PRELIMINARY ENGINEERING REPORT

2015 CDBG STREETS, DRAINAGE & UTILITY PROJECT

TO ACCOMPANY

AN APPLICATION TO THE

GEORGIA DEPARTMENT OF COMMUNITY AFFAIRS

FOR FUNDING UNDER THE

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

March 27, 2015

Prepared For:

City of Waycross, Georgia
417 Pendleton Street
Waycross, Georgia 31502-0099

Coastal Engineering Consultants, Inc.
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1.0 EXECUTIVE SUMMARY

This Document will accompany an application to the Georgia Department of Community Affairs for financial assistance under the Community Development Block Grant Program (CDBG) on behalf of the City of Waycross, Georgia. Grant funds under this program will be used for needed improvements to the City's streets, drainage and utility systems in a low to moderate income target area. The target area for this project includes Walker, Owens, Izlar and Roosevelt Streets near downtown Waycross.

The Target Area suffers from a number of issues relating to its infrastructure. These include poor drainage, failing sewer lines, inadequate fire protection, and deteriorating streets and pavements.

Recommended drainage improvements consist of the installation of concrete curb and gutter sections in areas where none currently exist and the replacement of existing curb and gutter sections that are broken or misplaced resulting in disrupted flow lines. The curb and gutter sections will divert storm water runoff to a series of newly constructed curb inlets to eliminate ponding and localized street flooding now prevalent throughout the CDBG Target Area. The curb inlets will be interconnected with a series of storm water pipes which will convey the collected storm water to the City's storm water conveyance system south of the Target Area.

To improve the water distribution system, undersized and deteriorated lines will be abandoned in favor of larger mains to improve system pressures, provide higher flows and more reliable fire protection, improve accessibility for system repairs and bring this aging and leaking system into compliance with current Georgia EPD minimum standards.

The sanitary sewer system will be rehabilitated by abandoning the existing VCP sewer lines in place and replacing with new mains by the conventional excavate and replace method. Under this approach, the existing manholes will be removed or abandoned in place and filled in with sand. New 4-inch service laterals will be installed and reconnected to the existing services at the property line. Lower clean outs will be installed to facilitate maintenance. New sewer mains will be properly bedded to ensure uniform grades and flow lines. By-pass pumping will not be required because the existing mains can remain in service until the new system is completed. These improvements will alleviate the frequent blockages and sewer backups which have become problematic for residents and maintenance personnel.

Finally a pavement repair and resurfacing program will be performed to prolong the life expectancy of the roadways, improve the smoothness, visual appeal and drainage characteristics.

The completion of this much needed project will improve the overall quality of life in the CDBG Target area by improving drainage and alleviating localized street flooding, providing a dependable wastewater collection system, enhanced fire protection and a safe, reliable potable water supply to serve normal domestic needs. Improved vehicle and pedestrian traffic patterns

will be available as a result of the proposed pavement repairs and resurfacing. The total project cost is estimated at **$1,166,798.00.**

Engineering plans, specifications, bidding and contract documents have been completed and submitted to the appropriate local and state authorities for review and approval. To document these achievements, a letter is included in the Appendix from the Engineer stating that the design is completed and listing the agencies to which the plans have been submitted along with the agency contact information. Also included is a letter from the Mayor stating that the project is ready for bid with the exception of final approval by the appropriate local and state authorities and listing the agencies to which the Contract Documents have been submitted along with the agency contact information.

Funding in excess of the proposed grant amount of $500,000 will be provided by the City of Waycross.

2.0 INTRODUCTION

2.1 Purpose and Scope

This Document will accompany an application to the Georgia Department of Community Affairs for financial assistance under the Community Development Block Grant Program (CDBG) on behalf of the City of Waycross, Georgia. Grant funds under this program will be used for needed improvements to the City's streets, drainage and utility systems in a low to moderate income target area.

This document will provide background information to include delineation of the target area, a description of existing conditions and needs to be addressed, and will develop alternative solutions for consideration to address those needs. A complete description of the proposed project will be presented along with a detailed opinion of probable cost.

2.2 Authorization

This Preliminary Engineering Report and subsequent application for funding was authorized by resolution of the Waycross City Commission adopted on March 3, 2015.

2.3 Previous Studies

Previous studies performed by Coastal Engineering Consultants, Inc. for the City of Waycross include

Preliminary Engineering Report entitled ***"Deep Well Water Supply FY 12-02"*** dated April 2012

Preliminary Engineering Report entitled ***"2014 CDBG Streets, Drainage & Utility Project"*** dated March 17, 2014

3.0 BACKGROUND

3.1 Target Area Description

Waycross is located in southeast Georgia and was incorporated as the county seat of Ware County on March 3, 1874. Waycross, originally known as Tebeauville, gets its name from the city's location at key railroad junctions. Lines from six directions meet at the city. Its name signifies its strategic position where "Ways Cross". In colonial days, it was the hub of stagecoach roads and pioneer trails. Later the old Plant System and the Brunswick and Western Railroad lines crossed here, giving birth to a modern railroad network.

The target area for this project encompasses approximately 19.27 acres and includes ***Walker, Owens, Izlar and Roosevelt Streets*** near downtown Waycross. The Target Area is bordered on the north by Brunswick Avenue and on the south by Carswell Avenue. Elevations range from 140 feet in the northwest corner near the intersection of Walker Street and Brunswick Avenue to 131 feet in the southeastern most reaches near the intersection of Izlar Street and Carswell Avenue. All streets within the Target Area are paved with limited storm water conveyance systems. The area is also provided with water and sewer service by the City of Waycross.

There are approximately 67 homes in the target area according to city sources. Field surveys performed in support of recent design efforts discovered approximately 62 water service connections. Existing population densities and projections of future population for the area were not prepared for this report. It is believed that any future development within the Target Area would be re-development and not new growth.

The Target Area suffers from a number of issues relating to its infrastructure. These include poor drainage, failing sewer lines, inadequate fire protection, and deteriorating streets and pavements. These issues are discussed in greater detail in the following sections.

A map of the Target Area is included as ***EXHIBIT A*** following page 4.

REVISIONS

N

NOTES

TO ACCOMPANY PRELIMINARY ENGINEERING REPORT FOR THE WAYCROSS, GEORGIA 2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT.

RIGHT–OF WAY LINES, PROPERTY LINES, AND ANY EXISTING INFRASTRUCTURE SHOWN HEREON WERE TAKEN FROM A SURVEY ENTITLED

TOPOGRAPHIC AND UTILITY SURVEY OF
IZLAR STREET, OWENS STREET, WALKER STREET
AND
ROOSEVELT STREET
LOCATED IN THE CITY OF WAYCROSS, WARE COUNTY, GEORGIA

PREPARED BY CHARLES H. TOMBERLIN AND ASSOCIATES DATED MAY 14, 2012.

VERTICAL DATUM NAVD88 (CORS 03)

HORIZONTAL DATUM NAD83, GEORGIA EAST ZONE

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- EXISTING CURB & GUTTER

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FILE NO.: 2015-003-EXHA
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SCALE: 1" = 150' (APPROXIMATE)

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT A - CDBG TARGET AREA

SHEET NO.
EXHIBIT A

3.2 Existing Conditions

3.2.1 Drainage System

The existing storm water conveyance system is shown on ***EXHIBIT B*** following page 5. Surface water run-off from the Target Area generally sheet flows in a southeasterly direction from the areas of highest elevation near Walker Street and Brunswick Avenue. Walker and Owens Streets drain toward Carswell Avenue but the only drainage pipe network serving the Walker-Owens watershed is located at the intersection of Owens Street and Carswell Avenue. It consists of four (4) curb inlets (#18, #19, #20 and #21) and one (1) grate inlet (#17) with interconnecting 10-inch, 15-inch and 18-inch diameter pipes. This pipe system connects to the City's storm water conveyance system at a grate inlet (#17) on Owens Street south of Carswell Avenue.

Izlar Street and portions of Roosevelt Street also drain to Carswell Avenue through a more extensive network of curb inlets and pipes. This storm drain network originates at three curb inlets located near the intersection of Nicholls Street and Roosevelt Street (#12, #13 and #14). This system connects to a similar system of curb inlets at the intersection of Roosevelt Street and Izlar Street (#5, #6, #7, #11, #15 and #16), and then continues south along Izlar Street to an existing curb inlet (#4). The network continues south to a series of curb inlets located near the intersection of Izlar Street and Carswell Avenue (#1, #2, #3, #8, #9 and #10). This series of inlets is interconnected by a network of 8-inch, 10-inch, 12-inch, 15-inch and 18-inch diameter pipes. This pipe system connects to the City's storm water conveyance system at a curb inlet (#1) on Izlar Street south of Carswell Avenue.

These systems are undersized for the area which they drain and are subject to clogging with sand and debris. This further limits their capacity and creates maintenance issues for city personnel. Areas without curb and gutter sections, such as Walker, Owens and Izlar Streets north of Roosevelt, rely on sheet flow to direct storm water run-off. This becomes problematic in areas of uneven and broken pavement sections and areas where the pavement sections have non-uniform grades. Portions of Walker, Owens, Izlar and Roosevelt Streets have curb and gutter sections but they are broken and displaced in many areas and the flow lines are poorly defined. Localized street flooding during heavy rainfalls is common throughout the Target Area. Storm drain caves-ins and flooding of sidewalks and adjacent properties are also prevalent.

EXISTING DRAINAGE STRUCTURES

NO.	TYPE	INVERT
1	GRATE INLET	128.70
2	CURB INLET	NA
3	CURB INLET	129.41
4	CURB INLET	130.32
5	CURB INLET	131.73
6	CURB INLET	133.53
7	CURB INLET	134.56
8	CURB INLET	129.08
9	CURB INLET	131.83
10	CURB INLET	130.16
11	CURB INLET	132.11
12	CURB INLET	132.96
13	CURB INLET	133.00
14	CURB INLET	133.86
15	CURB INLET	134.56
16	CURB INLET	134.00
17	GRATE INLET	127.78
18	CURB INLET	130.46
19	CURB INLET	130.75
20	CURB INLET	129.99
21	CURB INLET	129.99

REVISIONS

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LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- EXISTING CURB & GUTTER
- EXISTING STORM DRAINS AND STRUCTURES TO BE REMOVED
- EXISTING STORM DRAINS AND STRUCTURES TO REMAIN
- (19) STRUCTURE ID NUMBER (TO BE REMOVED)
- (21) STRUCTURE ID NUMBER (TO REMAIN)

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2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
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PRELIMINARY ENGINEERING REPORT

EXHIBIT B - EXISTING DRAINAGE NETWORK

SHEET NO.
EXHIBIT B

The following Table presents a list of photographs taken throughout the Target Area which document the aforementioned drainage problems.

PHOTOGRAPHIC DOCUMENTATION DRAINAGE ISSUES		
No.	**Location**	**Description**
SD-1	Owens Street & Carswell Avenue	Localized Street Flooding
SD-2	Walker Street & Carswell Avenue	Localized Street Flooding
SD-3	633 Owens Street	Localized Street Flooding
SD-4	612 Owens Street	Displaced Curb & Gutter
SD-5	612 Owens Street	Displaced Curb & Gutter
SD-6	Roosevelt Street & Nicholls Street	Localized Street Flooding
SD-7	1008 Roosevelt Street	Localized Street Flooding
SD-8	1008 Roosevelt Street	Localized Street Flooding
SD-9	Izlar Street & Carswell Avenue	Localized Street Flooding
SD-10	611 Izlar Street	Displaced Curb & Gutter
SD-11	Izlar Street & Roosevelt	Storm Drain Cave In
SD-12	611 Izlar Street	Flooding of Adjacent Property
SD-13	1008 Roosevelt Street	Flooding of Adjacent Property
SD-14	620 Izlar Street	Flooding of Adjacent Property
SD-15	625 Izlar Street	Flooding of Adjacent Property
SD-16	Roosevelt Street near Owens Street	Sidewalk Flooding
SD-17	Roosevelt Street near Izlar Street	Sidewalk Flooding
SD-18	1008 Carswell Avenue	Flooding of Adjacent Property
Note: Photographs provided by the City of Waycross		

The series of photographs listed above are presented following page 6.

EXHIBIT SD-1

Walker Street & Carswell Avenue

EXHIBIT SD-2


633 Owens Street
EXHIBIT SD-3


612 Owens Street
EXHIBIT SD-4


612 Owens Street
EXHIBIT SD-5

Roosevelt Street & Nicholls Street

EXHIBIT SD-6


1008 Roosevelt Street
EXHIBIT SD-7


1008 Roosevelt Street
EXHIBIT SD-8

IZLAR ST & CARSWELL AVE
FLOODING AFTER HEAVY RAIN

EXHIBIT SD-9


611 Izlar Street
EXHIBIT SD-10


Izlar Street at Roosevelt Street (Storm Drain Cave In) 01/23/2015
EXHIBIT SD-11


611 Izlar Street 01/23/2015
EXHIBIT SD-12


Behind 1008 Roosevelt Street
(View from Izlar Street)
01/23/2015
NO PARKING
EXHIBIT SD-13


620 Izlar Street
01/23/2015
EXHIBIT SD-14


625 Izlar Street
1/23/2015
EXHIBIT SD-15


Sidewalk on Roosevelt Street near Owens Street 01/23/2015
Owens Street
Roosevelt Street
EXHIBIT SD-16


Izlar Street
Roosevelt Street
Sidewalk on Roosevelt Street near Izlar Street 01/23/2015
EXHIBIT SD-17


Behind 1008 Carswell Avenue (View from Owens Street) 01/23/2015
EXHIBIT SD-18

3.2.2 Water Distribution System

A map of the existing water distribution system serving the Target Area is presented as ***EXHIBIT C*** following page 7. The area is presently served by a 4-inch diameter water main along Roosevelt Street which is connected to a 12-inch main at Seaman Street and a 6-inch main at Nicholls Street. Small 1-inch diameter water lines serve Walker Street and Izlar Streets between Carswell Avenue and Brunswick Avenue. These lines are connected to the 4-inch main on Roosevelt as well as the existing 4-inch and 6-inch mains on Carswell Avenue and Brunswick Avenue respectively. Owens Street is also served by a 1-inch diameter water line between Roosevelt Street and Brunswick Avenue; and by a 2-inch diameter main between Carswell Avenue and Roosevelt Street. These 1-inch and 2-inch diameter mains are connected to the larger mains on Carswell Street, Roosevelt Street and Brunswick Avenue.

The water distribution system serving the Target Area is undersized and does not meet current Georgia EPD Minimum Standards for Public Water Systems. The area experiences low water pressure, frequent leaks, and also lacks adequate water supply for fire protection purposes. The table below presents documented water line repairs performed in the over the last few years.

