and Early Coordination:

- Submit plans as early as possible to private utility owners in the area to allow them to determine if relocations will need to happen.

## Utilities:

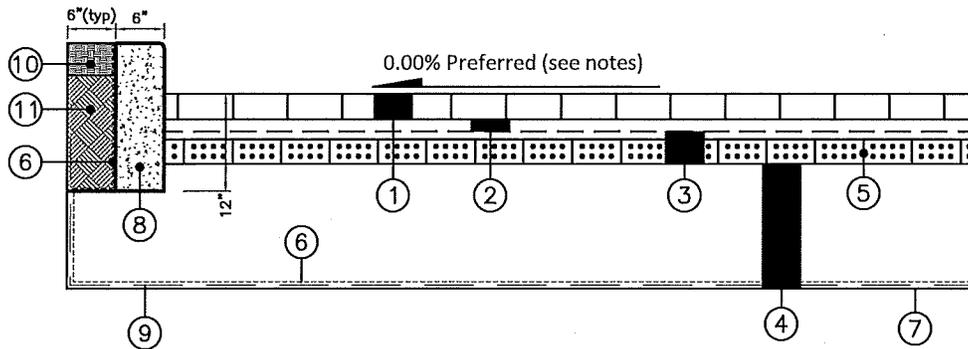
- What preemptive utility work will need to be done when a road is proposed become a permeable pavement?
- Columbia Gas has been doing double mains.
- Impermeable liner- designer determines the need, usually based on buildings close to the work and preventing stored water from entering basements.
- DOSD recommends keeping catch basins if they were existing, does not add new ones.

## Consider Maintenance of Traffic:

- All limits of work and durations shall be clearly defined in plan notes.
- Consider availability of alternative parking and distance travelled by residents when not permitted in their drives.
- Consider options when properties with alley access.
- Pedestrian path must be provided for access to properties.
- Work areas shall be maintained to protect the public and property in connection to the work.

## Traffic Control:

- Consider need for pavement markings.
- Colored brick cannot be used for pavement markings.



- ① ITEM 1525 - PERMEABLE PAVERS (T=\_\_\_") (INCLUDE WITH PERMEABLE PAVER ROADWAY FOR PAYMENT)
- ② ITEM 1525 - AGGREGATE SETTING BED, NO. 8 STONE (T=1 1/2") (INCLUDE WITH PERMEABLE PAVER ROADWAY FOR PAYMENT)
- ③ ITEM 1525 - AGGREGATE BASE, NO. 57 STONE (T=4")
- ④ ITEM 1525 - AGGREGATE SUB-BASE, NO. 2 OR 4 STONE (T=\_\_\_")
- ⑤ ITEM 1525 - CELLULAR CONFINEMENT SYSTEM (T=3")
- ⑥ ITEM 1525 - SUBGRADE STABILIZATION GEOTEXTILE
- ⑦ ITEM 204 - SUBGRADE COMPACTION
- ⑧ ITEM 609 - CURB, STRAIGHT 18"
- ⑨ ITEM 1525 - GEOMEMBRANE PVC LINER (OPTIONAL)
- ⑩ ITEM 653 - TOPSOIL FURNISHED AND PLACED (4" MIN)
- ⑪ ITEM 203 - EMBANKMENT

**NOTES:**

1. PERMEABLE PAVERS CAN BE CITY APPROVED 3 1/8" TALL CONCRETE PAVERS OR 2 3/4" TALL CLAY PAVERS.
2. WHEN USING STANDARD CURB SECTIONS INCLUDING GRANITE, SANDSTONE, OR COMBINATION CURB & GUTTER, NON-PERFORM 4" UNDERDRAINS.
3. PAVEMENT CROSS SLOPE CAN BE SLOPED OR FLAT WITH MAXIMUM SLOPE PER CITY OF COLUMBUS STANDARD ROADWAY DRAWINGS. A FLAT CROSS SLOPE IS PREFERRED. CROWNED SECTIONS ARE NOT RECOMMENDED. WHEN TRANSITIONING FROM A FLAT CROSS SLOPE INTO AN EXISTING CROWNED STREET, THE TRANSITION SHALL OCCUR IN THE PAVER SECTION WITH A MINIMUM TRANSITION LENGTH OF 20-FEET.
4. MINIMUM THICKNESS OF AGGREGATE SUB-BASE FOR STRUCTURAL CONSIDERATIONS TO BE DETERMINED BY CITY OF COLUMBUS PAVEMENT DESIGN POLICIES. THICKER SECTIONS MAY BE NEEDED FOR HYDROLOGIC REASONS.
5. AFTER THE CURB IS PLACED/SET, WRAP GEOTEXTILE OVER AGGREGATE AND AGAINST BACK OF CURB TO ALLOW FOR SOIL BACKFILL BEHIND CURB AND HELP PROTECT SOIL FROM MIGRATING INTO AGGREGATE BASE.
6. GEOMEMBRANE PVC LINER IS OPTIONAL AND TYPICALLY USED TO PROTECT AGAINST SEEPAGE INTO ADJACENT BUILDING FOUNDATIONS, BASEMENTS, OR UTILITIES. THE LINER CAN ALSO USED TO CREATE VERTICAL BARRIERS TO SLOW THE MOVEMENT OF RUNOFF THROUGH THE SYSTEM.
7. TYPICAL PAVER THICKNESS IS 3 1/8" FOR CONCRETE PAVERS AND 2 3/4" FOR CLAY PAVERS
8. TYPICAL CELL HEIGHT FOR CELLULAR CONFINEMENT SYSTEM IS 3", INCREASED HEIGHTS MAY BE USED WHEN NEEDED FOR INCREASING THE STRUCTURAL STRENGTH OF THE SECTION.

