

GENERAL POLICY AND PROCEDURE

DEPARTMENT OF PUBLIC SERVICE
TRANSPORTATION DIVISION
CITY OF COLUMBUS, OHIO

SUBJECT: Residential Street Pavement Design **EFFECTIVE DATE:** April 15, 2006
PAGES: 5 **By:** RJB

- I. **Applicability.** This policy shall be applicable to the design of pavement for all public streets included with residential development in the City of Columbus.
- II. **Effective Date.** This policy as revised and effective April 15, 2006 shall apply to all residential roadway engineering drawings submitted to the Public Service Department Transportation Division for initial review after the effective date.
- III. **Limitation on Use.** The use of multiple pavement types for any one class of roadway is not permitted in any section of a given development. A section of a development is defined by the proposed subdivision plat. The roadway class is defined by a range of Ultimate Average Daily Traffic shown in Table 1: Residential Pavement Design Options.
- IV. **Definitions.**
A. Working Day. A working day is hereby defined as any weekday, Monday through Friday that is not a city holiday.
- V. **Provision for Residential Streets Under Review.** This provision shall apply only to those residential street engineering drawings submitted for review prior to the effective date, but not yet approved. If the owner/developer desires to update the engineering drawings under review to comply with this policy, the owner/developer shall submit the required documents with the next plan review submittal to the Transportation Division as explained in the Design section below.
- VI. **Provision for Residential Street Drawings Approved Prior to Revised Effective Date.** This provision shall apply only to those residential streets that have engineering drawings approved prior to the effective date of this policy. The owner/developer may update the approved engineering drawings to comply with this policy if the roadway subgrade has not been constructed (cut or filled) to final elevation.
- VII. **Pavement Design Options.** The City of Columbus has specified pavement designs for residential streets. The designs are categorized by pavement material type, "standard" and "soil-stabilized", and ultimate expected maximum average daily traffic. Refer to Table 1: Residential Pavement Design Options for this information.

Table 1. Residential Pavement Design Options

Average Daily Traffic	Typical Application	Pavement Component	Standard				Soil-Stabilized			
			FD Asphalt	Concrete, 4,000 psi	Composite [†]	Flexible	FD Asphalt	Concrete, 4,000 psi	Composite [†]	Flexible
0 - 500	Typically mini-greens streets and cul-de-sac streets with no future extensions possible	Item 404	1.25		1.25	1.25	1.25		1.25	1.25
		Item 402	1.50		1.50	1.50	1.50		1.50	1.50
		Item 301	5.25			3.25	3.25			3.00
		Item 304				6.00				6.00
		Item 306			5.00 [‡]				5.00 [‡]	
		Item 452		6.00				5.00		
	Constructed Thickness	8.00	6.00	7.75	12.00	6.00	5.00	7.75	11.75	
501 - 1,500	Typically short one to two-block long loop streets with no future extensions possible	Item 404	1.25		1.25	1.25	1.25		1.25	1.25
		Item 402	1.50		1.50	1.50	1.50		1.50	1.50
		Item 301	5.75			3.75	3.75			3.00
		Item 304				6.00				6.00
		Item 306			5.50 [‡]				5.25 [‡]	
		Item 452		6.00				6.00		
	Constructed Thickness	8.50	6.00	8.25	12.50	6.50	6.00	8.00	11.75	
1,501 - 3,500	Typically through streets serving one or more neighborhoods or abutting properties, but no non-residential uses	Item 404	1.25		1.25	1.25	1.25		1.25	1.25
		Item 402	1.50		1.50	1.50	1.50		1.50	1.50
		Item 301	7.25			5.25	4.75			3.75
		Item 304				6.00				6.00
		Item 306			7.00*				6.50*	
		Item 452		7.50				7.00		
	Constructed Thickness	10.00	7.50	9.75	14.00	7.50	7.00	9.25	12.50	
> 3,500	Use ODOT Design Method for Ultimate Design ADT * *									

FD Asphalt = Full depth asphalt on prepared subgrade

Concrete = 4,000 psi strength PCC concrete on prepared subgrade

Composite = 2,500 psi strength PCC concrete base with two-layer asphalt surface, or 3,500 psi strength RCC concrete base with two-layer asphalt surface

Flexible = Asphalt on compacted aggregate base

Item numbers refer to Columbus Construction and Material Specification section

[‡] Item 306 with Class E (Modified) Concrete: Min. 28-day compress. strength of 2,500 psi

* Item 305 with Class E Concrete: Min. 28-day compress strength of 3,000 psi

** Ultimate Design ADT refers to Average Daily Traffic (ADT) with percent trucks breakdown per ODOT for full build-out of development, including through traffic.