SUMMARY OF DOCUMENTED WATER REPAIRS IN CDBG TARGET AREA

Date	Location	Work Performed
02-13-2015	Roosevelt St. and Seaman St.	Repaired Water Main
12-16-2014	633 Owens St.	Repaired Water Leak
07-22-2014	614 Owens Street	Repaired Water Leak
07-14-2014	603 Walker Street	Repaired Water Leak
05-27-2014	605 Izlar St.	Repaired Water Leak
03-10-2014	612 Owens St.	Repaired Water Leak
08-23-2013	623 Walker St.	Repaired Water Leak
03-19-2013	605 Owens St.	Repaired Water Leak

Source: Work Order Summary from Gene Thomas, Waycross Engineering Department March 6, 2015

The minimum size water main for domestic potable water supply, per Georgia EPD standards, is 2-inch diameter with no more than 20 connected residences. Current EPD Standards also require a minimum separation of 10 feet between potable water mains and sanitary sewer mains and storm drains. Minimum separation requirements are not met in multiple locations throughout the Target Area. The minimum size pipe for principal water mains (where fire hydrants are attached) is 6-inch diameter per Georgia EPD Minimum Standards. The existing fire hydrants at the intersections of Owens and Roosevelt Streets and Roosevelt and Nicholls Streets are connected to 4-inch mains and should be replaced.

REVISIONS

N

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LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- EXISTING CURB & GUTTER
- EXISTING WATER LINES AND APPURTENANCES TO BE REMOVED/ABANDONED
- EXISTING WATER LINES AND APPURTENANCES TO REMAIN

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EXHIBIT C - EXISTING WATER DISTRIBUTION SYSTEM

SHEET NO.
EXHIBIT C

The Target Area is of great concern to the Waycross Fire Department (See Memorandum dated March 26, 2015 from the Fire Chief to the City Engineer included in the Appendix). The Chief states that both of the hydrants on Roosevelt Street ***"have been out of service for years because they do not meet minimum water flow requirements. Furthermore, they are on a 4" main that is not accepted as (having) sufficient water flow capacity according to the Insurance Services Office (ISO).Not having these hydrants in service creates a life safety issue for to the citizens in the immediate area and responding firefighters."*** It also results in higher insurance costs for the area's property owners. Hydrant flow tests conducted by the Waycross Fire Department in accordance with procedures recommended by the American Water Works Association (AWWA) Manual M-17 and National Fire protection Association (NFPA) 291 were unable to document even the minimum fire flow of 250 gallons per minute recognized by ISO.

Photographs showing the "out of service" fire hydrants are presented following page 8.

OWENS ST & ROOSEVELT ST

FIRE HYDRANT (4" WATER MAIN) DOES NOT MEET FIRE PROTECTION FLOW REQUIREMENTS

EXHIBIT W-1

EXHIBIT W-2

ROOSEVELT ST & NICHOLLS ST

FIRE HYDRANT (4" WATER MAIN) DOES NOT MEET FIRE PROTECTION FLOW REQUIREMENTS

3.2.3 Sanitary Sewer System

A map of the existing sanitary sewer system serving the Target Area is presented as ***EXHIBIT D*** following page 9. The area is served by a system of 6-inch and 8-inch gravity sewer mains consisting of old vitrified clay pipes (VCP). The exact age of the system is not known but typically older pipes of this type are subject to a number of problems including displaced pipe joints, tree root intrusion, settlement, breakage and collapsed pipe sections, leaking pipe joints, etc. City maintenance staff has experienced all of the above on a regular basis in this system, both on the mains as well as the individual sewer services. The table below presents documented sewer repairs performed in the area over the last 20 years. Note that a number of the repairs occurred multiple times at the same location.

SUMMARY OF DOCUMENTED SEWER REPAIRS IN CDBG TARGET AREA

Date	Location	Work Performed
01-12-2015	Roosevelt St. and Seaman St.	Cleared Sewer Line
12-03-2014	625 Walker Street	Cleared Sewer Line
11-10-2014	617 Izlar St.	Repaired Sewer Main
11-07-2014	1106 Roosevelt St.	Repaired Sewer Main
07-25-2014	622 Izlar St.	Repaired Sewer Main
07-26-2014	611 Walker St.	Cleared Sewer Line
05-01-2013	638 Owens St.	Cleared Sewer Line
12-03-2012	611 Walker St.	Cleared Sewer Line
09-13-2010	Izlar St. & Roosevelt St.	Cave in – Repaired Sewer Main
09-20-2006	645 Walker St.	Cleared Sewer Line
06-16-2006	1320 Roosevelt St.	Cleared Sewer Line
05-31-2006	625 Walker St.	Cleared Sewer Line
04-24-2006	Roosevelt St. between Owens St. & Walker St.	Cave in – Repaired Sewer Main
05-17-2004	1107 Roosevelt St.	Cave in – Repaired Sewer Main
02-24-2004	Roosevelt St. & Izlar St.	Cave in – Repaired Sewer Main
09-09-2002	Owens St. & Carswell Ave.	Cleared Sewer Main
06-16-2000	623 Owens St.	Cave in – Repaired Sewer Service
07-04-1999	631 Izlar St.	Cleared Sewer Main
08-03-1998	1006 Roosevelt St.	Cave in – Repaired Sewer Main
07-16-1998	629 Owens St.	Cave in – Repaired Sewer Main
06-03-1998	633 Owens St.	Cave in – Repaired Sewer Main
03-31-1998	623 Owens St.	Cave in – Repaired Sewer Service
02-23-1998	Roosevelt St. & Walker St.	Cave in – Repaired Sewer Main
08-07-1997	611 Izlar St.	Cleared Sewer Main
09-21-1996	634 Izlar St.	Cleared Sewer Main
05-26-1995	634 Izlar St.	Cleared Sewer Main
05-23-1995	Izlar St. & Carswell Ave.	Cave in – Repaired Sewer Service
04-24-1994	636 Izlar St.	Cleared Sewer Main
08-08-1993	Roosevelt St. & Owens St.	Cave in – Repaired Sewer Main
07-15-1993	Izlar St. & Roosevelt St.	Cave in – Repaired Sewer Main
03-10-1993	Roosevelt & Izlar St.	Cave in – Repaired Sewer Main

Source: Work Order Summary from Gene Thomas, Waycross Engineering Department March 6, 2015

CCTV PHOTOGRAPH LEGEND

NO.	DESCRIPTION
1	ROOT INTRUSION
2	INTRUDING SEWER TAP
3	BROKEN PIPE AT JOINT
4	SPIRAL FRACTURE
5	BROKEN PIPE AT JOINT
6	OFFSET PIPE JOINT (ROOTS)
7	PREVIOUS PIPE REPAIR
8	BROKEN PIPE AT JOINT
9	ROOT INTRUSION AT TAP
10	BROKEN PIPE AT JOINT
11	SAND INFILTRATION AT TAP
12	INTRUDING SEWER TAP
13	SPIRAL FRACTURE
14	BROKEN PIPE

EXISTING SANITARY SEWER MANHOLES

NO.	TYPE	INVERT
1	SSMH	NA
2	SSMH	NA
3	SSMH	120.87
4	SSMH	121.45
5	SSMH	133.60
6	SSMH	120.33
7	SSMH	132.90
8	SSMH	132.88
9	SSMH	136.09
10	SSMH	NA
11	SSMH	130.78
12	SSMH	132.23
13	SSMH	NA
14	SSMH	133.60
15	SSMH	133.86

REVISIONS

N

NOTES

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- LIMITS OF TARGET AREA
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- EXISTING R/W LINE
- EXISTING CURB & GUTTER
- EXISTING STORM DRAINS AND STRUCTURES TO BE REMOVED
- EXISTING STORM DRAINS AND STRUCTURES TO REMAIN
- (13) STRUCTURE ID NUMBER (TO BE REMOVED)
- (10) STRUCTURE ID NUMBER (TO REMAIN)
- [10] CCTV PHOTOGRAPH NUMBER

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EXHIBIT D - EXISTING SANITARY SEWER SYSTEM

SHEET NO.
EXHIBIT D

On March 13, 2015, an internal inspection of the sanitary sewer mains in the Target Area using a closed circuit television camera (CCTV) was performed by United Sewer Services, Patterson, Georgia for the City of Waycross. The CCTV inspection confirmed the poor condition of these mains. A copy of the United Sewer Services Report and associated inspection logs, photographs and video is included as an Appendix to this report. The CCTV inspection results are summarized in the Table below.

Summary of CCTV Inspection				
Segment	**Pipe Size**	**Pipe Material**	**Joint Length**	**Defects Observed**
MH 11 TO __ Owens St. Upstream	8"	VCP	4-foot	Offset Pipe Joints Root Intrusions Intruding Sewer Taps Debris In Line ***Inspection Terminated at 76' (intruding Tap)***
MH 11 to MH 3 Owens St. Downstream	8"	VCP	4-foot	Offset Pipe Joints Intruding Sewer Taps Debris In Line Cracked and Broken Pipe Holes in Pipe Spiral Fractures in Pipe Evidence of Infiltration Sags in Pipe
MH 11 TO MH 12 Walker St. Upstream	8"	VCP PVC	VARIES	Offset Pipe Joints Separated Pipe Joints Debris In Line Root Intrusions Change In Pipe Material (VCP to PVC) Change in Pipe Material (PVC to VCP) Sags in Pipe Cracked and Broken Pipe Intruding Sewer Taps Longitudinal Fractures Evidence of Infiltration Sand intrusion ***Inspection Terminated at MH 12 (262 feet)***
MH 12 to MH 14 Roosevelt St Upstream	8"	VCP	4-foot	Intruding Sewer Taps Circumferential Fractures Offset Pipe Joints Broken Pipe Sags in Pipe ***Inspection Terminated at 131' (intruding Tap)***
MH 14 to MH 12 Roosevelt St. Downstream	8"	VCP	4-foot	Intruding Sewer Tap ***Inspection Terminated at 65' (intruding Tap)***
MH 14 to MH 15 Roosevelt St. Upstream	8"	VCP	4-foot	Debris and Sand in Line No Flow ***Inspection Terminated at 53't (Debris in Line)***

EXHIBIT D includes a legend in tabular form showing the location of photographs extracted from the CCTV report. These photographs are included following page 11.

Owens Street 57 feet from Roosevelt toward Brunswick
"Root Intrusion"

CCTV-1

Owens 74 feet from
Roosevelt toward Brunswick
"Intruding Sewer Tap"

CCTV-2

Owens Street 151 feet from Roosevelt toward Carswell
"Broken Pipe at Joint"

CCTV-3

Owens Street 236 feet from Roosevelt toward Carswell "Spiral Fracture in Pipe"

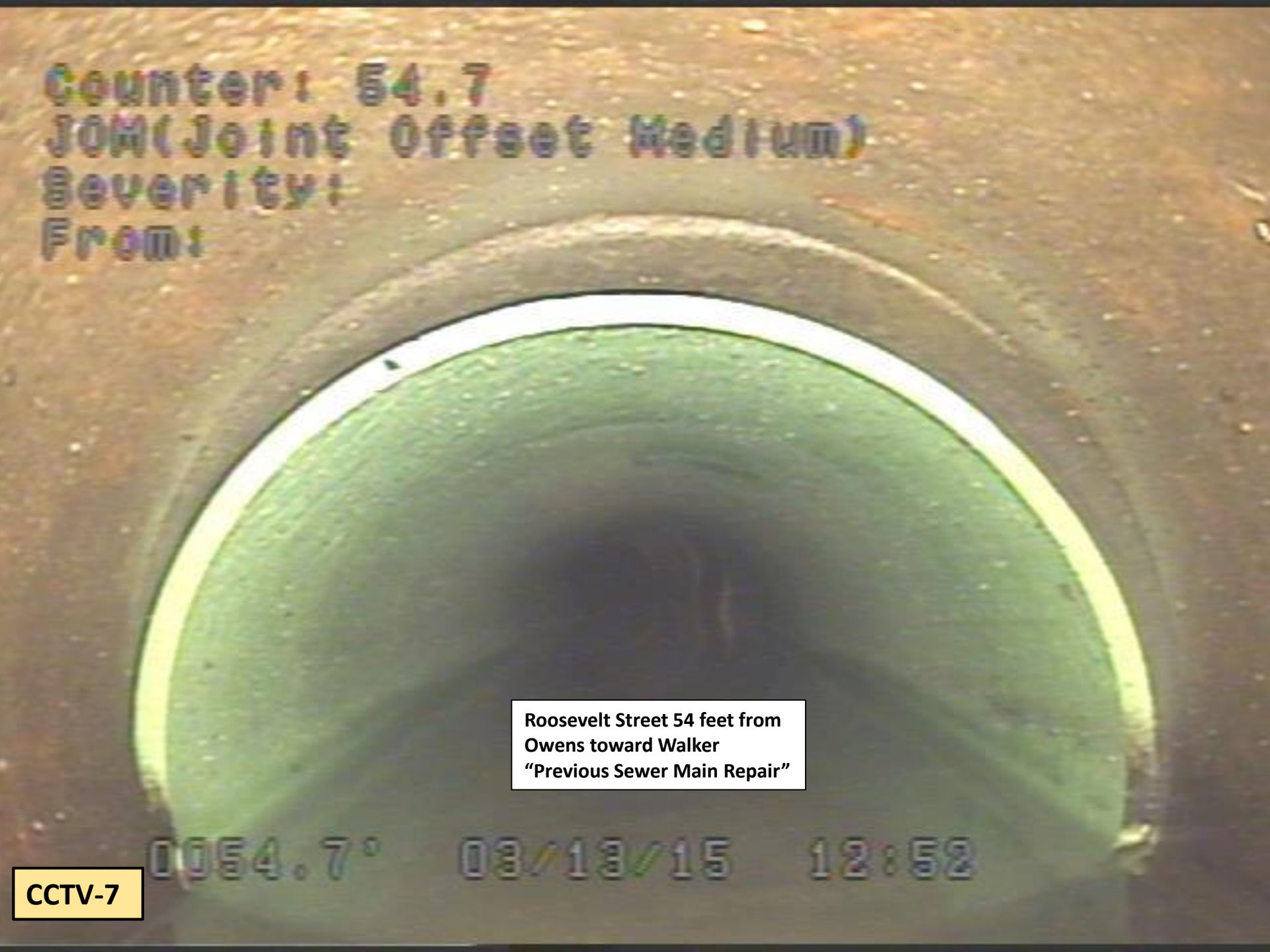
CCTV-4

Roosevelt Street 10 feet from Owens toward Walker
"Broken Pipe at Joint"

CCTV-5

Roosevelt Street 35 feet from
Owens toward Walker
"Offset Pipe Joint with Roots"

CCTV-6



Roosevelt Street 54 feet from
Owens toward Walker
"Previous Sewer Main Repair"

CCTV-7

Roosevelt Street 85 feet from Owens toward Walker "Broken Pipe at Joint"

CCTV-8

Roosevelt Street 129 feet from Owens toward Walker
"Root Intrusion at Sewer Tap"

CCTV-9

Roosevelt Street 164 feet from Owens toward Walker "Broken Pipe at Joint"