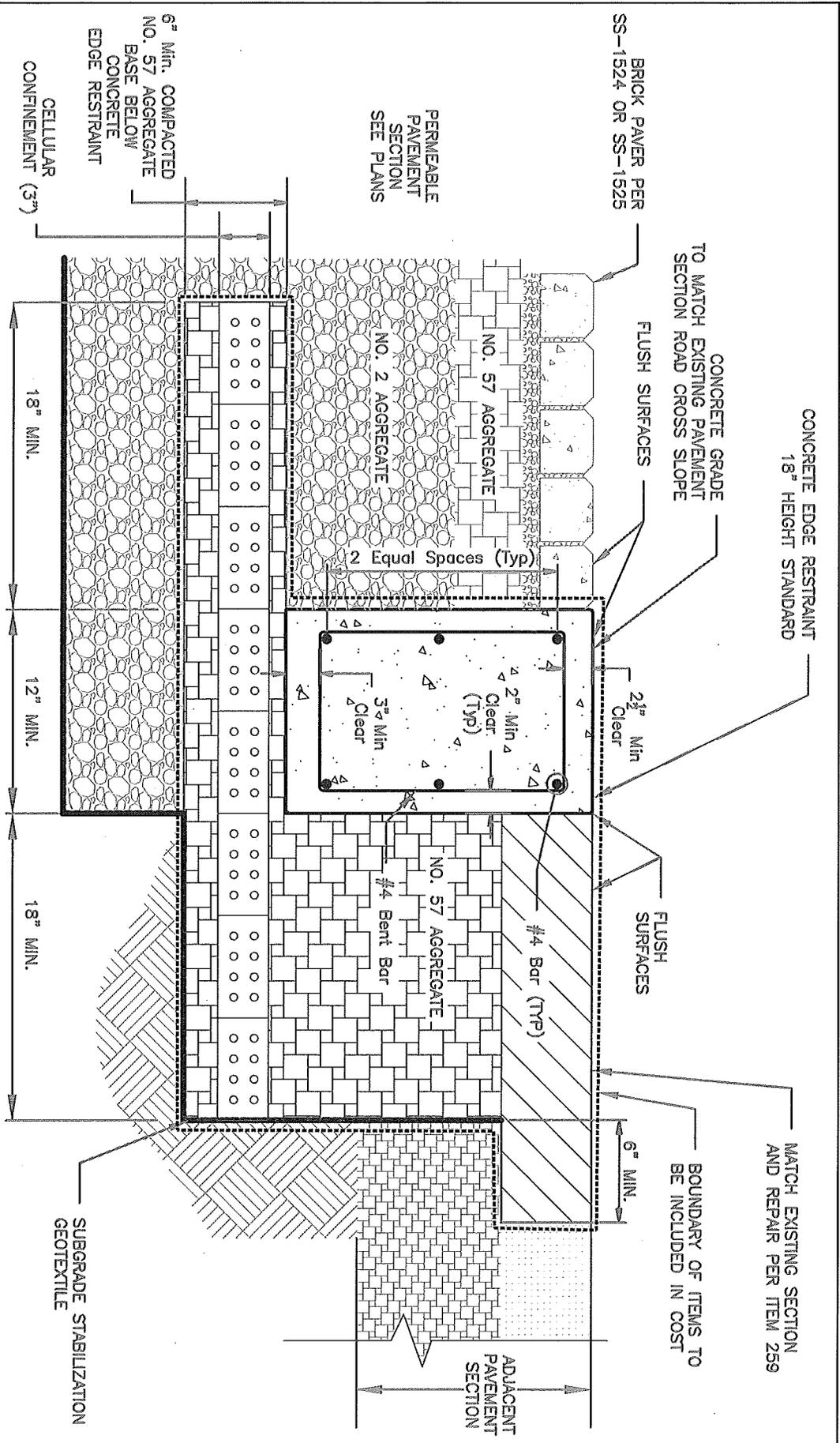
## PERMEABLE PAVER TYPICAL SECTION DESIGN DETAIL

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

4/1/2019

CITY ENGINEER