Minimum pavement component layers:

Item 404: 1.25 inches

Item 402: 1.50 inches

Item 301: 3.00 inches

Item 304: 6.00 inches

Item 305: 5.00 inches

Item 306: 5.00 inches

Item 452: 5.00 inches

VIII. Pre-Design When Reserving “Soil-Stabilized” Option.

If an owner/developer selects the option of utilizing “soil-stabilized” pavement design, such determination shall be based upon engineering analysis of soil samples obtained from various representative locations within the roadway construction limits throughout the proposed residential development section. The owner/developer shall submit said analysis to the Plan Review Manager for review and concurrence at least ten (10) working days in advance of submitting engineering drawings for review. The analysis report shall include the site map showing locations of soil samples taken, soil type identification, analysis of the soil samples for suitability for soil stabilization, and a recommendation for applicable soil stabilization. Such analysis shall be performed and signed and sealed by an Ohio-registered professional engineer practicing in geotechnical engineering. It is strongly suggested the owner/developer meet with the Transportation Division Construction Materials Manager prior to preparing soils reports. The Transportation Division will provide written notification to the consulting engineer within 5 working days of receipt of the engineering analysis.

IX. Plan Review.

A. General. The owner/developer shall provide with the engineering drawings for review ultimate average daily traffic (ADT) volumes for each street segment in the proposed project. The ADT volumes shall be submitted on an exhibit showing the proposed and existing streets for this and all adjoining developments. Said ADT volumes shall represent full build-out of the project and abutting properties. Streets connecting to existing, planned and future developments shall include full build-out traffic volumes from those developments. The distribution of these ADT volumes shall also be indicated on the exhibit. Residential collector and higher-classification streets in the projects shall include ADT for all through traffic and locally generated traffic. All residential engineering drawings shall have a typical section sheet per Exhibit B. When the final decision on the composition of the typical section has been made, the design consultant will be responsible for notifying the Plan Review Manager and the Private Inspection Services Engineer via electronic mail of the selection. This notification must be received by 12:00 PM, two (2) working days prior to the commencement of paving operations.

B. “Soil-Stabilized” Pavement Design. If the owner/developer has elected the “soil-stabilized” pavement design alternative, the roadway engineering drawings shall show all necessary typical details, plan notes and directions to the contractor specifying the pavement design selected for the project.

X. Construction.

A. General. All pavement and subgrade construction shall comply with the approved engineering drawings and specifications for the project. All applicable sections of City of Columbus Construction and Material Specifications, current edition shall be followed.

B. Selecting “Soil-Stabilized” Pavement Design. Selecting a soil-stabilized pavement design commits an owner/developer to a more rigorous subgrade preparation process than a “standard” pavement design or soil modification. In addition to the notification requirements stated above, the owner/developer shall obtain soil samples approximately 45 calendar days prior to conducting soil stabilization operations. The samples shall be obtained at the depth of the proposed subgrade at representative locations along all residential streets proposed for soil-stabilization. A sufficient number of samples shall be taken to ensure control data (moisture-density field relationship curves), developed in

the laboratory, represent field conditions, and to account for any change in soil type. A mix design shall be submitted for each anticipated soil type. The analysis shall be provided to the Plan Review Manager for review and approval no less than fifteen (15) working days prior to soil stabilization operations. The Transportation Division will provide written approval or rejection of the analysis to the design engineer and Construction Inspection Services section within ten (10) working days after receipt of the analysis. If approved, the consulting engineer must have the plan revised within the previous guidelines of this policy. If rejected, the consulting engineer must address the comments and re-submit the analysis as indicated above. Testing, sampling and construction of stabilized soil subgrade shall be conducted according to the requirements of Supplemental Specification 1503.

XI. Soil Modification. Soil modification shall be defined as an optional mechanical and chemical treatment of a soil subgrade and constructed in compliance with Supplemental Specification 1502 and City of Columbus Construction and Material Specifications. No reduction in the pavement design or any credit to the owner/developer shall be permitted for conducting soil modification. Soil modification is the option of the owner/developer. The owner/developer shall obtain the recommendation of an Ohio-registered professional engineer practicing in geotechnical engineering, and submit the recommendation and laboratory control data to the Plan Review Manager for review and approval at least by 12:00 PM, two (2) working days before commencing soil modification.

XII. Density Testing. Density of asphalt and aggregate layers constructed under this policy shall be tested and verified according to Supplemental Specifications 1501 and 1542.