CCTV-10

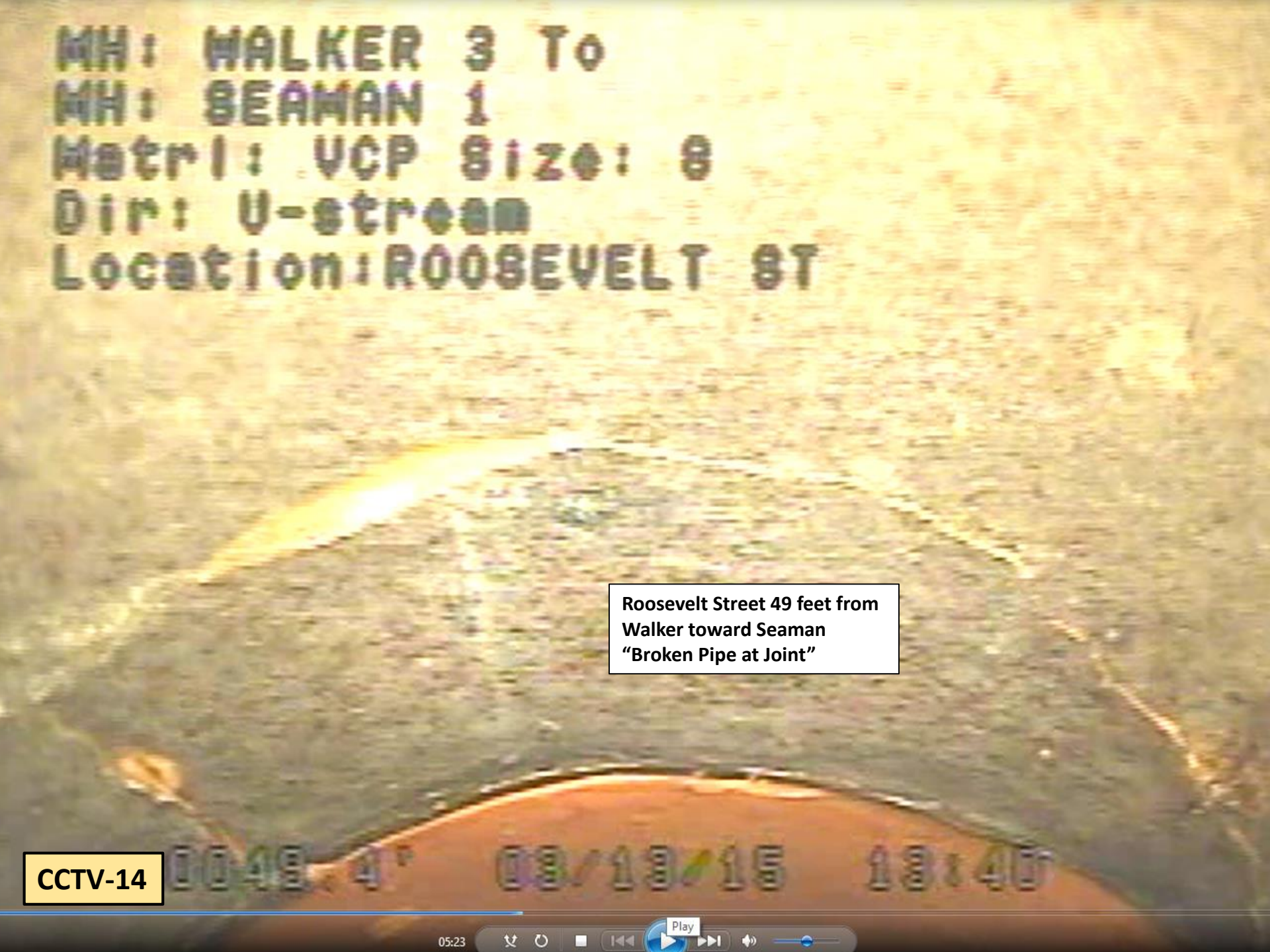
CCTV-11

Roosevelt Street 246 feet from Owens toward Walker "Sand Infiltration at Sewer Tap"

Roosevelt Street 8 feet from Walker toward Seaman "Intruding Sewer Tap"

CCTV-12


Counter: 10.6
TB(Tap Break=(m)
Severity:
From: 08
To:
Remarks: VC
00'10.6" 08/13/15 13:37
Roosevelt Street 10 feet from
Walker toward Seaman
"Spiral Fracture in Pipe"
CCTV-13
01:51


MH: WALKER 3 To
MH: SEAMAN 1
Matrl: VCP Size: 8
Dir: U-stream
Location:ROOSEVELT ST
0048.4' 08/13/15 13:40
CCTV-14
Roosevelt Street 49 feet from Walker toward Seaman "Broken Pipe at Joint"
05:23
Play

3.2.4 Streets and Pavements

Asphalt pavements within the Target Area are, for the most part, badly deteriorated and in need of repair and/or resurfacing. Streets are normally designed to last about 20 years but pavement begins to deteriorate much earlier. Pavement condition can be measured by a Pavement Condition Index (PCI) which indicates the extent and severity of pavement distress such as cracking, rutting, raveling, etc. Usually expressed as a number from 0 (very bad, essentially gravel) to 100 (essentially perfect), new streets start with pavement conditions in the high nineties. The rating system in the following Table is sometimes used:

Pavement Rating System	
Condition	**PCI**
Very Good	85 to 10
Good	70 to 85
Fair	55 to 70
Poor	40 to 55
Very Poor	Less than 40

All of the pavement surfaces in the Target Area would be classified as poor to very poor according to the PCI Pavement Rating System. Factors most likely to affect pavement condition and which are most likely the causes of deterioration include traffic volume, weather (especially as it relates to poor drainage), and the excessive construction and utility work associated with the numerous sewer and storm drain repairs performed over the last 20 years.

The following examples of pavement deterioration are found in the Target Area.

Longitudinal Cracking – cracking along the roadway parallel to the direction of travel.

Transverse Cracking – cracking across the roadway perpendicular to the direction of travel

Alligator Cracking – a combination of longitudinal and transverse cracking that has become so dense as to resemble alligator scales

Repair Patches – numerous utility repairs have resulted in a multitude of asphalt patches throughout the Target Area some of which have deteriorated over time.

Some specific locations for which photographic documentation has been included following page 13 are listed in the Table below.

EXAMPLES OF PAVEMENT DETERIORATION		
Location	**Type of Deterioration**	**Exhibit**
Izlar St. & Roosevelt St.	Repair Patches; Transverse, Alligator Cracking	PVMT-1
Izlar St. & Roosevelt St.	Repair Patches; Transverse, Longitudinal, Alligator Cracking	PVMT-2
605 Izlar St.	Repair Patch; Transverse, Longitudinal Cracking	PVMT-3
Roosevelt St.	Repair Patches; Transverse, Longitudinal, Alligator Cracking	PVMT-4
Roosevelt St.	Repair Patches; Transverse, Longitudinal, Alligator Cracking	PVMT-5
Roosevelt St.	Repair Patches; Longitudinal, Alligator Cracking	PVMT-6
611 Walker St.	Repair Patch; Transverse, Longitudinal Cracking	PVMT-7
623 Walker St.	Transverse, Longitudinal Cracking	PVMT-8
NOTE: Photographs provided by the City of Waycross		

Large portions of the Target Area are absent of curb and gutter. This make it difficult to divert or channel storm water runoff to its preferred point of discharge. This results in localized flooding and ponding within local streets and erosion of road shoulders and slopes. Even in areas where concrete curb and gutters do exist, the sections are often broken or displaced (As discussed and documented in Section 3.2.1 above) thereby disrupting the flow lines resulting in ponding water and hazardous driving conditions. Such standing water seeps through the pavement structure into the pavement base material below which leads to further deterioration and failure of the entire pavement structure.

4.0 ALTERNATIVE DEVELOPMENT, EVALUATION AND SELECTION

Alternatives (where feasible alternatives exist) for necessary drainage, water distribution system, sanitary sewer system and pavement improvements have been developed. These alternatives have been evaluated with consideration given to constructability, cost, reliability, and maintenance requirements. The advantages and disadvantages of each are presented in tabular format. The recommended improvements are presented in Section 4.5 below.

4.1 Drainage Improvements

Three alternatives were considered for the necessary drainage improvements - 4.1A, 4.1B and 4.1C.

Alternative 4.1A – Concrete Curb & Gutter with Curb Inlets and Piping Systems

Alternative 4.1A consists of the installation of concrete curb and gutter sections in areas where none currently exist and the replacement of existing curb and gutter sections that are broken or misplaced resulting in disrupted flow lines. The curb and gutter sections will divert storm water runoff to a series of newly constructed curb inlets to eliminate ponding and localized street flooding now prevalent throughout the CDBG Target Area. The curb inlets would be interconnected by a piping system to convey the collected storm water to the City's existing storm water conveyance system south of Carswell Avenue.

Alternative 4.1B – Inverted Crowns with Grate Inlets and Piping Systems

Alternative 4.1B consists of an inverted crown pavement section with a series of grate inlets along the centerline of the streets. In an inverted crown section, the center of the street is the lowest part of the roadway, and the outside lanes slope inward toward the center of the street. When rain falls on an inverted crown roadway, the runoff flows toward the center of the road and is then channeled along the road centerline to an inlet located in the center of the street. In this configuration, the roadway centerline is used in place of gutters or swales as the pavement is actually collecting and conveying the rainwater to the drainage system. The inlets would be interconnected by a piping system to convey the collected storm water to the City's existing storm water conveyance system south of Carswell Avenue.

Alternative 4.1C – Roadside Ditches

The use of roadside swales or ditches with cross drains or culverts is not feasible in this instance due to the lack of adequate space to construct the side ditches and swales, conflicts with driveways and sidewalks, existing utility conflicts, and high maintenance

costs. Additional right of way acquisition and tree removal requirements are deterrents to further consideration.

Evaluation of Drainage Improvement Alternatives

The Table below presents a comparison of the Drainage Alternatives developed above showing the advantages and disadvantages of each. Opinions of probable cost for each alternative have been developed and are also shown.

COMPARISON OF DRAINAGE IMPROVEMENT ALTERNATIVES

Alternative	Advantages	Disadvantages	Cost
4.1A	Low Maintenance No Street Reconstruction Fewer Utility Conflicts Runoff Diverted Outside of Traffic Lanes Additional Right-of-Way Not Required	Reconstruction of Driveways More Drainage Inlets More Piping	$ 264,352.00
4.1B	Fewer Drainage Inlets Less Piping Curb & Gutter Not Required Additional Right-of-Way Not Required	More Utility Conflicts Street Reconstruction Required Erosive Effects on Pavements Uneven Pavement at Inlets Runoff Contained Within Traffic Lanes Water Seepage into Base & Subgrade Pavement Resurfacing More Frequent	$ 219,547.00
4.1C	Greater Flow Capacity	Wider Right-of Way Required Conflicts with Sidewalks Driveway Culverts Required More Utility Conflicts High Maintenance Safety Concerns Visually Unattractive	Not Developed

Notes:

1. Cost of concrete curb & gutter associated with Alternative 4.1A is included in paving improvements (4.4A)
2. Cost of street reconstruction associated with Alternative 4.1B is included in paving improvements (4.4B)
3. Costs are exclusive of contingency allowance and engineering/surveying fees

4.2 Water Distribution Improvements

The primary objectives of the water distribution system improvements proposed for the CDBG Target Area are as follows:

- Provide a safe and reliable supply of potable water with adequate pressures for customer needs
- Provide water in sufficient quantity and at adequate pressure for reliable fire protection
- Replace old and deteriorated mains which have been costly to repair and maintain and which have resulted in water losses from the system
- Locate new mains outside of paved areas so as to be more readily accessible to maintenance personnel

- Provide a sufficient number of valves so that main breaks can be isolated thereby minimizing service interruptions to water customers.
- Install water mains with adequate separation from potential sources of contamination such as sanitary sewers and storm water pipes

Two alternatives were considered for the necessary improvements to the water distribution system - 4.2A and 4.2B.

Alternative 4.2A – Upgrade with 8-inch Mains

Alternative 4.2A consists of abandoning the existing 4-inch water main along Roosevelt Street in favor of a new 8-inch PVC main which would connect the existing 12-inch at Seaman Street to the existing 6-inch at Nicholls Street. A new 8-inch PVC main is also proposed from the intersection of Roosevelt Street and Izlar Street north along Izlar connecting to the existing 6-inch main at Brunswick Avenue. Undersized 1-inch water mains would be replaced with 2-inch diameter mains and new fire hydrants are proposed along Roosevelt Street at the intersections of Walker, Owens and Izlar Streets. New services would be installed along with appurtenant valves and fittings.

Alternative 4.2B – Upgrade with 6-inch Mains

Alternative 4.2B consists of abandoning the existing 4-inch water main along Roosevelt Street in favor of a new 6-inch PVC main which would connect the existing 12-inch at Seaman Street to the existing 6-inch at Nicholls Street. A new 6-inch PVC main is also proposed from the intersection of Roosevelt Street and Izlar Street north along Izlar connecting to the existing 6-inch main at Brunswick Avenue. Undersized 1-inch water mains would be replaced with 2-inch diameter mains and new fire hydrants are proposed along Roosevelt Street at the intersections of Walker, Owens and Izlar Streets. New services would be installed along with appurtenant valves and fittings.

Evaluation of Water Distribution System Improvement Alternatives

The Table on page 17 presents a comparison of the Water Distribution System Alternatives developed above showing the advantages and disadvantages of each. Opinions of probable cost for each alternative have been developed and are also shown.

COMPARISON OF WATER DISTRIBUTION IMPROVEMENT ALTERNATIVES			
Alternative	**Advantages**	**Disadvantages**	**Cost**
4.2A	Stabilized Water Pressures Increased Fire Flows More Reliable Service	8-inch not Eligible For CDBG Funding	$ 162,555.00
4.2B	Stabilized Water Pressures Increased Fire Flows More Reliable Service 6-inch Eligible for CDBG Funding	Lower Water Pressures Lower Fire Flows	$ 155,830.00
Notes: 1. Costs are exclusive of contingency allowance and engineering/surveying fees			

4.3 Sanitary Sewer Improvements

Two alternatives were considered for sanitary sewer improvements in the CDBG Target Area. These include Alternative 4.3A and 4.3B.

Alternative 4.3A-Trenchless Technologies

Alternative 4.3A consists of structural repairs to the sanitary sewer lines involving trenchless technologies by lining of the mains using cured-in-place pipe (CIPP). Other methods commonly used include pipe bursting or slip lining. A cured-in-place pipe (CIPP) is one of several trenchless rehabilitation methods used to repair existing pipelines and is the method considered for this alternative. CIPP is a joint less, seamless, pipe within a pipe with the capability to rehabilitate pipes ranging in diameter from 4-inch to 110-inch. All manholes would be inspected for structural stability and repaired or replaced as required. Lateral connections would be restored without excavation via a remote controlled device that drills a hole in the liner at the point of the lateral connection. Lower clean outs would be installed at the property line to facilitate maintenance and provide a delineation between public and private maintenance responsibility. Two additional manholes will be required at the upstream terminus of the sanitary sewer mains on Walker Street and Owens Street.