**PERMEABLE PAVEMENT  
CONCRETE EDGE RESTRAINT  
TYPE 1 - DESIGN DETAIL**

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

4/1/19

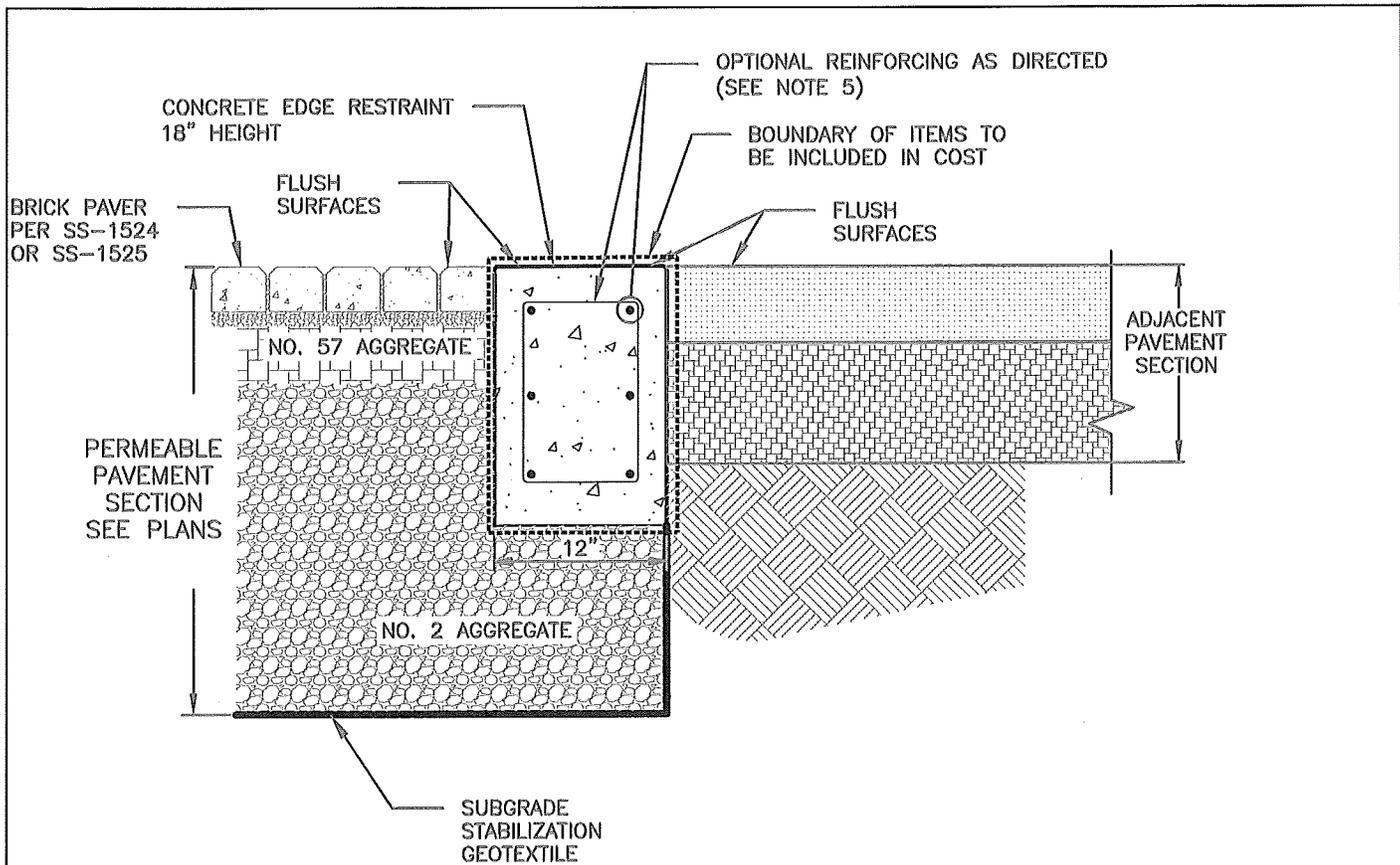
NOTES:

1. THIS CONCRETE EDGE RESTRAINT IS PRIMARILY RECOMMENDED WHEN PERMEABLE PAVEMENT ABUTS EXISTING PAVEMENT PERPENDICULAR TO TRAFFIC FLOW.
2. ALL JOINTS SHALL BE CLEANED AND EDGED. EXTERNAL EDGES SHALL BE 1/4-INCH RADIUS. INTERNAL JOINTS SHALL BE 1/4-INCH RADIUS.
3. ALL SOFT AND YIELDING FOUNDATION MATERIAL BENEATH COMPACTED AGGREGATE SHALL BE REMOVED AND REPLACED WITH 6-INCHES OF ADDITIONAL COMPACTED AGGREGATE
4. SUBGRADE STABILIZATION GEOTEXTILE SHALL BE EXTENDED BETWEEN SUBGRADE AND NEW AGGREGATE BASE AND VERTICALLY BETWEEN NEW AGGREGATE BASE AND OLD ROADWAY BASE
5. PROVIDE CONSTRUCTION/CONTROL JOINT AT CENTERLINE OF PAVEMENT OR OTHER LANE LINES IN WIDER INSTALLATIONS
6. CONCRETE SHALL AT A MINIMUM CONFORM TO CITY OF COLUMBUS CMSC ITEM 511, CLASS COCG.
7. EPOXY COATED REINFORCING STEEL SHALL AT A MINIMUM CONFORM TO CITY OF COLUMBUS CMSC ITEM 509, GRADE 60.
8. MINIMUM REINFORCEMENT, UNLESS OTHERWISE SHOWN, SHALL BE #4 BARS, EACH WAY, AT 12" SPACING. USE OF GALVANIZED (GRADE 60 MIN) WELDED WIRE REINFORCING, PROVIDING AT MINIMUM 0.20 IN<sup>2</sup>/FT OF STEEL, IS PERMITTED IN LEU OF DETAILED REINFORCING.
9. TO BE PAID UNDER ITEM 1525 - PERMEABLE PAVEMENT CONCRETE EDGE RESTRAINT TYPE 1. COST OF CONCRETE, REINFORCING, CELLULAR CONFINEMENT, PAVEMENT RESTORATION PER ITEM 259, NO. 57 AGGREGATE BASE, AND SUBGRADE STABILIZATION GEOTEXTILE AS OUTLINED ABOVE TO BE INCLUDED IN THE PER LINEAR FOOT PRICE OF PERMEABLE PAVEMENT EDGE RESTRAINT TYPE 1.

**PERMEABLE PAVEMENT  
CONCRETE EDGE RESTRAINT  
TYPE 1 - DESIGN DETAIL**

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

4/1/19



**NOTES:**

1. THIS CONCRETE EDGE RESTRAINT IS PRIMARILY RECOMMENDED WHEN PERMEABLE PAVEMENT ABUTS EXISTING PAVEMENT PARALLEL TO TRAFFIC FLOW. EXAMPLES WOULD INCLUDE PERMEABLE PAVEMENT PARKING STALLS ALONG A ROADWAY.
2. ALL JOINTS SHALL BE CLEANED AND EDGED. EXTERNAL EDGES SHALL BE 1/4-INCH RADIUS. INTERNAL JOINTS SHALL BE 1/4-INCH RADIUS.
3. ALL SOFT AND YIELDING FOUNDATION MATERIAL BENEATH COMPACTED AGGREGATE SHALL BE REMOVED AND REPLACED WITH 6-INCHES OF ADDITIONAL COMPACTED AGGREGATE
4. CONCRETE SHALL AT A MINIMUM CONFORM TO CITY OF COLUMBUS CMSC ITEM 511, CLASS COC6.
5. OPTIONAL REINFORCING TO BE INCLUDED AS DIRECTED. REINFORCING TYPE, GRADE, AND SPACING/GEOMETRY SHALL CONFORM THE SPECIFICATIONS OF TYPE 1 PERMEABLE PAVEMENT CONCRETE EDGE RESTRAINT, UNLESS DIRECTED OTHERWISE.
6. TO BE PAID PER LINEAR FOOT UNDER ITEM 1525 – PERMEABLE PAVEMENT CONCRETE EDGE RESTRAINT TYPE 2. ONLY MATERIAL AND COST OF PLACEMENT OF CONCRETE AND REINFORCING STEEL TO BE INCLUDED IN PRICE PER LINEAR FOOT. ALL OTHER ITEMS PAID FOR SEPARATELY.

**PERMEABLE PAVEMENT  
CONCRETE EDGE RESTRAINT  
TYPE 2 - DESIGN DETAIL**

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

4/1/19