XIII. Warranty. Pavements listed in Table 1: Residential Pavement Design Options constructed according to this policy shall be guaranteed by the developer/owner for a period not less than two (2) years from date of acceptance of the street. The guarantee period may be extended up to an additional three (3) years for a total of five (5) years, depending on asphalt surface density test results according to Supplemental Specification 1542. When the City requires the warranty period to be extended beyond two (2) years, the developer shall execute and submit to the City Engineer for acceptance using the standard warranty form in Exhibit A. Composite pavements with a single lift of Item 404 constructed under the 2003 version of this policy shall be provided with a two-year warranty, effective from the date of acceptance by the City Engineer.

XIV. Roller Compacted Concrete. The City of Columbus instituted a five-year testing program of Roller Compacted Concrete (RCC) in 2001. Through the end of 2005, a total of 48 projects were approved by the City Engineer for RCC installation. The 2005 construction season comprises the fifth year of the testing program. Based on extensive testing, inspection and monitoring of RCC installations, the City is hereby accepting for unrestricted use Roller Compacted Concrete as a base for residential pavements. The Portland Cement Association has published updated RCC specifications, which are incorporated into Supplemental Specification 1523. RCC training was conducted in 2005 by the City of Columbus to contractors, designers and producers. The City will continue to offer training on a periodic basis. This training shall be a prerequisite for any paving contractor or any producer of concrete not already approved to construct RCC in public roadways. Test sections will be required for all paving equipment not previously approved for RCC installation, and for contractors and concrete suppliers with no RCC installation experience in City of Columbus public roadways.

XV. Reference Materials. Extensive study and analysis was conducted from June, 2001 through January, 2002 by a committee composed of Transportation Division staff; representatives of the building industry, design engineering, and geotechnical engineering communities; and Resource International, Inc., a geotechnical and pavement design consulting firm retained by the City of Columbus. Study reports, graphs, assumptions and other background documents are on file in the office of the City Engineer.

XVI. Revision Notes.

A. May 31, 2005:

1. Updated procedural timeframes and deadlines to reflect experience with policy during 2003 construction season.
2. Added Definitions section.
3. Updated Table 1. Changes to composite pavement options made to reflect experiences during 2003 construction season and ongoing input from various construction industry representatives.
4. Restored 2002 concrete pavement and concrete base thicknesses and 28-day strength requirement for concrete base.
5. Replaced references to "Design & Plan Services Section Manager" with "Plan Review Manager".
6. Updated plan requirements to show all pavement options on the plan and select a pavement option two (2) days prior to paving operations.
7. Deleted Figures 1 and 2.
8. Added Exhibits A and B.

B. April 15, 2006:

1. Added Roller Compacted Concrete for unrestricted use in residential pavements.
2. Corrected numerous typographical, non-substantive errors.

XVII. Revision History.

- July 8, 2002
- February 28, 2003
- May 31, 2005
- April 15, 2006

**EXTENDED WARRANTY
RESIDENTIAL PAVEMENT POLICY**

Whereas, the City of Columbus, Public Service Department, Transportation Division (the "City"), has promulgated Supplemental Specifications 1542 for in-place density of Hot Mixed Asphalt; and

Whereas, _____ is a developer engaged in the installation of new residential streets, in the City of Columbus, which installation is required to meet City specifications.

Now, therefore, in consideration that required densities were not achieved as described above in Supplemental Specifications 1542, _____ agrees to and provides the following warranty:

_____ warrants to the City of Columbus, Public Service Department, Transportation Division, as a condition of nonconformance as defined by Supplemental Specification 1542 at PLAN TITLE & NUMBER, will extend the original pavement warranty period for an additional three (3) years from the date the original two (2) year warranty concludes.

If at any time during the extended period the condition of the pavement becomes unacceptable or needs repair, _____ will, at no cost to the City, repair and/or restore the pavement as required in Table A – titled "Warranty Items and Remedial Actions".

By: _____
Authorized Agent

Warranty Items Coverage: Warranty items and Remedial Actions are specified in Table A. The warranty applies only to the mainline pavement, cul-de-sacs, and eyebrows. The contractor is not responsible for pavement damage beyond his control and the warranty does not apply to structural problems below the pavement placement placed as part of this project, provided the structural problem is not the fault of the asphalt paving contractor.