Alternative 4.3B – Excavation and Replacement

Alternative 4.3B consists of sanitary sewer improvements in the CDBG Target Area by abandoning the existing VCP sewer lines in place and replacing with new mains by the conventional excavate and replace method. For the most part the mains are shallow (less than 8-feet deep) and replacement should be very competitive with the CIPP method of trenchless technology which becomes more cost effective on deeper sewer mains. Under this approach, the existing manholes would be removed or abandoned in place and filled in with sand. New 4-inch service laterals would be installed and reconnected to the existing services at the property line. Lower clean outs would be installed at the property line to facilitate maintenance and provide a delineation between public and private

maintenance responsibility. Two additional manholes will be required at the upstream terminus of the sanitary sewer mains on Walker Street and Owens Street.

Evaluation of Sanitary Sewer System Improvement Alternatives

The Table below presents a comparison of the Sanitary Sewer System Alternatives developed above showing the advantages and disadvantages of each. Opinions of probable cost for each alternative have been developed and are also shown.

COMPARISON OF SANITARY SEWER SYSTEM IMPROVEMENT ALTERNATIVES

Alternative	Advantages	Disadvantages	Cost
4.3A	Generally Less Excavation Less Surface Restoration Less Disruptive to Auto & Pedestrian Traffic Minimal Utility Conflicts Reduced Noise and Air Pollution	Requires By-pass Pumping Diminished Pipe Size Reduced Flow Capacity More Costly on Shallow Mains Condition of Existing Mains a Concern Multiple Point Repairs Likely	$ 351,352.00
4.3B	No By-pass Pumping Required Maintain Full Pipe Diameter Maintain Full Flow Capacity Less Costly on Shallower Mains	More Surface Restoration Disruptive to Auto & Pedestrian Traffic Utility Conflicts Increased Noise and Air Pollution	$ 296,420.00

Notes:
1. Costs are exclusive of contingency allowance and engineering/surveying fees

4.4 Street and Pavement Improvements

The Georgia Department of Transportation (GDOT) Asphalt Pavement Selection Guidelines were consulted for information used in the selection of appropriate pavement recommendations for the proposed street improvements in the CDBG Target Area. The types of asphalt pavement covered in those guidelines include Bituminous Surface Treatments (BST) and Hot Mix Asphalt (HMA) composed of the GDOT's 4.75, 9.5 and 12.5 Superpave mixes. These materials are described in Sections 400, 424, 824, and 828 of the GDOT Standard Specifications.

Mix types are distinguished according to nominal maximum size of aggregate in millimeters (i.e. 9.5 relates to an aggregate size of 9.5 millimeters), with selection guidelines presented in two categories: Low to Medium Volume and Medium to High Volume as illustrated in the Table on the following page.

Surface Mix Recommendations		
Volume	**Traffic Count**	**Surface Type**
Low to Medium	TPD < 100 or ADT < 800	BST
	TPD < 100 or ADT < 1,000*	4.75 HMA
	TPD < 200 or ADT < 2,000*	9.5 Type I HMA
Medium to High	TPD < 200 and 2,000 < ADT < 10,000	9.5 Type II HMA
	TPD > 200 or ADT > 10,000	12.5 HMA
TPD = Trucks per Day ADT = Average Daily Traffic *Note: ADT is conservative and can be exceeded with accurate information on TPD		

The key parameters for selecting an appropriate surface type for this project are Average Daily Traffic (ADT) and the distressed condition of the existing pavements. Trucks per Day (TPD), usually an equally important design parameter for most roads, is not considered of significant concern in a ***low volume***, residential area such as this one. There are two pavement types to consider as surface mixes on low volume roads.

Bituminous Surface Treatment (BST) is beneficial to seal weathered pavements without major distresses and very low traffic. It is composed of one or more alternating applications of bituminous material (either asphalt cement or asphalt emulsion) and cover aggregate. The aggregate used in each layer is of uniform size as practical and the maximum size aggregate for each successive layer is approximately one half that of the previous layer. BST can be used to prevent surface water from penetrating old pavements that have become weathered or cracked and to restore skid resistance to pavements that have become slippery because of wear and polishing of the surface aggregates. The best candidate for BST would be a very low volume (< 200 ADT), low Speed road with structurally sound pavement, either HMA or BST, with proper cross section and adequate drainage (no leveling required). The limitations of BST are that it cannot correct an irregular road section, nor does it add significant structure to the underlying pavement. It is not suitable for in town locations where traffic speeds exceed 25 MPH and can lead to loose stone hazards during early stages of service. Due to these factors and the condition of the existing underlying pavements, it is not considered acceptable for use on this project.

The second and preferred pavement type for this project is Hot Mix Asphalt (HMA). The two HMA mix types for low volume pavements most commonly specified in Georgia are 4.75 and 9.5 Type I. These mixes are ideal for most local roads and offer several advantages over coarser mixes in these applications. They excel in workability, smoothness, visual appeal and imperviousness to surface water. They are also very durable when properly constructed. Their workability allows them to conform well to surface irregularities during placement and compaction and their smoothness allows for better drainage characteristics with less layer thickness than coarser mixes. For surface courses under light to moderate traffic, 4.75 and 9.5 Type I mixes are generally more economical than the high volume mixes because they utilize ingredients such as local sand, Recycled Asphalt Pavement (RAP), and crushed aggregate screenings, which are more available than graded stone. In the coastal plain region, where quarry materials must be delivered over long distances, local sand is used in some state mixes to replace up to 20 percent of the aggregate, mainly the processed screenings.

Based upon the above discussions regarding preferred pavement types, two alternatives were considered for street and pavement improvements in the CDBG Target Area. These include Alternative 4.4A and 4.4B.

Alternative 4.4A – Normal Crown Section

Alternative 4.4A consists of the installation of concrete curb and gutter sections in areas where none currently exist and the replacement of existing curb and gutter sections that are broken or misplaced resulting in disrupted flow lines. After curb and gutter has been installed, and all utility improvements, sidewalk and driveway repairs have been completed, the condition of the existing pavement surface must be addressed before new asphalt overlays are placed. Severe alligator cracking is a load associated structural failure. Overlaying such extensive distress is not cost effective. Isolated base failures must be corrected by full depth patching which replaces both base and pavement in the small area affected. Block cracking is generally not load associated and like transverse and longitudinal cracking, can be sealed if not too severe to prevent moisture from entering the subgrade. Potholes, utility repairs and other such issues require full depth patches including base and subgrade repairs.

After all repairs have been made a 4.75 Superpave HMA level course with a recommended layer thickness of 7/8-inches (90 lbs/sy) is recommended to smooth out surface irregularities and establish centerline crowns with edges feathered toward the curb and gutter flow lines. This would be followed by a surface course of 9.5 Type I Superpave HMA with a recommended layer thickness of 1-1/8-inches (125 lbs/sy) for a total pavement thickness of 2-inches.

Alternative 4.4B – Inverted Crown Section

Alternative 4.4B consists of the reconstruction of street subgrade and base to divert surface runoff to the centerline (or inverted crown). After reconstruction a 4.75 Superpave HMA level course with a layer thickness of 7/8-inches (90 lbs/sy) is recommended to smooth out surface irregularities. This would be followed by a surface course of 9.5 Type I Superpave HMA with a recommended layer thickness of 1-1/8-inches (125 lbs/sy) for a total pavement thickness of 2-inches.

Evaluation of Street and Pavement Improvement Alternatives

The Table below presents a comparison of the Street and Pavement Improvement Alternatives developed above showing the advantages and disadvantages of each. Opinions of probable cost for each alternative have been developed and are also shown.

COMPARISON OF STREET AND PAVEMENT IMPROVEMENT ALTERNATIVES

Alternative	Advantages	Disadvantages	Cost
4.4A	Less Disruptive to Auto & Pedestrian Traffic Lower Maintenance Resurfacing Only – Minor Reconstruction	Requires Curb & Gutter More Drainage Inlets More Storm Drain Pipe	$ 284,864.00
4.4B	No Curb & Gutter Required Fewer Drainage Inlets Less Storm Drain Pipe	Major Reconstruction More Disruptive to Traffic Flow Utility Conflicts Increased Noise and Air Pollution Higher Maintenance	$ 357,224.00

Notes:
1. Costs are exclusive of contingency allowance and engineering/surveying fees

4.5 Recommended Improvements

The recommended alternatives for the multi-infrastructure improvements in the CDBG Target Area are highlighted in the Table below.

SUMMARY OF SELECTED ALTERNATIVES

Infrastructure Improvement	Alternative Number			Construction Cost
Drainage Improvements	4.1A	4.1B	4.1C	$ 264,352.00
Water Distribution System Improvements	4.2A	4.2B	-	$ 162,555.00
Sanitary Sewer System Improvements	4.3A	4.3B	-	$ 296,420.00
Street and Pavement Improvements	4.4A	4.4B	-	$ 284,864.00

Notes:
1. Construction costs are exclusive of contingency allowance and Engineering/Surveying Fees
2. A complete project budget is presented in Section 6.0
3. Alternatives 4.1A and 4.4A must be implemented together

4.1A – Concrete Curb & Gutter with Curb Inlets and Piping Systems

4.2A – Upgrade with 8-inch Mains

4.3B – Excavation and Replacement

4.4A – Normal Crown Section

Recommended Drainage Improvements

The selected Drainage System Improvement Alternative is 4.1A – Concrete Curb and Gutter with Curb Inlets and Piping Systems. The proposed drainage system is shown on ***EXHIBIT E*** following page 22. Two new piping networks are proposed and are depicted in orange. Facilities shown in green are existing storm pipes and structures to remain in service.

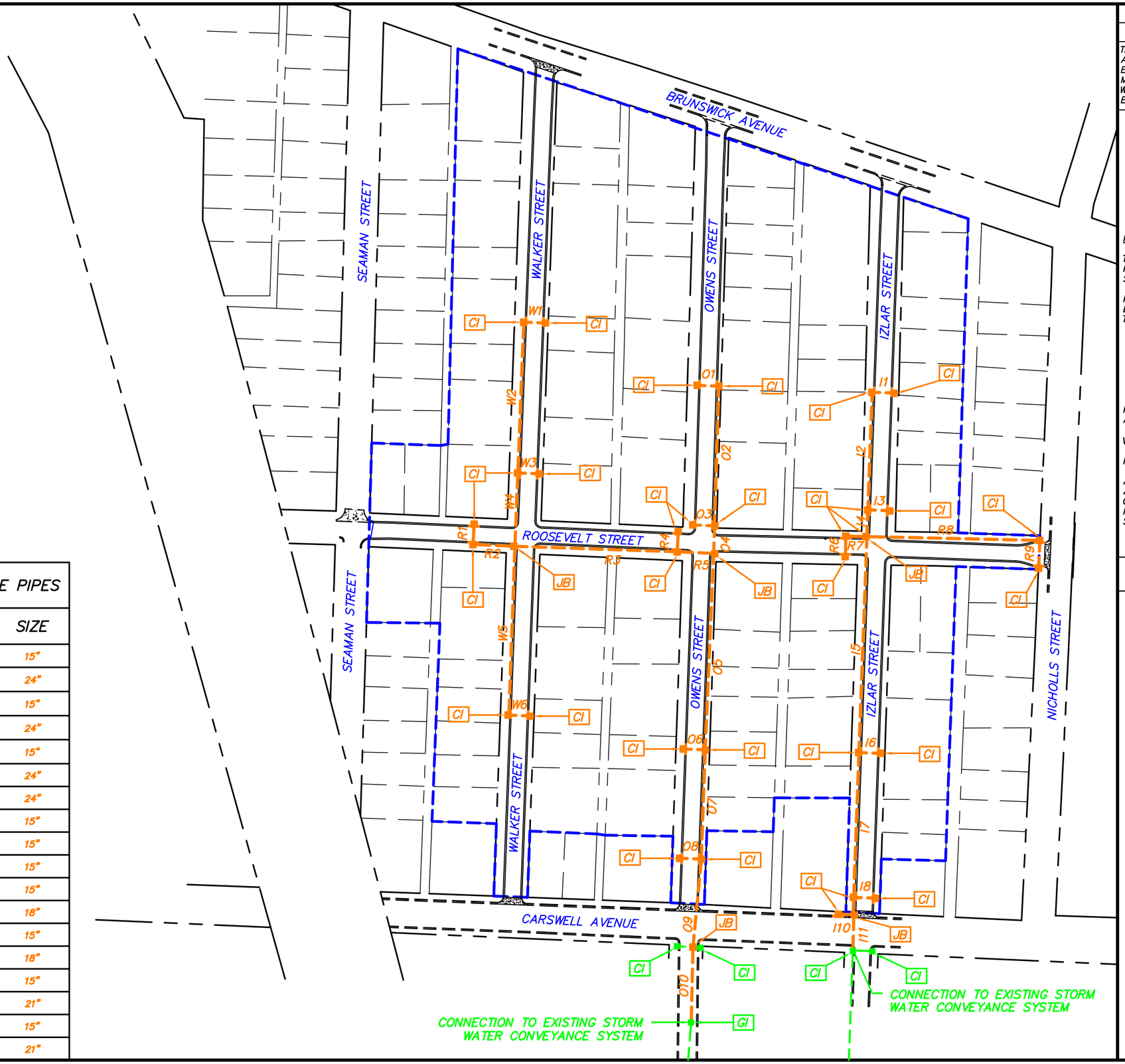
The first new piping network collects storm water from a watershed within the Target Area consisting of Walker Street, Owens Street and portions of Roosevelt Street. This system connects to the City's existing storm water conveyance system on Owens Street just south of Carswell Avenue. This network consists of six (6) curb inlets and one (1) junction box on Walker Street; four (4) curb inlets on Roosevelt Street; and eight (8) curb inlets and two (2) junction boxes on Owens Street. The network has twenty one (21) interconnecting pipes (W1 through W6, R1 through R5, and O1 through O10) ranging in size from 15-inch to 24-inch.

The second piping network collects storm water from Izlar Street and portions of Roosevelt Street. This system connects to the City's existing storm water conveyance system on Izlar Street just south of Carswell Avenue. This network consists of four (4) curb inlets on Roosevelt Street, and nine (9) curb inlets and two (2) junction boxes on Izlar Street. The network has fifteen (15) interconnecting pipes (R6 through R9, and I1 through I11) ranging in size from 15-inch to 21-inch.

Material selection for piping systems is based on depth of cover over the crown of the pipe. Pipes with less than 2.5-feet of cover will be reinforced concrete pipe (RCP). Pipes with more than 2.5-feet of cover will be constructed of HDPE.

All pipe sizes were calculated using the Rational Method for computing runoff with a rainfall intensity based upon the 25-year return period. The procedural guide as set forth in the Manual for Erosion and Sediment Control in Georgia was used. Hydrologic and hydraulic design calculations are included in the Appendix. A discussion of downstream impacts on existing storm water conveyances of the Target Area is presented in Section 5 of this Preliminary Engineering Report.

No user fees are associated with these improvements.



PROPOSED DRAINAGE PIPES

NO.	SIZE	NO.	SIZE
W1	15"	O4	15"
W2	15"	O5	24"
W3	15"	O6	15"
W4	15"	O7	24"
W5	15"	O8	15"
W6	15"	O9	24"
R1	15"	O10	24"
R2	15"	I1	15"
R3	18"	I2	15"
R4	15"	I3	15"
R5	18"	I4	15"
R6	15"	I5	18"
R7	15"	I6	15"
R8	15"	I7	18"
R9	15"	I8	15"
O1	15"	I9	21"
O2	15"	I10	15"
O3	15"	I11	21"

REVISIONS

N

NOTES

TO ACCOMPANY PRELIMINARY ENGINEERING REPORT FOR THE WAYCROSS, GEORGIA 2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT.

RIGHT–OF WAY LINES, PROPERTY LINES, AND ANY EXISTING INFRASTRUCTURE SHOWN HEREON WERE TAKEN FROM A SURVEY ENTITLED

TOPOGRAPHIC AND UTILITY SURVEY OF
IZLAR STREET, OWENS STREET, WALKER STREET
AND
ROOSEVELT STREET
LOCATED IN THE CITY OF WAYCROSS, WARE COUNTY, GEORGIA

PREPARED BY CHARLES H. TOMBERLIN AND ASSOCIATES DATED MAY 14, 2012.

VERTICAL DATUM NAVD88 (CORS 03)

HORIZONTAL DATUM NAD83, GEORGIA EAST ZONE

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- PROPOSED STORM DRAIN PIPES AND STRUCTURES
- EXISTING STORM DRAINS AND STRUCTURES TO REMAIN
- CI — PROPOSED CURB INLET
- JB — PROPOSED JUNCTION BOX
- CI — EXISTING CURB INLET
- GI — EXISTING GRATE INLET

Coastal Engineering Consultants, Inc.
PO BOX 1895
BRUNSWICK, GA 31521
(912) 223-0647

FILE NO.: 2015-003-EXHE
DRAWN BY: NJH
CHECKED BY:
DATE: MARCH 15, 2015
SCALE: 1" = 150' (APPROXIMATE)

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT E - PROPOSED DRAINAGE IMPROVEMENTS

SHEET NO.
EXHIBIT E

Recommended Water Distribution System Improvements

The selected Water Distribution System Improvement Alternative is 4.2A – Upgrade with 8-inch Mains. The proposed water distribution system is shown on ***EXHIBIT F*** following page 23. New water mains and appurtenances are depicted in orange. Facilities shown in green are existing water lines and appurtenances to remain in service.

The minimum size pipe for principal water mains and for water mains where fire hydrants are to be attached is 6-inch diameter in accordance with EPD's Minimum Standards. This is the maximum size main that is eligible for CDBG funding. However the City desires the installation of 8-inch diameter mains to provide more stable flows and pressures for reliable fire protection. The City will pay the difference in cost between 6-inch and 8-inch diameter mains as part of its leverage to the project.

The 4-inch cast iron main along Roosevelt Street will be abandoned in favor of a new 8-inch PVC main which will connect the existing 12-inch at Seaman Street to the existing 6-inch main at Nicholls Street. New fire hydrant assemblies will be installed on the 8-inch main along Roosevelt Street at the intersections of Walker Street, Owens Street, Izlar Street and Nicholls Street. The undersized 1-inch mains along Walker Street, Owens Street north of Roosevelt Street and Izlar Street south of Roosevelt Street will be abandoned and replaced with new 2-inch PVC mains. The 2-inch mains will be connected to the new 8-inch PVC main as well as the existing 4-inch main at Carswell Avenue and the existing 6-inch main at Brunswick Avenue. A new 8-inch PVC main will extend from the intersection of Roosevelt Street and Izlar Street north along Izlar connecting to the existing 6-inch main at Brunswick Avenue. This will serve to stabilize pressures and increase fire flows in the CDBG Target Area. All new water mains will be located behind the back of curb to facilitate repairs and maintenance. The improvements will include all appurtenant valves, fittings and accessories for a complete and reliable installation.

New service taps will be provided and existing water services will be re-connected to the new mains. Before being placed into service, all newly constructed water mains will be pressure tested and disinfected in accordance with applicable AWWA and Georgia EPD requirements.

User fees associated with these improvements are the water rates and fees normally assessed to customers of the utility. Operation and maintenance responsibilities generally include but are not limited to labor and material costs associated with normal system flushing of hydrants, meter reading services, service requests, etc.

REVISIONS

NOTES

TO ACCOMPANY PRELIMINARY ENGINEERING REPORT FOR THE WAYCROSS, GEORGIA 2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT.

RIGHT-OF WAY LINES, PROPERTY LINES, AND ANY EXISTING INFRASTRUCTURE SHOWN HEREON WERE TAKEN FROM A SURVEY ENTITLED

TOPOGRAPHIC AND UTILITY SURVEY OF
IZLAR STREET, OWENS STREET, WALKER STREET
AND
ROOSEVELT STREET
LOCATED IN THE CITY OF WAYCROSS, WARE COUNTY, GEORGIA

PREPARED BY CHARLES H. TOMBERLIN AND ASSOCIATES DATED MAY 14, 2012.

VERTICAL DATUM NAVD88 (CORS 03)

HORIZONTAL DATUM NAD83, GEORGIA EAST ZONE

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

* THE CITY OF WAYCROSS PREFERS 8-INCH MAINS OVER 6-INCH MAINS, THE MAXIMUM SIZE ALLOWABLE FOR CDBG FUNDING. IT IS THE CITY'S INTENTION TO PAY THE DIFFERENCE IN PRICE BETWEEN THE 6-INCH AND 8-INCH MAINS.

LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- PROPOSED CURB & GUTTER
- PROPOSED WATER LINES AND APPURTENANCES
- EXISTING WATER LINES AND APPURTENANCES TO REMAIN
- PROPOSED FIRE HYDRANTS
- EXISTING FIRE HYDRANTS TO REMAIN IN SERVICE

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FILE NO.:	2015-003-EXHF
DRAWN BY:	NJH
CHECKED BY:	
DATE:	MARCH 15, 2015
SCALE:	1" = 150' (APPROXIMATE)

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT F - PROPOSED WATER DISTRIBUTION SYSTEM

SHEET NO.
EXHIBIT F

Recommended Sanitary Sewer System Improvements

The selected Sanitary Sewer System Improvement Alternative is 4.3B – Excavation and Replacement. The proposed sanitary sewer system is shown on ***EXHIBIT G*** following page 24. New sewer mains and appurtenances are depicted in orange. Facilities shown in green are existing sewer lines and appurtenances to remain in service. This alternative is preferred for the following reasons:

- Lower construction cost due to the relatively shallow depth of the proposed mains.
- No by-pass pumping is required
- The condition of the existing sewer mains will present significant obstacles to CIPP lining systems such as intruding service taps and offset pipe joints requiring multiple point repairs
- Pavement cuts are not an issue since the project involves milling and resurfacing of all pavements within the Target Area.

The proposed improvements include the construction of three new and separate 8-inch gravity sewer systems to replace the existing 6-inch and 8-inch lines which are to be abandoned in place. The first serves Walker Street south of Roosevelt Street. This system includes three (3) new manholes and connects to an existing downstream manhole at the intersection of Carswell Avenue and Walker Street. The second system serves Walker Street; all of Owens Street within the Target Area; and portions Roosevelt Street. This system includes nine (9) new manholes and connects to an existing downstream manhole at the intersection of Carswell Avenue and Owens Street. An upstream connection to an existing manhole at the intersection of Roosevelt Street and Seaman Street is also required. The third system serves all of Izlar Street within the Target Area. This system includes five (5) new manholes and connects to an existing downstream manhole at the intersection of Carswell Avenue and Izlar Street.

The new sewer mains will be properly bedded to ensure uniform grades and flow lines. By-pass pumping will not be required in as much as the existing mains can remain in service until the new system is completed. New sewer service laterals will be installed and connected to existing laterals. Lower clean outs will be installed at the property line to facilitate maintenance and to provide a delineation between public and private maintenance responsibilities.

User fees associated with these improvements are the sewer rates and fees normally assessed to customers of the utility. Operation and maintenance costs include estimated personnel costs associated with normal system cleaning and flushing of sewer lines and service laterals, un-plugging clogged laterals, etc.

REVISIONS

N

NOTES

TO ACCOMPANY PRELIMINARY ENGINEERING REPORT FOR THE WAYCROSS, GEORGIA 2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT.

RIGHT–OF WAY LINES, PROPERTY LINES, AND ANY EXISTING INFRASTRUCTURE SHOWN HEREON WERE TAKEN FROM A SURVEY ENTITLED

TOPOGRAPHIC AND UTILITY SURVEY OF
IZLAR STREET, OWENS STREET, WALKER STREET
AND
ROOSEVELT STREET
LOCATED IN THE CITY OF WAYCROSS, WARE COUNTY, GEORGIA

PREPARED BY CHARLES H. TOMBERLIN AND ASSOCIATES DATED MAY 14, 2012.

VERTICAL DATUM NAVD88 (CORS 03)

HORIZONTAL DATUM NAD83, GEORGIA EAST ZONE

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

LEGEND

- PROPOSED TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- PROPOSED CURB & GUTTER
- PROPOSED SEWER LINE
- EXISTING SEWER LINE TO REMAIN IN SERVICE
- MH — PROPOSED SEWER MANHOLE
- MH — EXISTING SEWER MANHOLE REMAIN IN SERVICE

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FILE NO.: 2015-003-EXHG
DRAWN BY: NJH
CHECKED BY:
DATE: MARCH 15, 2015
SCALE: 1" = 150' (APPROXIMATE)

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT G - PROPOSED SANITARY SEWER SYSTEM

SHEET NO.
EXHIBIT G

Recommended Street and Pavement Improvements

The selected Street and Pavement Improvements Alternative is 4.4A, a normal crown pavement section with concrete curb and gutter in support of the proposed drainage system to be installed under Alternative 4.1A. ***EXHIBIT H*** following page 25 shows the limits of new curb and gutter construction and areas for proposed milling, localized subgrade and base reconstruction and resurfacing. It encompasses all street sections within the Target Area.

After curb and gutter has been installed, and all utility improvements, sidewalk and driveway repairs have been completed, the condition of the existing pavement surface must be addressed before new asphalt overlays are placed. Isolated base failures will be corrected by full depth patching which replaces both base and pavement in the small area affected. Areas which exhibit transverse and longitudinal cracking will be sealed to prevent moisture from entering the subgrade. Potholes, utility repairs and other such issues require full depth patches including base and subgrade repairs.

After all repairs have been made a 4.75 Superpave HMA level course with a recommended layer thickness of 7/8-inches (90 lbs/sy) will be applied to smooth out surface irregularities and establish centerline crowns with edges feathered toward the curb and gutter flow lines. This will be followed by a surface course of 9.5 Type I Superpave HMA with a recommended layer thickness of 1-1/8-inches (125 lbs/sy) for a total pavement thickness of 2-inches.

REVISIONS

N

NOTES

TO ACCOMPANY PRELIMINARY ENGINEERING REPORT FOR THE WAYCROSS, GEORGIA 2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT.

RIGHT–OF WAY LINES, PROPERTY LINES, AND ANY EXISTING INFRASTRUCTURE SHOWN HEREON WERE TAKEN FROM A SURVEY ENTITLED

TOPOGRAPHIC AND UTILITY SURVEY OF
IZLAR STREET, OWENS STREET, WALKER STREET
AND
ROOSEVELT STREET
LOCATED IN THE CITY OF WAYCROSS, WARE COUNTY, GEORGIA

PREPARED BY CHARLES H. TOMBERLIN AND ASSOCIATES DATED MAY 14, 2012.

VERTICAL DATUM NAVD88 (CORS 03)

HORIZONTAL DATUM NAD83, GEORGIA EAST ZONE

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

LEGEND

- LIMITS OF TARGET AREA
- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- PROPOSED CONCRETE CURB AND GUTTER
- INDICATES AREAS FOR PROPOSED MILLING AND RESURFACING

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FILE NO.:	2015-003-EXHH
DRAWN BY:	NJH
CHECKED BY:	
DATE:	MARCH 15, 2015
SCALE:	1" = 150' (APPROXIMATE)

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT H - PROPOSED PAVING PLAN

SHEET NO.
EXHIBIT H

5.0 PROJECT IMPACTS

5.1 Noise

Noise is basically unwanted sound and can pose a hazard to human health and hearing. Noise is of particular concern when construction activities are located in or near noise sensitive locations such as residential areas, schools, hospitals, etc. Adverse impacts such as noise from construction equipment and operations will be temporary. The affected area includes the construction area of the Proposed Action as well as the surrounding properties.

To mitigate the effects of noise during construction normal working hours for construction operations will be limited to weekdays between the hours of 7:00 AM and 5:00 PM. Weekend work will be discouraged unless absolutely necessary due to weather conditions, critical operations, etc. Contractors will be required to comply with all applicable OSHA regulations as they relate to construction noise standards. Workers should be required to wear hearing protectors such as ear muffs or ear plugs when working in areas of high noise levels.

5.2 Air Quality

Federal government actions must comply with the Clean Air Act, General Conformity Rule. Established under the Clean Air Act (Section 176(c)(4)), the General Conformity Rule and requirements are meant to prevent air quality impacts of federally approved or funded activities from causing or contributing to violations of the national ambient air quality standards in an area working to attain or maintain the standards.

Under the Clean Air Act, EPA establishes air quality standards to protect public health, including the health of "sensitive" populations such as people with asthma, children, and older adults. EPA also sets limits to protect public welfare. This includes protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings.

All construction machinery and equipment will comply with applicable emissions standards. During construction the burning of trash and debris within the construction area will not be allowed. Temporary methods to control dust include disturbed area stabilization with mulching and/or temporary seeding (vegetative cover). Irrigation or sprinkling with water may also be performed as an emergency measure as long as no runoff is produced as a result thereof. After construction, permanent vegetation will be established on all disturbed areas.

5.3 Erosion and Sedimentation

The land disturbing activities proposed by the Proposed Action may have serious environmental consequences if not properly designed and controlled. The erosion of denuded soils may result in the transportation and discharge of silt and sediments onto adjacent properties or into downstream storm water conveyances. In addition to sediments, other pollutants which may be transported from the construction site by storm water runoff include detergents, paints, fertilizers, petroleum products, cleaning solvents, etc. The water quality degradation which may be caused by such pollutants poses a threat to fish and wildlife habitats. Windblown dust and debris from disturbed areas could also temporarily degrade the air quality in surrounding areas.

To mitigate the environmental consequences described above, the Erosion, Sedimentation and Pollution Control Plan for this project will be prepared by a GSWCC Level 2 Certified Design professional and will be prepared in accordance with all provisions of the NPDES General Permit to Discharge Storm Water Associated with Construction Activities. The design will include appropriate structural BMP's and vegetative practices to prevent the escape of sediments and other pollutants from the construction site. The contractor will be responsible for maintenance and replacement of the BMP's; rainfall monitoring; daily inspections of petroleum storage areas and temporary construction exits; weekly, monthly and rain event inspections of all BMP's and vegetative practices by "qualified personnel"; sampling and analysis of storm water discharges; and all other provisions of the General Permit.

5.4 Hazards, Nuisances and Site Safety

Nuisances such as noise and dust during construction will be of a temporary nature and are discussed in greater detail in previous paragraphs of this section. The General Contractor will be responsible for the safety of workers during construction and the construction contract will require compliance with all applicable OSHA regulations.

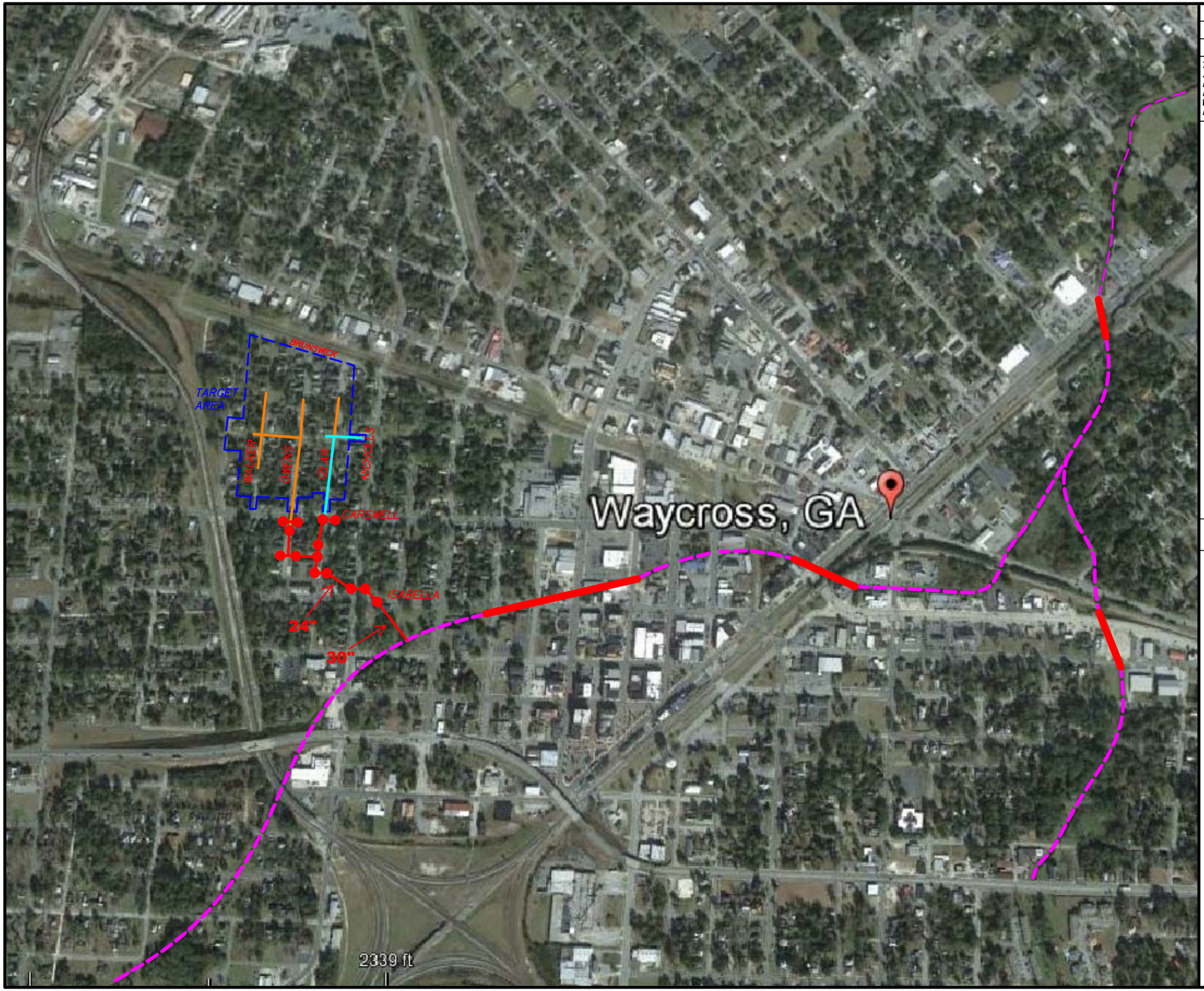
5.5 Quality of Life

The completion of this project will improve the overall quality of life in the CDBG Target area by improving drainage and alleviating localized street flooding, providing a dependable wastewater collection system, enhanced fire protection and a safe, reliable potable water supply with adequate pressures to serve normal domestic needs. Improved vehicle and pedestrian traffic patterns will be available due to proposed pavement repairs and resurfacing.

5.6 Downstream Storm Water Conveyances and Impacts

EXHIBIT I following page 28 presents an aerial view of the downtown Waycross area upon which have been superimposed the CDBG Target Area, downstream drainage canals and the location of existing downstream piping systems into which the storm water runoff from this project is directed. The existing drainage pipes are shown in green while the new piping systems proposed herein are shown in orange and cyan. The new piping systems indicated in cyan replace existing systems, while the orange piping systems are extensions to existing systems.

Existing drainage patterns will not be altered by the proposed project, nor will the amount of storm water runoff be increased. The proposed facilities will provide a definitive flow path for storm water runoff from the CDBG Target Area to the major drainage canals which traverse the City thereby eliminating the street flooding which currently exists during periods of heavy rainfall. While no adverse impacts to downstream conveyances are anticipated, it is recommended that the City continue its comprehensive storm water cleaning, inspection and rehabilitation program to ensure that downstream conveyances remain clear and unobstructed particularly downstream of the CDBG Target Area including Owens Street, Izlar Street and Isabella Street.



REVISIONS

N

NOTES

AERIAL IMAGERY TAKEN FROM GOOGLE EARTH AND WAS LAST UPDATED ON DECEMBER 17, 2013.

LOCATION OF EXISTING DRAINAGE PIPES AND CONCRETE BOX CULVERTS IS APPROXIMATE AND WAS PROVIDED BY THE CITY OF WAYCROSS ENGINEERING DEPARTMENT.

ANY EXISTING UTILITY INFORMATION SHOWN IS APPROXIMATE AND MAY NOT BE COMPLETE. COASTAL ENGINEERING CONSULTANTS, INC. DOES NOT WARRANT THE ACCURACY OF ANY EXISTING SUCH INFORMATION.

LEGEND

- LIMITS OF TARGET AREA
- EXISTING CANAL
- EXISTING CONCRETE BOX CULVERT
- EXISTING DRAINAGE PIPE
- REPLACEMENT DRAINAGE PIPE
- NEW DRAINAGE PIPE

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FILE NO.:	2015-003-EXHI
DRAWN BY:	NJH
CHECKED BY:	
DATE:	MARCH 15, 2015
SCALE:	NONE

2015 CDBG STREETS, DRAINAGE AND UTILITY PROJECT
CITY OF WAYCROSS, GEORGIA
PRELIMINARY ENGINEERING REPORT

EXHIBIT I - DOWNSTREAM STORM WATER CONVEYANCES

SHEET NO.
EXHIBIT I

6.0 IMPLEMENTATION

Arrangements for implementation include development of a detailed project budget, project scheduling, permitting issues, and requirements for operation and maintenance of the proposed facilities. A discussion of each follows.

6.1 Project Budget

A detailed opinion of probable cost for the improvements recommended in Section 4 of this Preliminary Engineering Report has been prepared. In developing such cost opinions it is expressly understood that Coastal Engineering Consultants, Inc. has no control over the cost of materials or equipment or over the Contractor's method of pricing. Opinions of probable cost are prepared based on the cost of recent similar projects located in the same geographical area and represent our best professional judgment. No warranty, expressed or implied, is made that the actual project cost will not differ from the Engineer's opinion of cost. The opinion of probable cost is summarized below and presented in detail in the Appendix.

Project Budget		
Item	**Description**	**Cost**
1	Mobilization	$25,000
2	Streets	$284,864
3	Drainage	$251,669
4	Water Distribution System	$165,555
5	Sanitary Sewer Rehabilitation	$296,420
	Sub-Total Construction Cost	**$1,023,508**
	Contingency – 8%	$81,880
	Engineering – 6.1%	$61,410
	Project Total	**$1,166,798**

Proposed funding sources include a combination of CDBG Grant funds with supplemental funding in excess of the grant amount from the City of Waycross. Grant administration fees are not included in the project cost opinion presented above.

6.2 Project Schedule

The design of this project has been completed with a shovel ready bid package consisting of bidding documents, construction plans and specifications. The documents have been submitted to and are under review by the following agencies:

- Georgia Environmental Protection for water and sewer improvements

- City of Waycross Engineering Department (Local Issuing Authority) for Erosion, Sediment and Pollution Control Plans

The project will be advertised for bids as soon as all project funding has been identified and in place. The anticipated construction period is 9 to 12 months.

6.3 Permitting Issues

Applicable Permits include Erosion, Sedimentation and Pollution Control Plan approval for land disturbing activity and coverage under the General Permit for Stormwater Discharges Associated with Construction Activity. No GDOT permitting is required. All water mains will be designed and constructed in accordance with Georgia EPD Minimum Standards for Public Water Systems. Plans will be submitted to EPD although technically no new extensions are proposed. All pavement designs will utilize GDOT Standard Specifications for mix design and construction standards.

6.4 Operation and Maintenance Requirements

The City of Waycross will be the responsible party for the on going maintenance of all streets, storm drains, water mains and sewer lines installed and/or rehabilitated as part of this project. The City maintains adequate staff, either in-house or by contracted operations consultants, to properly maintain these systems in an effective and responsible manner.

APPENDICES

DETAILED OPINION OF PROBABLE COST

CITY OF WAYCROSS, GEORGIA

2015 CDBG MULTI INFRASTRUCTURE IMPROVEMENTS

WALKER, OWENS, IZLAR & ROOSEVELT STREETS

OPINION OF PROBABLE COST

10-Mar-15

ITEM NO.	EST. QTY.	UNITS	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1	1	LS	**Mobilization**	$ 25,000.00	**$ 25,000.00**
2			**Streets:**		
a	1	LS	Traffic Control and Construction Signage	$ 7,000.00	$ 7,000.00
b	1304	LF	Removal & Disposal of Existing Conc. Curb & Gutter - Walker St	$ 2.00	$ 2,608.00
c	1172	LF	Removal & Disposal of Existing Conc. Curb & Gutter - Owens St	$ 2.00	$ 2,344.00
d	1413	LF	Removal & Disposal of Existing Conc. Curb & Gutter - Izlar St	$ 2.00	$ 2,826.00
e	973	LF	Removal & Disposal of Exist. Conc. Curb & Gutter - Roosevelt St	$ 2.00	$ 1,946.00
f	12000	SY	Mill Existing Asphalt Pavement as Required Including Disposal	$ 0.75	$ 9,000.00
g	2458	LF	Concrete Curb & Gutter - 24-inch Roll Over Walker Street	$ 15.00	$ 36,870.00
h	2300	LF	Concrete Curb & Gutter - 24-inch Roll Over Owens Street	$ 15.00	$ 34,500.00
i	2154	LF	Concrete Curb & Gutter - 24-inch Roll Over Izlar Street	$ 15.00	$ 32,310.00
j	2064	LF	Concrete Curb & Gutter - 24-inch Roll Over Roosevelt Street	$ 15.00	$ 30,960.00
k	410	SY	Remove & Replace Concrete Driveways	$ 50.00	$ 20,500.00
l	1300	Tons	Asphalt Resurfacing GDOT Specifications	$ 80.00	$ 104,000.00
			Subtotal Streets		**$ 284,864.00**
3			**Drainage:**		
a	975	LF	Removal and Disposal of Existing Storm Drain Pipes	$ 14.00	$ 13,650.00
b	15	EA	Removal and Disposal of Existing Curb Inlets	$ 500.00	$ 7,500.00
c	35	EA	Precast Concrete Curb Inlet	$ 2,000.00	$ 70,000.00
d	1869	LF	15" Reinforced Concrete Pipe	$ 35.00	$ 65,415.00
e	854	LF	18" Reinforced Concrete Pipe	$ 45.00	$ 38,430.00
f	736	LF	24" Reinforced Concrete Pipe	$ 54.00	$ 39,744.00
g	135	SY	Graded Aggregate Base Course at Pipe Crossings	$ 18.00	$ 2,430.00
h	1	LS	Erosion Control & Grassing	$ 10,000.00	$ 10,000.00
i	1	LS	NPDES/NOI/LDA Compliance and Monitoring	$ 4,500.00	$ 4,500.00
			Subtotal Drainage		**$ 251,669.00**
4			**Water Distribution System Improvements:**		
a	1	EA	8-inch Connection to 12-inch Main w/12' x 8" Tapping Saddle and Valve	$ 5,000.00	$ 5,000.00
b	1	EA	8-inch Connection to 4-inch Water Main	$ 3,000.00	$ 3,000.00
c	1	EA	8-inch Connection to 6-inch Water Main	$ 4,000.00	$ 4,000.00
d	6	EA	2-inch Connection to 8-inch Water Main	$ 500.00	$ 3,000.00
e	2	EA	2-inch Connection to 4-inch Water Main	$ 500.00	$ 1,000.00
f	3	EA	2-inch Connection to 6-inch Water Main	$ 500.00	$ 1,500.00
g	1600	LF	8-inch AWWA C900 PVC Water Main	$ 21.50	$ 34,400.00

CITY OF WAYCROSS, GEORGIA

2015 CDBG MULTI INFRASTRUCTURE IMPROVEMENTS

WALKER, OWENS, IZLAR & ROOSEVELT STREETS

OPINION OF PROBABLE COST

10-Mar-15

ITEM NO.	EST. QTY.	UNITS	DESCRIPTION	UNIT PRICE	TOTAL PRICE
h	2975	LF	2-inch SDR-21 PVC Water Main	$ 12.00	$ 35,700.00
i	11	EA	2-Inch Gate Valve & Box	$ 500.00	$ 5,500.00
j	5	EA	8-inch Gate Valve & Box	$ 1,175.00	$ 5,875.00
k	30	EA	Single Water Services Short Side	$ 430.00	$ 12,900.00
l	32	Ea.	Single Water Services Long Side	$ 740.00	$ 23,680.00
m	5	EA	Fire Hydrant Assemblies (Complete w/Line Tee/ Valve & Lead Pipe)	$ 3,000.00	$ 15,000.00
n	1	TNS	Mechanical Joint Fittings	$ 10,000.00	$ 10,000.00
o	1	LS	Water Line Testing & Disinfection	$ 5,000.00	$ 5,000.00
			Subtotal Water Distribution System Improvements		**$ 165,555.00**
5			**Sanitary Sewer Rehabilitation:**		
a	14	EA	4'-0" Diameter Standard Manhole Base Sections	$ 3,500.00	$ 49,000.00
b	3878	LF	8-inch PVC Sewer 0'-8' Cut	$ 40.00	$ 155,120.00
c	56	VF	4'-0" Diameter Precast Concrete Manhole Riser Sections	$ 125.00	$ 7,000.00
d	1550	LF	4-inch PVC Service Laterals	$ 15.00	$ 23,250.00
e	62	EA	8-inch by 4-inch Service Wyes	$ 125.00	$ 7,750.00
f	62	EA	Install Lower Clean Outs on Sewer Service Laterals	$ 300.00	$ 18,600.00
g	950	SY	Graded Aggregate Base Course at PipeTrenches	$ 18.00	$ 17,100.00
h	62	EA	Reconnect Existing Sewer Services	$ 300.00	$ 18,600.00
			Subtotal Sanitary Sewer Rehabilitation		**$ 296,420.00**
Sub-Total Construction Cost					**$ 1,023,508.00**
Contingency - 8%					$ 81,880.00
Engineering - 6%					$ 61,410.00
PROJECT TOTAL					**$ 1,166,798.00**

PRELIMINARY DRAINAGE CALCULATIONS

MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA

Fifth Edition
2000

includes any changes through January 1, 2000

GEORGIA SOIL AND WATER CONSERVATION COMMISSION

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APPENDIX A-3

PROCEDURAL GUIDE FOR COMPUTING RUN-OFF BY RATIONAL METHOD

The Rational Method is a method for determining run-off in terms of cubic feet per second at the drainage structure. It is based on the direct relationship between rainfall and run-off and may be expressed by the formula:

$$Q = CIA$$

Q = the run-off in cu. ft. per sec. from a given area.

C = a coefficient representing the ratio of run-off to rainfall (related to impervious area) i.e., 1.0 - 100% run-off.

I = the intensity of rainfall in inches per hour for a duration equal to the time of concentration and for a stated frequency.

A = the drainage area in acres.

		SOIL CLASSIFICATION			
SLOPE	LAND USE	SAND OR SANDY LOAM SOILS (Pervious) Min.	Max.	HIGH CLAY SOILS (Impervious) Min.	Max.
Flat (0% - 3%)	Woodlands	0.15	0.20	0.20	0.25
	Pasture	0.20	0.25	0.25	0.30
	Paved	0.95		0.95	
	Residential	0.35	0.60	0.50	0.60
	Commercial	0.60	0.95	0.60	0.95
Rolling (3% - 7%)	Woodlands	0.15	0.20	0.18	0.25
	Pasture	0.30	0.40	0.35	0.45
	Paved	0.95		0.95	
	Residential	0.50	0.60	0.50	0.60
	Commercial	0.60	0.95	0.60	0.95
Hilly (7% - 11%)	Woodlands	0.20	0.25	0.25	0.30
	Pasture	0.35	0.45	0.45	0.55
	Paved	0.95		0.95	
	Residential	0.50	0.60	0.50	0.60
	Commercial	0.60	0.95	0.60	0.95
Mountainous (11% +)	Woodlands			*0.70*	0.80
	Bare		*0.80*	*0.80*	0.95
Steep Grassed Slopes	Pasture	*0.70*		*0.70*	

Table A-3.1

1. Determine "C" by observation in the field of culture and soils and by use of Table A-3.1, p. A-3-1.

2. Determine "I" (intensity rate) from the time of Concentration Figure A-3.1, p. A-3-3 and Rainfall Figures A-3.3 through A-3.7, p. A-3-5 through A-3-9.

NOTE:

a. Height (ft.) is determined in the field or from contour maps. Height is the difference in elevation of the most remote point in the drainage area and the inlet flow line of the structure.

b. Maximum length of travel is determined in the field or from the contour maps. It is the greatest distance the water will travel from the most remote point of the drainage area to the inlet of the drainage structure.

c. Use height and length to determine the time of concentration by use of Figure A-3.1. Use a minimum of 10 minutes for rural and urban areas.

d. Now refer to rainfall figures - Atlanta, Macon, Augusta, Thomasville and Savannah (use figure nearest to project or combination of two figures) and by scaling the time of concentration, which is equal to the rainfall duration, along the bottom of the table and moving up to the selected return period, (10-25-50 yr.), move horizontally to the left and read the intensity "I".

3. Determine the time of concentration using the "Kinematic Wave Nomograph," Figure A-3.2, p. A-3-4. The kinematic wave table incorporates variables, the rainfall intensity and mannings "n." In using the nomograph, the designer has two unknowns starting the computations, the time of concentration and the rainfall density. The problem is attempting to determine a rainfall intensity which, in turn, actually determines the time of concentration. Thus, the problem is one of iteration. A value of "i" must be assumed, compute a time of concentration and then check back to see if the rainfall intensity that was assumed is consistent with the frequency curve of Figures A-3.3 through A-3.7. If one is the given length, slope, roughness coefficient, and intensity-duration-frequency curve the steps are as follows:

a. Assume rainfall intensity.
b. Use kinematic wave nomograph or equation to obtain first estimate of time concentration.
c. Using the time of concentration obtained from Step "b", enter Figures A-3.3 through A-3.7 for appropriate area and find rainfall intensity corresponding to the computed time of concentration. If this rainfall intensity corresponds with the assumed intensity, the problem is solved. If not, proceed to Step "d".
d. Assume a new rainfall intensity that is betwen that assumed in Step "a" and that determined in Step "c."
e. Repeat Steps "a" through "c" until there is good agreement between the assumed rainfall intensity and that obtained from Figures A-3.3 through A-3.7. Experience has shown that a solution can be found on the third iteration with little difficulty.

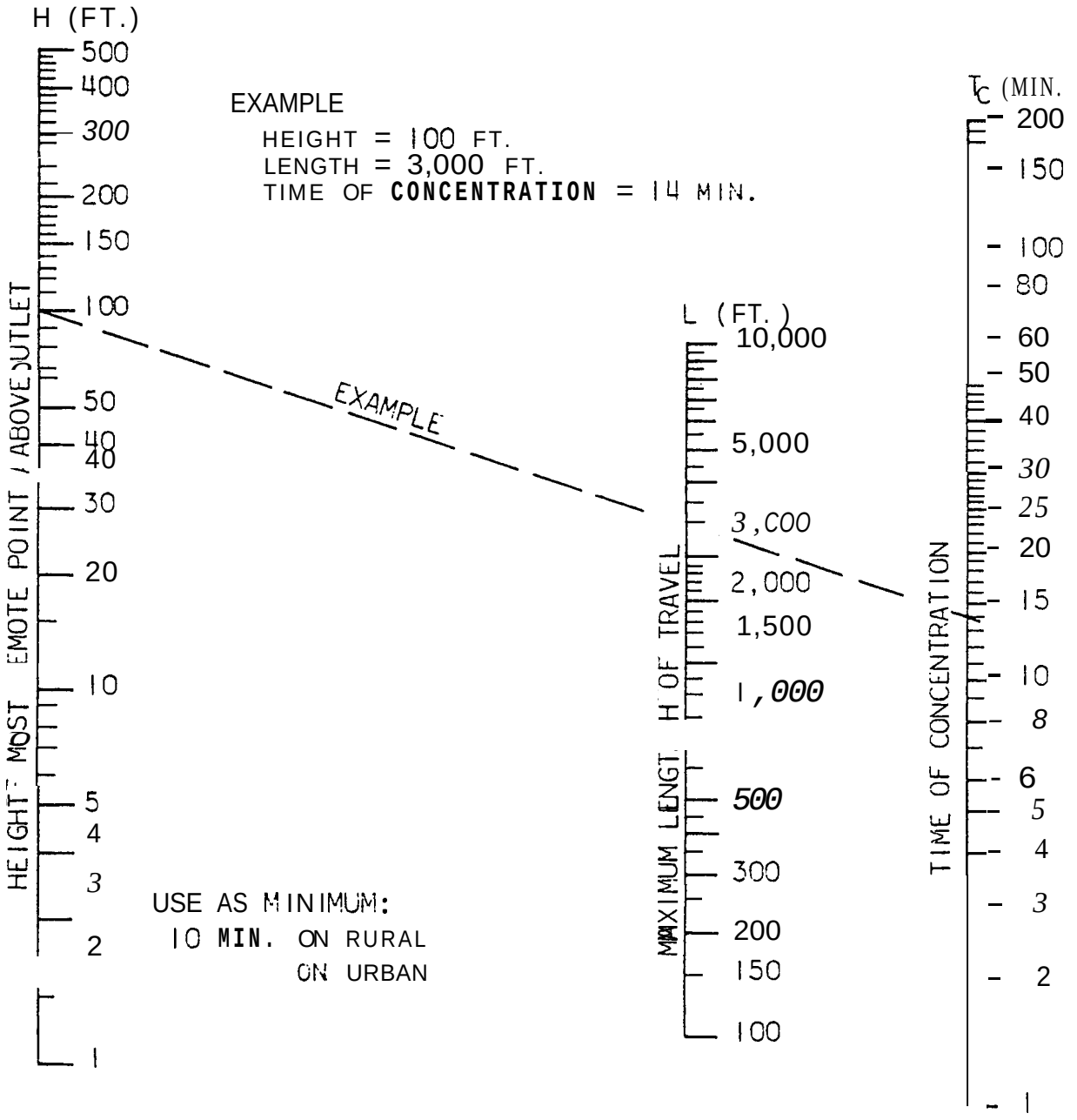
Generally, the time of concentration for overland flow is only a part of the overall design problem. Often one encounters swale flow, confined channel flow, and closed conduit flow-times that must be added as part of the overall time of concentration. When this situation is encountered, it is best to compute the confined flow-times as the first step in the overall determination of the time of concentration. This will give the designer a rough estimate of the time involved for the overland flow which will give a better first start on the rainfall intensity assumption. For example, if the flow time in a channel is 15 minutes and the overland flow time from this ridge line to the channels is 10 minutes, then the total time of concentration is 25 minutes. The channel flow can be determined by length divided by velocity.

4. Determine drainage Area "A" in the field or from contour maps.

5. Multiply the values of C x I x A to determine Q (cu. ft. per sec.).

6. Using "Q" as determined above, solve for size of structure required by use of Culvert Capacity Charts or nomographs.

Table A-3.2, p. A-3-10 may be used for organizing computation.



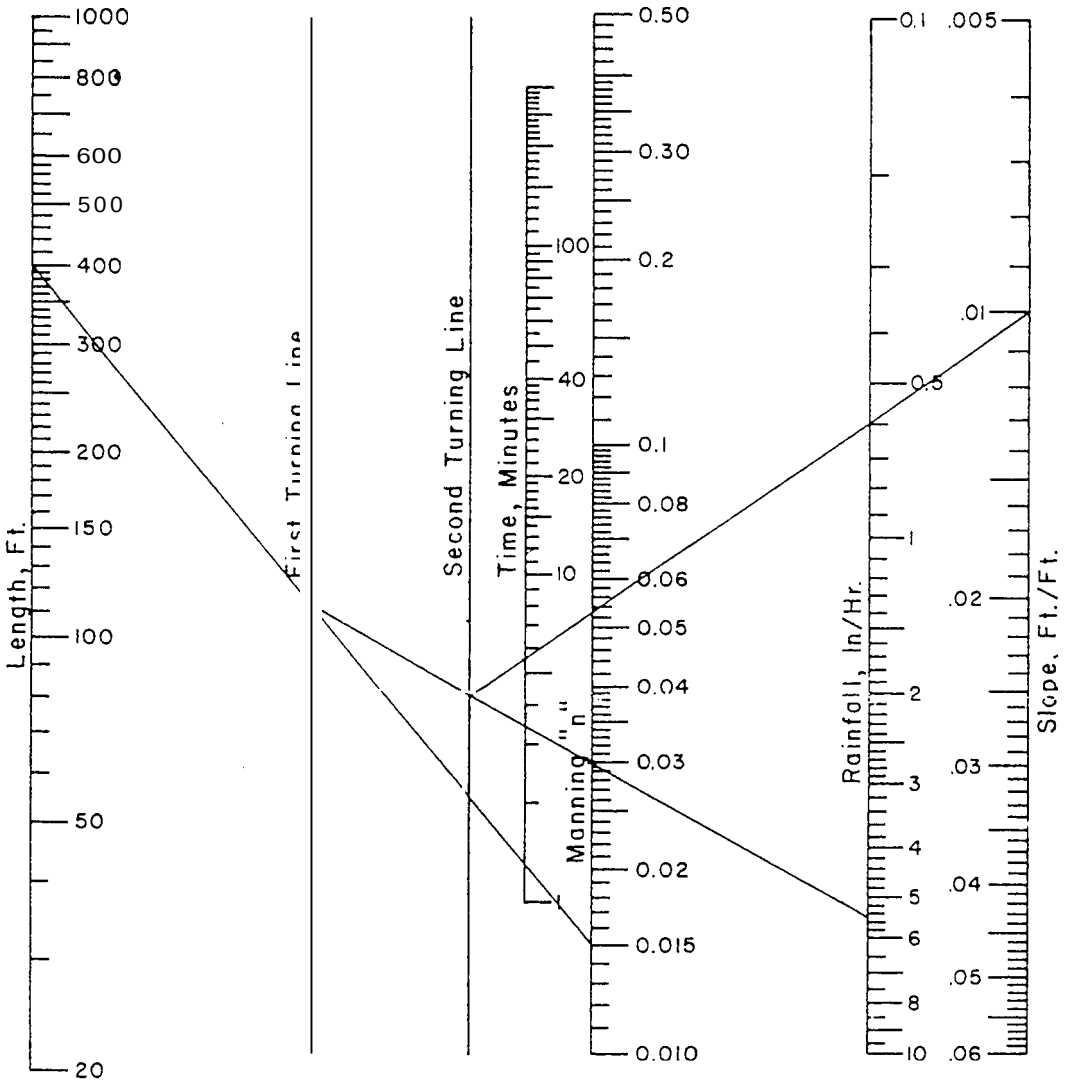
TIME OF CONCENTRATION OF SMALL DRAINAGE BASINS

Based on study by P. Z. Kirpich,
Civil Engineering, Vol.10, No.6, June 1940, p.362

Figure A-3.1

Equation solved by nomograph:

$$t_c\,(\text{Sec}) = 56\,\frac{L_o^{.6}\,n^{.6}}{i.4\,S_o^{.3}}$$



The initially assumed value of i and the nomograph value of t must be checked against the applicable intensity-duration-frequency curve by trial and error.

Example:

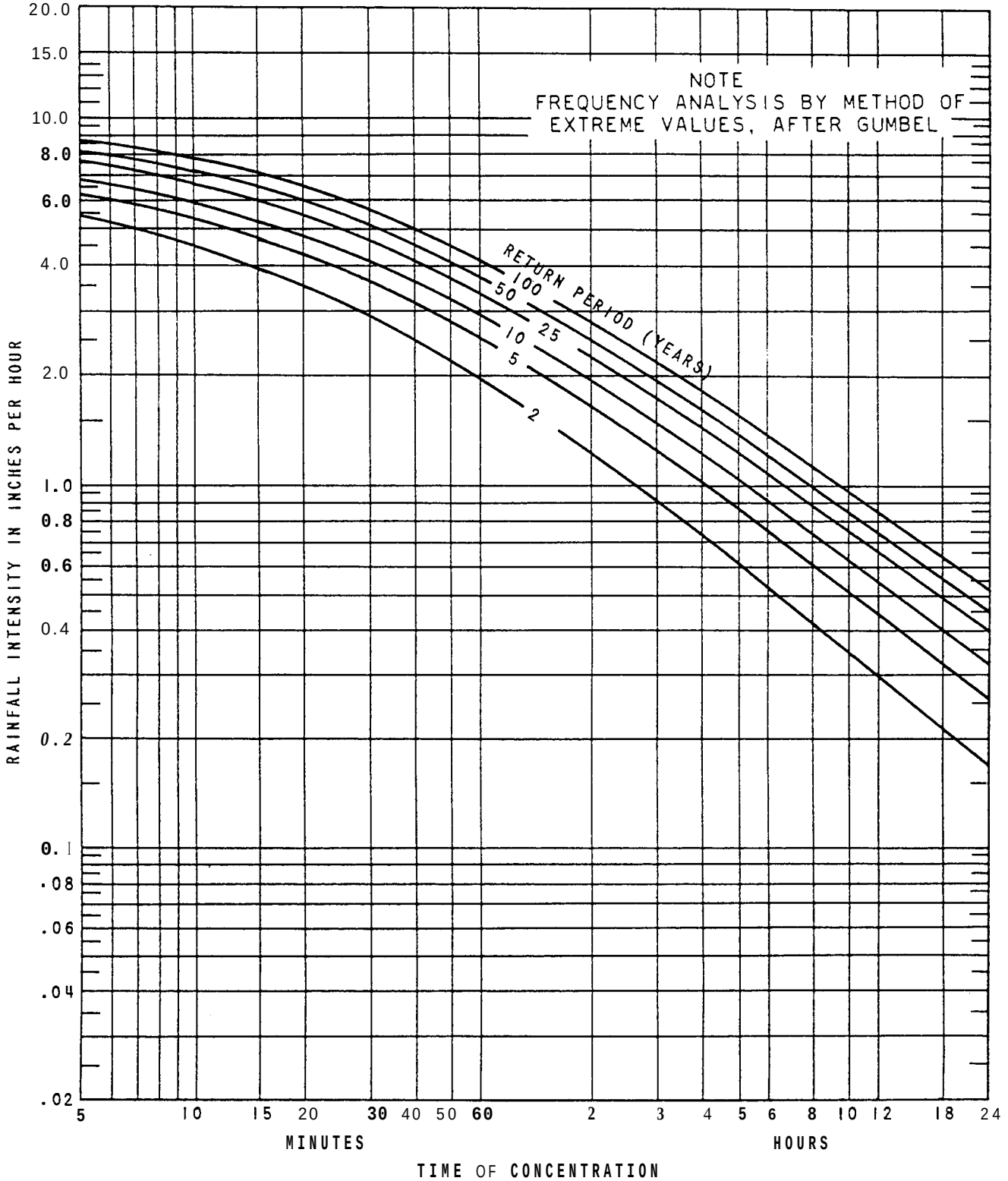
L_o = 400 ft.
n = 0.015
i = 5.5 in./hr.
S_o = 0.01
t = 5.5 min.

ONE INCH is 25.4mm
ONE FOOT is 0.3048m

Nomograph for determining time of concentration for overland flow, Kinematic Wave Formulation. *(After Ragan.)*

Figure A-3.2

SAVANNAH, GEORGIA
1903-1951



WEATHER BUREAU
TECHNICAL PAPER 25

Figure A-3.6

City of Waycross, Georgia
2015 CDBG Streets, Drainage & Utility Project
Preliminary Drainage Calculations
Runoff Calculations By Basin

BASIN	AREA		C	i	Q
	SF	Acres		(in/hr)	(CFS)
Pipe System Number 1					
1	6572	0.15	0.65	5.6	0.55
2	9510	0.22	0.65	5.6	0.79
3	6761	0.16	0.65	5.6	0.56
4	9576	0.22	0.65	5.6	0.80
5	4801	0.11	0.65	5.6	0.40
6	5358	0.12	0.65	5.6	0.45
7	8827	0.20	0.65	5.6	0.74
8	4974	0.11	0.65	5.6	0.42
9	5412	0.12	0.65	5.6	0.45
10	6292	0.14	0.65	5.6	0.53
11	4721	0.11	0.65	5.6	0.39
12	7916	0.18	0.65	5.6	0.66
13	7362	0.17	0.65	5.6	0.62
14	10115	0.23	0.65	5.6	0.85
15	7210	0.17	0.65	5.6	0.60
16	8783	0.20	0.65	5.6	0.73
17	5852	0.13	0.65	5.6	0.49
18	7220	0.17	0.65	5.6	0.60
Pipe System Number 2					
19	5768	0.13	0.65	6.0	0.52
20	7041	0.16	0.65	6.0	0.63
21	4633	0.11	0.65	6.0	0.41
22	6326	0.15	0.65	6.0	0.57
23	6130	0.14	0.65	6.0	0.55
24	4250	0.10	0.65	6.0	0.38
25	4834	0.11	0.65	6.0	0.43
26	4531	0.10	0.65	6.0	0.41
27	2685	0.06	0.65	6.0	0.24
28	2109	0.05	0.65	6.0	0.19
29	5301	0.12	0.65	6.0	0.47
30	7158	0.16	0.65	6.0	0.64
31	5582	0.13	0.65	6.0	0.50
32	6905	0.16	0.65	6.0	0.62

City of Waycross, Georgia
2015 CDBG Streets, Drainage and Utility Project
Preliminary Drainage Calculations
Pipe System No. One
Preliminary Pipe Sizes

Pipe No.	Calculated Runoff By Basin Number																		Total Flow in Pipe (CFS)	Approx. Pipe Slope	Pipe Size Reqd
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53	0.39	0.66	0.62	0.85	0.60	0.73	0.49	0.60			
W1	0.55																		0.55	0.00489	15
W2	0.55	0.79																	1.34	0.00489	15
W3			0.56																0.56	0.00489	15
W4	0.55	0.79	0.56	0.80															2.70	0.00489	15
W5							0.74	0.42											1.16	0.00489	15
W6								0.42											0.42	0.00489	15
R1						0.45													0.45	0.00489	15
R2					0.40	0.45													0.85	0.00489	15
R3	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42											4.71	0.00489	18
R4									0.45										0.45	0.00489	15
R5	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53									5.69	0.00489	18
O1												0.66							0.66	0.00489	15
O2											0.39	0.66							1.05	0.00489	15
O3													0.62						0.62	0.00489	15
O4											0.39	0.66	0.62	0.85					2.52	0.00489	15
O5	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53	0.39	0.66	0.62	0.85					8.21	0.00489	24
O6																0.73			0.73	0.00489	15
O7	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53	0.39	0.66	0.62	0.85	0.60	0.73			9.54	0.00489	24
O8																		0.60	0.60	0.00489	15
O9	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53	0.39	0.66	0.62	0.85	0.60	0.73	0.49	0.60	10.63	0.00489	24
O10	0.55	0.79	0.56	0.80	0.40	0.45	0.74	0.42	0.45	0.53	0.39	0.66	0.62	0.85	0.60	0.73	0.49	0.60	10.63	0.00489	24

City of Waycross, Georgia
2015 CDBG Streets, Drainage and Utility Project
Preliminary Drainage Calculations
Pipe System No. Two
Preliminary Pipe Sizes

Pipe No.	Calculated Runoff By Basin Number																		Total Flow in Pipe (CFS)	Approx. Pipe Slope	Pipe Size Reqd
	19	20	21	22	23	24	25	26	27	28	29	30	31	32							
	0.52	0.63	0.41	0.57	0.55	0.38	0.43	0.41	0.24	0.19	0.47	0.64	0.50	0.62							
I1	0.52																		0.52	0.00665	15
I2	0.52	0.63																	1.15	0.00665	15
I3	0.52	0.63		0.57															1.72	0.00665	15
I4	0.52	0.63	0.41	0.57															2.13	0.00665	15
I5	0.52	0.63	0.41	0.57	0.55	0.38	0.43	0.41	0.24	0.19									4.33	0.00665	18
I6											0.47								0.47	0.00665	15
I7	0.52	0.63	0.41	0.57	0.55	0.38	0.43	0.41	0.24	0.19	0.47	0.64							5.44	0.00665	18
I8													0.50						0.50	0.00665	15
I9	0.52	0.63	0.41	0.57	0.55	0.38	0.43	0.41	0.24	0.19	0.47	0.64	0.50	0.62					6.56	0.00665	21
I10																			0.00	0.00665	15
I11	0.52	0.63	0.41	0.57	0.55	0.38	0.43	0.41	0.24	0.19	0.47	0.64	0.50	0.62					6.56	0.00665	21
R6					0.55														0.55	0.00665	15
R7					0.55	0.38													0.93	0.00665	15
R8							0.43	0.41	0.24	0.19									1.27	0.00665	15
R9								0.41		0.19									0.60	0.00665	15

MEMO SUMMARIZING RESULTS

OF FIRE HYDRANT FLOW TESTS

Waycross

Opportunity in every direction.

Office of Fire Chief

March 26, 2015

To: Jessica Deal – City Engineer

Re: Need for Main and Hydrant Upgrade

An area of great concern to the Waycross Fire Department when it comes to fire protection is in the neighborhood of the streets involving Izlar Street, Owens Street, Walker Street, Roosevelt Street and Nichols Street.

We have two fire hydrants that are on Roosevelt Street to cover the majority of the houses on Roosevelt Street and the other streets listed. These hydrants are and have been out of service for years because they do not meet minimum water flow requirements. Furthermore, they are on a 4" main that is not accepted as sufficient water flow capacity according to the Insurance Services Office (ISO). Not having these hydrants in service creates a life safety issue to the citizens in the immediate area and responding firefighters. Not only is this a life safety issue it also directly effects the insurance premium of the property owners in this immediate area. This translates into higher costs for insurance.

On March 26, 2015 the Waycross Fire Department went to this area specifically to perform a flow test on these hydrants. We used the two hydrant flow test procedure recommended by the American Water Works Association (AWWA) Manual M-17 and National Fire Protection Association (NFPA) 291. The following are the results:

The Test Hydrant is located on the corner of Roosevelt Street and Nichols Street and is a modern style hydrant with (1) 4.5" steamer connection and (2) 2.5" nozzles. The flow hydrant is located on the corner of Roosevelt Street and Owens Street and is an older hydrant consisting of only (2) 2.5" nozzles.

Our static reading on the Test Hydrant was 46 psi. Once the flow hydrant was opened flowing only (1) 2.5" nozzle and settled we observed a residual pressure of 42 psi on the Test Hydrant. The test was shut down due to the low pressure drop and both nozzles of the flow hydrant were opened. The residual remained the same. The pitot reading of both pitot gauges on the flow hydrant nozzles was "0". When calculating these results using the Hazen-Williams Formula the flow values are very misleading and inaccurate.

We shut the testing down after documenting all the readings and attached a hydrant flow gauge to (1) of the 2.5" nozzles of the Test Hydrant. The lowest number reading on the gauge is 380 gpm, we did not get the needle/indicator to make it half way between "0" and 380 gpm. The minimum gallons per minute recognized by ISO are 250. The Waycross Fire Department would not use either of these hydrants for fire suppression operations.

David E. Eddins – Fire Chief

P.O. Drawer 99 • 417 Pendleton Street • Waycross, GA 31502-0099 • Tele: (912) 827-2937 • Fax: (912) 287-2904
www.waycrossga.com • E.O.E.

LETTERS DOCUMENTING COMPLETION OF ENGINEERING PLANS AND CONTRACT DOCUMENTS

P.O. Box 1895
Brunswick, Georgia 31521
(912) 223-0647

COASTAL ENGINEERING CONSULTANTS, INC.

March 27, 2015

Southern Georgia Regional Commission
Community Development
1725 South Georgia Parkway, W.
Waycross, Georgia 31503

Subject: **2015 CDBG Streets, Drainage and Utility Project**
City of Waycross, Georgia
Georgia Department of Community Affairs
Community Development Block Grant Program
Engineering Plans, Bidding and Contract Documents

To Whom It May Concern:

On behalf of the City of Waycross, Georgia Coastal Engineering Consultants, Inc. is pleased to provide this letter in support of the City's 2015 CDBG Application for the subject project. The engineering plans, specifications, bidding and contract documents for the subject project have been completed. These documents are currently under review by the following agencies:

Water Distribution System Improvements
Georgia Environmental Protection Division
Coastal District
400 Commerce Center Drive
Brunswick, Georgia 31523
Contact Person: Christopher Baranek
(912) 264-7284

Sanitary Sewer Improvements
Georgia Environmental Protection Division
Municipal Permitting Unit
2 MLK, Jr. Dr. SW, Suite 1152
Atlanta, Georgia 30334
Contact Person: Jennifer Goodman
(404) 463-4936

Erosion, Sediment & Pollution Control Plans
City of Waycross (Local Issuing Authority)
417 Pendleton Street
Waycross, Georgia 31502
Contact Person: Joey San Nicolas
(912) 287-2945 or (912) 281-0737

If you have any questions, do not hesitate to give me a call at (912) 223-0647.

Coastal Engineering Consultants, Inc.

N. John Hunkele, Jr., P.E.
President

CITY LETTERHEAD

March 27, 2015

Southern Georgia Regional Commission
Community Development
1725 South Georgia Parkway, W.
Waycross, Georgia 31503

Subject: **2015 CDBG Streets, Drainage and Utility Project**
City of Waycross, Georgia
Georgia Department of Community Affairs
Community Development Block Grant Program
Engineering Plans, Bidding and Contract Documents

To Whom It May Concern:

Please be advised that the engineering plans, specifications, bidding and contract documents for the subject project have been completed and the project is ready to bid subject to the final approval of the appropriate local and state authorities. These documents are currently under review by the following agencies:

Water Distribution System Improvements
Georgia Environmental Protection Division
Coastal District
400 Commerce Center Drive
Brunswick, Georgia 31523
Contact Person: Christopher Baranek
(912) 264-7284

Sanitary Sewer Improvements
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Erosion, Sediment & Pollution Control Plans
City of Waycross (Local Issuing Authority)
417 Pendleton Street
Waycross, Georgia 31502
Contact Person: Joey San Nicolas
(912) 287-2945 or (912) 281-0737

If you have any questions, do not hesitate to give me a call at (912) 287-2900.

City of Waycross

Clarence E. Billups
Mayor

CCTV INSPECTION REPORT