

Derry Township

Stormwater Management Study — 2nd Phase

December 9, 2008



[BUILDING RELATIONSHIPS.
DESIGNING SOLUTIONS.]

HRG CONTACT INFORMATION

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**BUILDING RELATIONSHIPS.
DESIGNING SOLUTIONS.**

PRIORITY AREA NO. 1 – MILL STREET / CHERRY DRIVE

Drawing No. 1 shows the area where flooding has been experienced along Mill Street and Cherry Drive as a result of runoff from the contributing watershed. There is an existing storm sewer that runs northward under Mill Street and Cherry Drive from Governor Road (Route 322) to a discharge point at the quarry ponds north of the railroad tracks. The contributing drainage area at the quarry discharge point is approximately 1.04 square miles, at Route 422 it is 0.95 square miles, and at the intersection of Governor Road and Cherry Street it is 0.51 square miles. The existing storm sewer system is undersized for the level of development and the amount of impervious cover in the contributing watershed. Peak discharge estimates for the contributing drainage areas are presented in Table 5.

**TABLE 5
PRIORITY AREA NO. 1 – ESTIMATED PEAK DISCHARGES**

STORM RETURN FREQUENCY (YEARS)	PEAK DISCHARGE (CFS) AT GOVERNOR RD.	PEAK DISCHARGE (CFS) AT ROUTE 422	PEAK DISCHARGE (CFS) AT QUARRY
2.33	55	92	98
10	201	274	286
50	437	590	617
100	568	771	806

Our recommendation for this priority area is to install a new storm sewer parallel to the existing storm sewer with inlets and pipes of sufficient supplemental capacity so that together, the existing and proposed system can handle the 50 year return frequency storm event. The proposed solution also includes installing a storm sewer along Chestnut Avenue to reduce street and property flooding along Chestnut Avenue and Hillcrest Road. Drawing No. 1 illustrates the approximate alignment of the new storm sewer system. The existing storm sewer ranges in size from 24 inches to 60 inches at the quarry outfall. Assuming an average proposed system slope of 1.0 percent, the new pipe diameters would be as shown in Table 6.

**TABLE 6
PRIORITY AREA NO. 1 – RECOMMENDED PIPE SIZES**

LOCATION	PIPE SIZE (INCHES)
Governor Road to Cedar Avenue	30
Cedar Avenue to Route 422	48
Route 422 to Quarry Outfall	60


The system from the intersection of Governor Road and Cherry Drive to the outfall at the quarry pond would be approximately 6,500 feet long. Another 4,000 feet of sewer would be needed on Greenlea Road and Chestnut Avenue. This priority area would require significant coordination between the various affected property owners, utility companies, PennDOT, and Norfolk Southern Railroad.


The estimated cost for the recommended system is \$1,249,200.


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LEGEND

 STRUCTURE BENEFITED BY PROJECT

 PROPOSED STORM SEWER



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DERRY TOWNSHIP
STORMWATER MANAGEMENT
IMPLEMENTATION STUDY

STORMWATER PROBLEM AREAS
PRIORITY AREA NO. 1
MILL STREET / CHERRY DRIVE

PROJ. MGR. - MSB
DESIGN- ATB
CADD-
CHECKED-
SCALE- 1" = 500'
DATE- 11-4-08

DRAWING NO.
1
SHEET NO.
1 OF **17**
PROJECT 2484.0429

PRIORITY AREA NO. 2 – COCOA AVENUE / GOVERNOR ROAD

The location of this priority area is illustrated on Drawing No. 2. Flooding and channel erosion has been occurring along Cocoa Avenue, in the shopping center parking lot, and on several private properties near the intersection of Governor Road. The primary cause of the problems is the lack of capacity in various roadway culverts and stream channels.

Table 7 summarizes the existing culvert sizes for the system starting at the Fulton Bank and extending down to the open channel just upstream of the library. Our recommendations for controlling the erosion and reducing the flooding problems in this area are presented in Table 8 and illustrated on Drawing No. 2. A 50-year return frequency storm event is recommended for this priority area due to the significant traffic levels carried by the affected roads. Further investigation must be conducted to evaluate the capacity of the downstream channel to ensure there will be no increase in flooding in the park, especially near the pool and ball fields. This will require detailed survey data.

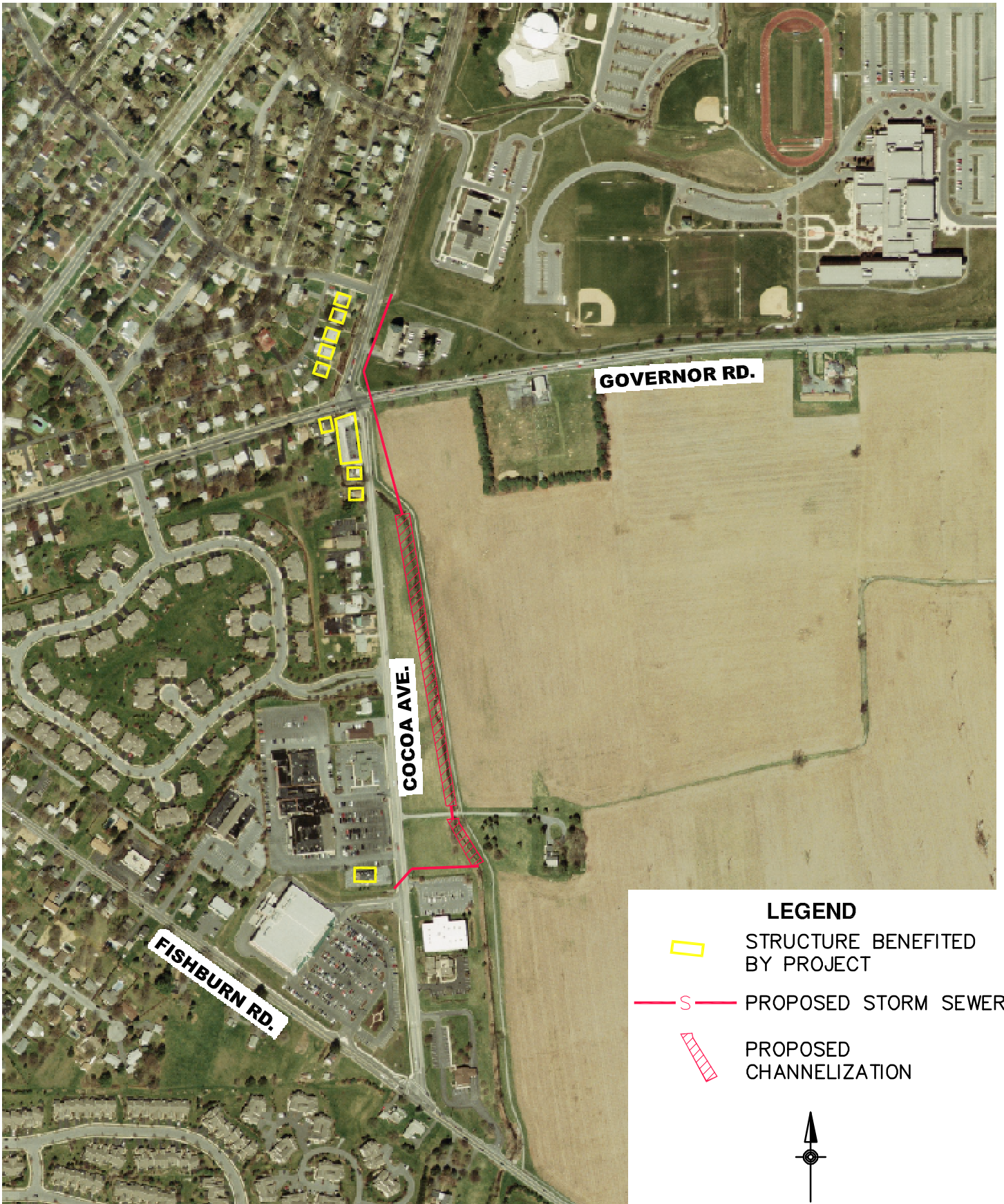
**TABLE 7
PRIORITY AREA NO. 2 – ESTIMATED PEAK DISCHARGES AND
EXISTING CULVERT SIZES**

LOCATION AND PROPOSED IMPROVEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE (CFS) FOR INDICATED RETURN FREQUENCY EVENT				EXISTING FACILITY
		2.33 YEAR	10 YEAR	50 YEAR	100 YEAR	
Culvert under Cocoa Avenue near Fulton Bank	0.05	5	50	127	161	18" RCP
Culvert under private driveway	1.41	117	329	713	935	5' X 3.5' Conc. Arch
Culvert under Cocoa Avenue just south of Governor Road	1.50	120	338	734	963	2 - 42" RCP
Culvert under Governor Road	1.53	121	341	741	973	6' x 5' Conc. Box
Culvert under Cocoa Avenue just south of Valley Road	1.54	121	342	743	976	11' x 3.5' Conc. Box




**TABLE 8
PRIORITY AREA NO. 2 – RECOMMENDED SYSTEM**

PROPOSED IMPROVEMENT	DESIGN CAPACITY	RECOMMENDED FACILITY
Culvert under Cocoa Avenue near Fulton Bank	127 CFS	1 - 48" CMP, 350' Long
Culvert under private driveway	713 CFS	2 - 66" CMP, 40' Long
Culvert under Governor Road	741 CFS	2 - 72" CMP, 800' Long

The estimated cost for the recommended system is \$595,280.



LEGEND

-  STRUCTURE BENEFITED BY PROJECT
-  PROPOSED STORM SEWER
-  PROPOSED CHANNELIZATION



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**DERRY TOWNSHIP
 STORMWATER MANAGEMENT STUDY
 PRIORITY AREA NO. 2
 COCOA AVENUE / GOVERNOR ROAD**

DAUPHIN COUNTY PENNSYLVANIA

PROJ. MGR. - MSB
DESIGN- ATB
CADD-
CHECKED-
SCALE- 1" = 500'
DATE- 11-4-08

DRAWING NO.
2
SHEET NO.
2 OF 17
PROJECT 2484.0429

PRIORITY AREA NO. 3 – COCOA AVENUE BETWEEN ELM AND AREBA

The location of this priority area is illustrated on Drawing No. 3. The existing storm sewer system serving Cocoa Avenue in this area does not have the capacity for the runoff generated by the residential development in the upstream watershed. The problem is also impacted by the small size of many older storm inlets throughout the neighborhood streets. These small inlets often get clogged with debris, resulting in local street flooding. The drainage area of the watershed is approximately 40 acres (0.06 sq. mi.) and the estimated peak discharges for the selected design storm events are presented in Table 9.

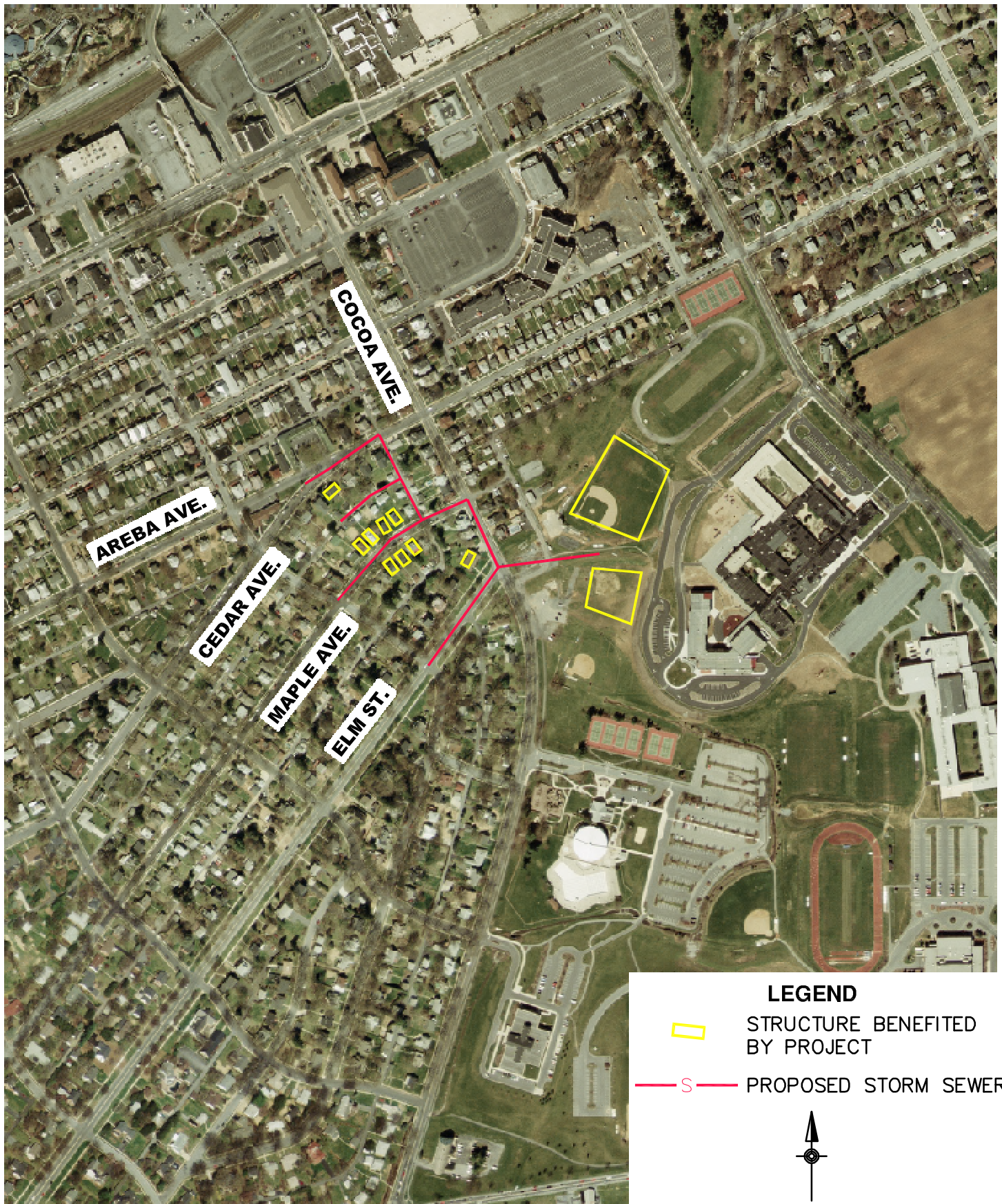
**TABLE 9
PRIORITY AREA NO. 3 – ESTIMATED PEAK DISCHARGES**

DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE (CFS) FOR INDICATED RETURN FREQUENCY EVENT			
	2.33 YEAR	10 YEAR	50 YEAR	100 YEAR
0.06	6	57	142	181


The recommended solution is to replace the existing storm sewer with a pipe network having greater capacity. The size of the existing system has not been confirmed, but most likely ranges from 12 to 18 inches in diameter. The proposed system should be designed to handle the 50 year return frequency storm event that is estimated to generate a peak discharge of approximately 142 cfs. The recommended system would be approximately 2,800 feet long and would be comprised of 24 inch diameter pipes. The system would run under Cocoa Avenue from Elm to Areba Avenues with branches on Maple and Cedar Avenues. The system would connect to the major storm sewer line that runs under the athletic fields east of Cocoa Avenue. The approximate layout of the recommended storm sewer system is illustrated on Drawing No. 3.


It is not recommended to replace the major storm sewer line that runs under the athletic fields at this time. That system is impacted, to some degree, by backwater conditions in Spring Creek and, as a result, is dependent on resolving the West Mansion Road problem area (Priority Area No. 17). Implementing the recommendations for Priority Area No. 3 will improve conditions for smaller storm. However, large storms could still cause backwater conditions that would reduce the performance of the recommended system. A more detailed study of the major storm sewer line, including topographic and structure surveys, is required to better determine the capacity of that storm sewer system.


The estimated cost for the recommended system is \$286,280.



LEGEND

 STRUCTURE BENEFITED BY PROJECT

 PROPOSED STORM SEWER



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STORMWATER MANAGEMENT STUDY
PRIORITY AREA NO. 3
COCOA AVENUE BETWEEN ELM AND AREBA

DAUPHIN COUNTY PENNSYLVANIA

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DRAWING NO.
3
SHEET NO.
3 OF 17
PROJECT 2484.0429