I. TABLE A – WARRANTY ITEMS AND REMEDIAL ACTIONS

II. Distress Type	Threshold Level (per 0.1 lane mile Segment)	Remedial Action
Cracking (1)	(500) feet of cracks which average over 0.25 inch in width	(4)
Disintegrated Area (2)	None	(5)
Flushing	125 square feet	(6)
Rutting (3)	0.25 inch – mainline 0.50 inch - within 250 feet of an intersection on composite pavement	(5)

(1) This Distress applies to all cracks, except longitudinal cracks above the interface of a rigid base pavement and a flexible pavement, and reflective cracks on a composite pavement. The width of multiple cracks in a 1 foot width area is totaled to determine the width of the crack.

(2) This includes all types of disintegration, including, but not limited to, mix delamination, potholes, and raveling. This includes any type of disintegration that occurs at a joint or crack.

(3) Measure the wheel path with a 4 foot straight edge at 6 locations in a Segment. If one measurement exceeds the Threshold Level, the entire Segment will be measured at 50 foot intervals for each wheel. Remedial

Action is required if six or more measurements exceed the Threshold Level.

To determine the depth of the distressed area, cut a 1 foot by 4 foot slab to a depth necessary to determine the depth of the distress at a maximum of three locations determined by the City Engineer. The slabs will be retained for possible use in any appeal process. Cost of this slab removal and replacement, including construction traffic control, is paid by the Contractor, unless it is determined the rutting is not the Contractor's fault. Remove slabs within 30 days after receiving the results of the yearly review

(4) Blow out with compressed air and seal all the cracks in the Section with Type 1 crack seal in according to 413 for cracks less than or equal to 0.75 inches. Conform to Note 5 of Remedial Actions for cracks greater than 0.75 inches wide or multiple cracks in a 1 foot width area.

(5) Remove and replace the distressed area to the depth needed to repair the distress.

(6) Remove and replace the lane width of the distressed area to a depth needed to repair the distress.

EXHIBIT B-1

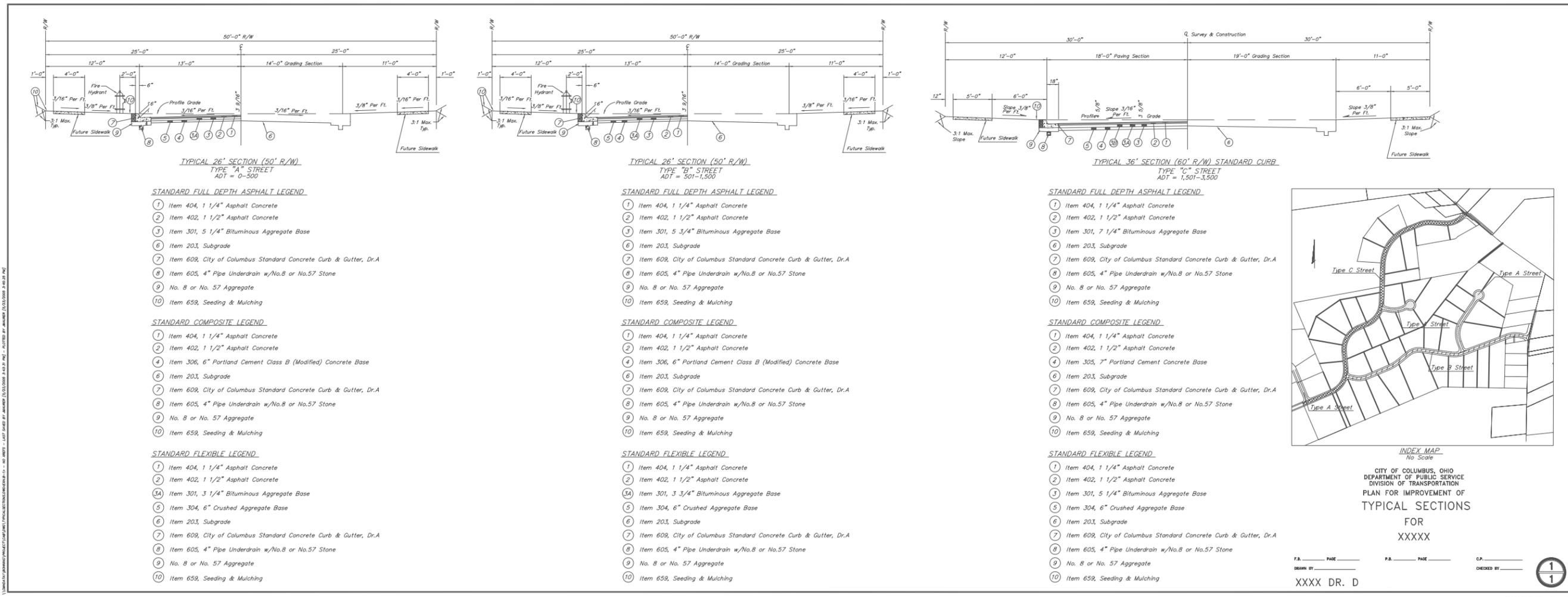
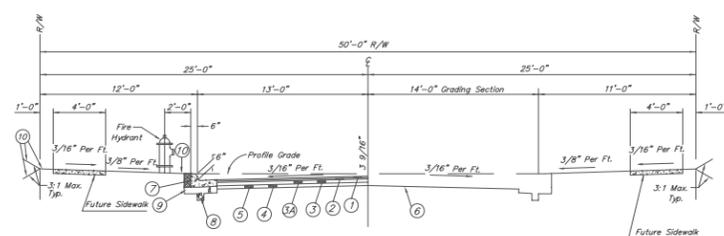


EXHIBIT B-2



TYPICAL 26' SECTION (50' R/W)
TYPE "A" STREET
ADT = 0-500

SOIL STABILIZED FULL DEPTH ASPHALT LEGEND

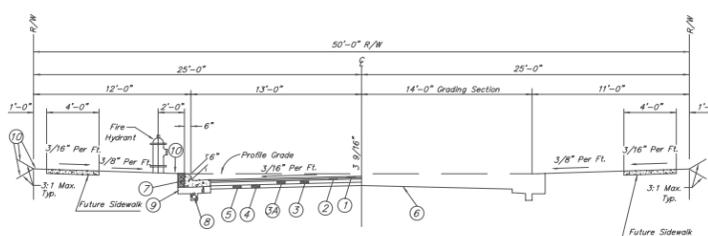
- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3 Item 301, 3 3/4" Bituminous Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED COMPOSITE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 4 Item 306, 6" Portland Cement Class B (Modified) Concrete Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED FLEXIBLE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3A Item 301, 3" Bituminous Aggregate Base
- 5 Item 304, 6" Crushed Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching



TYPICAL 26' SECTION (50' R/W)
TYPE "B" STREET
ADT = 501-1,500

SOIL STABILIZED FULL DEPTH ASPHALT LEGEND

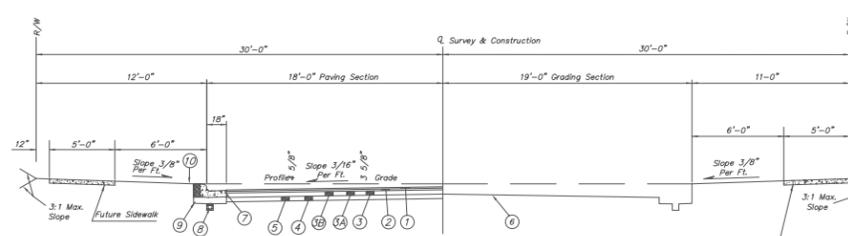
- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3 Item 301, 3 3/4" Bituminous Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED COMPOSITE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 4 Item 306, 6" Portland Cement Class B (Modified) Concrete Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED FLEXIBLE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3A Item 301, 3" Bituminous Aggregate Base
- 5 Item 304, 6" Crushed Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching



TYPICAL 36' SECTION (60' R/W) STANDARD CURB
TYPE "C" STREET
ADT = 1,501-3,500

SOIL STABILIZED FULL DEPTH ASPHALT LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3 Item 301, 3 3/4" Bituminous Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED COMPOSITE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 4 Item 306, 6" Portland Cement Concrete Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching

SOIL STABILIZED FLEXIBLE LEGEND

- 1 Item 404, 1 1/4" Asphalt Concrete
- 2 Item 402, 1 1/2" Asphalt Concrete
- 3 Item 301, 3 3/4" Bituminous Aggregate Base
- 5 Item 304, 6" Crushed Aggregate Base
- 6 Item 203, Subgrade
- 7 Item 609, City of Columbus Standard Concrete Curb & Gutter, Dr.A
- 8 Item 605, 4" Pipe Underdrain w/No.8 or No.57 Stone
- 9 No. 8 or No. 57 Aggregate
- 10 Item 659, Seeding & Mulching



INDEX MAP
No Scale
CITY OF COLUMBUS, OHIO
DEPARTMENT OF PUBLIC SERVICE
DIVISION OF TRANSPORTATION
PLAN FOR IMPROVEMENT OF
TYPICAL SECTIONS
FOR
XXXXX

DESIGN BY: XXXX DR. D

CHECKED BY:

