1. Call to Order/Roll Call

2. Approval of Meeting Minutes: January 16, 2019

3. Abbot Avenue Drainage

4. Dune Height Graphs – James Hickey, CGA

5. Public Comments (3-minute time limit per speaker)

6. Adjournment
1. Call to Order/Roll Call

The meeting was called to order at 6:32 p.m.

The following were present: Bertha Goldenberg
Deborah Cimadevilla
Clara Diaz-Leal
Andrea Travani

Also present: Daniel Dietch, Mayor, Town Commission Liaison
Lillian Arango, Town Attorney
James Hickey, Town Planner
Guillermo Olmedillo, Town Manager
Duncan Tavares, Asst. Town Manager
Elora Riera, Deputy Town Clerk
Sandra Lee, Calvin, Giordano and Associates, Inc.

2. Approval of Meeting Minutes: December 18, 2018

Committee Member Goldenberg made a motion to approve the meeting minutes as written. The motion was seconded by Committee Member Diaz-Leal and all voted in favor.

3. Election of Officers

Committee Member Travani commented that he would be willing to serve as the Chair.

Committee Member Cimadevilla made a motion to nominate Andrea Travani as Chair. The motion was seconded by Committee Member Diaz-Leal and all voted in favor.

Committee Member Diaz-Leal made a motion to nominate herself as the Vice Chair. The motion was seconded by Committee Member Cimadevilla and all voted in favor.

Nirit of 9032 Dickens Avenue asked about the role of the Vice Chair. Town Attorney Arango explained the process for public speakers and explained the role of the Vice Chair.
4. List of Environmental Resolutions and Ordinances – Guillermo Olmedillo, Town Manager

Town Manager Olmedillo provided the Committee with a list of environmental resolutions and ordinances that are already in place with the Town. He answered questions from the Committee.

Committee Member Goldenberg commented that Miami-Dade County revised their landscape ordinance in 2009 and no longer uses the term “city scape” and now uses the term “Florida friendly” and suggested that perhaps the Town should revise their ordinance as well. She also mentioned rain sensors and moisture sensors and questioned how the Committee would go about discussing these items.

Town Manager Olmedillo explained how the Committee works and that they report to the Town Commission unlike the prior Subcommittee that reported to the Planning and Zoning Board.

Mayor Dietch arrived at 6:43 p.m.

5. Beach and Dune Report Presentation – Sandra Lee, AICP CEP, LEED AP BD+C, CFM, Director Environmental, Calvin Giordano and Associates

Assistant Town Manager Tavares introduced the item to the Committee.

Sandra Lee of Calvin Giordano and Associates provided a Beach and Dune Report PowerPoint presentation. She answered questions from the Committee.

Committee Member Diaz-Leal requested to see a list of ocean front buildings that have not complied with the revised lighting requirements.

The Committee would like to see a list of each of the existing trash receptacles in Town and who is in charge of each.

Discussion ensued regarding the beach and dune report and how to begin the process of creating a beach and dune management plan. Town Manager Olmedillo stated that Ms. Wheaton will be available at the next meeting to present the Miami Beach plan that is in place.

The Committee discussed the different recommendations that were outlined in the report and would like to address the following items in the beach and dune management plan:

- Partner with a company who has a specific know how in dealing with the control of light pollution to work with the Town
- Recommendation to have signage regarding the beach at the ocean front condos and hotels
- Program to constantly remove all of the invasive vegetation
- Thorough professional cleaning of the vegetation and then search for alternatives of yearly maintenance of invasive species
- Revise title to read “Control Feral Animals”
Mayor Dietch suggested the following topics: sand quality, solid waste, ropes and posts, permitting, survey and ownership.

The Committee would like to discuss the dune management height at their next meeting.

6. Committee Priorities from the Town Commission
Mayor Dietch introduced the item and explained the priorities from the Town Commission. Mayor Dietch stated that one of them is the Dune and Beach Management Plan, the second one is the past, present and future of all the sustainability initiatives in order to tell the story. The third item is the Abbott Avenue drainage.

Assistant Town Manager Tavares commented that staff has earmarked the March meeting for the Abbott Avenue drainage report.

Chair Travani stated that they should work on identifying areas and one of the ones that is a big challenge for the Town is sea level rise. He spoke about the possibility of receiving information on how much water the soil in Town absorbs.

Board Member Cimadevilla encouraged all members to review the CGA report that was presented during the last Commission meeting regarding the Abbott Avenue drainage.

7. Public Comments
There were no public comments.

8. Adjournment
Vice Chair Diaz-Leal moved to adjourn the meeting at 8:42 p.m. Committee Member Goldenberg seconded the motion and all voted in favor.

Respectfully submitted:

Accepted this _____day of ____________________, 2019

Attest:

_______________________
Elora Riera, CMC
Deputy Town Clerk
MEMORANDUM

To: Honorable Mayor, Vice-Mayor and Members of the Town Commission

From: Guillermo Olmedillo, Town Manager

Date: December 11, 2018 / January 8, 2019

Subject: Abbott Avenue Drainage Improvements

The Town of Surfside is located on a low-lying barrier island between Biscayne Bay and the Atlantic Ocean and is susceptible to flooding due to tides, high water table, low lying grounds.

Drainage improvements were completed by the Town in 2013 under a FEMA grant to address water quality issues prior to discharge to the Bay. While the project did provide quantity/conveyance/storage improvements incidental to the quality improvements, that was not the primary focus of that project.

Over the past few years the Town has received numerous complaints of water standing in the Abbott Avenue roadway during common rain events. In response to these complaints, the Town commissioned Calvin, Giordano and Associates, Inc. (“CGA”) to perform a drainage study and prepare a report to identify the likely causes and recommended steps to mitigate or eliminate the standing water.

CGA has completed the study and has provided its report (Attachment “A” - Section Five of the Report), which concludes that the desired level of service, that will keep the streets dry at all times, for all drainage basins within the Town, cannot be met, but includes mitigating recommendations.

The options presented are:

Option 1,

a) Replace and upsize the existing conveyance pipes and storm inlets at 91st Street/Abbott Avenue intersection.
b) Replace and upsize the existing conveyance pipes and storm inlets at 92\textsuperscript{nd} Street/Abbott Avenue intersection.

c) Provide a Pump Station (2,250 GPM) at the intersection of Abbott Avenue and 92\textsuperscript{nd} Street discharging into Indian Creek by a 12" diameter force main. The new 12" drainage FM shall be constructed in place of existing abandoned 8" WM along 92\textsuperscript{nd} Street.

d) Provide 24" diameter conveyance pipe along Abbott Avenue between 91\textsuperscript{st} Street and the new proposed pump station.

e) Provide additional curb inlets along Abbott Avenue between 90\textsuperscript{th} Street and 92\textsuperscript{nd} Street.

f) The construction constraints for these improvements would be existing underground FPL/AT&T facilities along Abbott Avenue and existing Electric Poles behind back of curb. Relocation of FPL poles and underground FPL and AT&T facilities might be needed for these proposed improvements.

*Estimated cost including design, permitting and construction is $982,000.*

**Option 2.**

a) Implementation of all improvements of Option 1.

b) Provide three new pressurized drainage wells and a new pump station (10,500 GPM) at the west end of 92\textsuperscript{nd} Street.

c) As an alternative option, the existing Pump Station at 92nd Street can be replaced with the new proposed pump station and the new pressurized drainage wells.

*Estimated cost including design, permitting and construction is $1,720,000.*

**Option 3.**

a) Implementation of all improvements of Options 1 and 2.

b) Provide 48" conveyance Trunk line along 91\textsuperscript{st} Street.

c) This option will require extensive utility reconstruction/relocation and complete roadway restoration to construct the proposed 48" drainage pipe.

*Estimated cost including design, permitting and construction is $4,971,000.*
Any of these options may be financed by one or more of the following:

1. Borrow for the project.
2. Use Stormwater reserves for the project.
3. Levy a special assessment on the properties that benefit from the improvement.
4. Use property tax revenues to fund the project.

From the consultant’s report we can conclude that the fiscally prudent way to engage in these improvements is to start with Option 1, and evaluate the performance of these improvements, then consider the additional suggested improvements.

Town Administration is recommending to engage CGA to provide design and permitting services to facilitate the recommended improvements in Option 1, and budget funds to construct the improvements in the upcoming fiscal year’s budget.
SECTION FIVE

STORMWATER MODELING – PROPOSED IMPROVEMENTS

5.1 FLOOD ROUTING FOR PROPOSED IMPROVEMENTS

After evaluation of the existing conditions and ICPR model of the Town’s master drainage system, CGA analyzed various alternatives and ICPR models to develop recommendations to help alleviate the deficiencies in the drainage system of Abbott Avenue.

The following general considerations were the basis to develop the recommendations:

a) The improvements need to be permissible with all regulatory agencies and be in general compliance with current design criteria set-up for acceptable stormwater practices in SFWMD and DRER.

b) The improvements need to provide a reliable upgrade and upsizing of the system to alleviate flood conditions.

c) The improvements need to be cost effective.

d) The improvements should not negatively impact adjacent properties.

e) The improvements need to be maintainable by the operating entity or the Town’s Public Works Department.

f) The proposed improvements need to be feasible and achievable.

5.2 PROPOSED IMPROVEMENTS

Various measures and solutions were researched to improve the existing flood protection level of service. The most appropriate solutions were incorporated into alternative ICPR models for proposed conditions. Please refer to Appendix D, Appendix E, and Appendix F for ICPR Models for Proposed Improvements. Based on the model results, CGA offers the following improvements to be implemented for the Abbott Avenue drainage system and Surfside master drainage system:

Option 1:

a) Replace and upsize the existing conveyance pipes and storm inlets at 91st street /Abbott Avenue intersection.

b) Replace and upsize the existing conveyance pipes and storm inlets at 92nd street /Abbott Avenue intersection.

c) Provide a Pump Station (2,250 GPM) at the intersection of Abbott Avenue and 92nd Street discharging into Indian Creek by a 12” diameter force main. The new 12” drainage FM shall be constructed in place of existing abandoned 8” WM along 92nd Street.

d) Provide 24” diameter conveyance pipe along Abbott Avenue between 91st street and the new proposed pump station.

e) Provide additional curb inlets along Abbott Avenue between 90th Street and 92nd Street.

f) The construction constraints for these improvements would be existing underground FPL/AT&T facilities along Abbott Avenue and existing Electric Poles behind back of curb. Relocation of FPL poles and underground FPL and AT&T facilities might be needed for these proposed improvements.
Option 2:

a) Implementation of all improvements of Option 1.
b) Provide three new pressurized drainage wells and a new pump station (10,500 GPM) at the west end of 92nd Street.
c) As an alternate option, the existing Pump Station at 92nd Street can be replaced with the new proposed pump station and the new pressurized drainage wells.

Option 3:

d) Implementation of all improvements of Option 1 and Option 2.
e) Provide 48" conveyance Trunk line along 91st Street.
f) This option will require extensive utility reconstruction/relocation and complete roadway restoration to construct the proposed 48" drainage pipe.

The above described improvements will significantly improve the existing level of service for high intensity short-duration storm events. However, due to the deficiencies of the overall master drainage system including insufficient number of pump stations and drainage wells, inadequate size of storm drains, inadequate number of storm inlets, the required level of service for all drainage basins will never be met. The preliminary construction cost estimate for these options is as follows:

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Option 1</td>
<td>$982,000</td>
</tr>
<tr>
<td>Option 2</td>
<td>$1,720,000</td>
</tr>
<tr>
<td>Option 3</td>
<td>$4,971,000</td>
</tr>
</tbody>
</table>
Calvin, Giordano, and Associates, Inc. (CGA) has performed a drainage study to evaluate and assess the existing drainage conditions along Abbott Avenue from 90th Street to 96th Street and to offer recommendations for improvements to resolve issues with reported ponding and setting water. This report describes related information discovered during site reconnaissance and project research and provides options, based on computer modeling, which alleviate the flooding.

OBJECTIVE OF THE STUDY
MAGNITUDE OF FLOOD

Flooding with an unspecified elevation and duration has been occurring in the subject site and the adjacent neighborhoods. Recent flood complaints and site observations suggest that the subject corridor experiences approximately 1 foot or higher flood waters during frequent short-duration, high-intensity (±1 inch/hour) rainfall events.
BASIN CHARACTERISTICS

• The Town of Surfside is very low-lying area and the existing roadway elevations range from 2.80 feet NGVD to 5.50 feet NGVD on average.

• The average wet season ground water elevation is 1.60 feet NGVD. There are not sufficient number of storm inlets or catch basins to capture stormwater runoff.

• The stormwater conveyance system is insufficient and can’t carry the stormwater runoff efficiently through the existing pipe network and outfalls.

• The existing pipe sizes range from 10” diameter to 36” diameter. All the pipe networks are restricted by physical weirs (Elevation 2 feet NGVD) at the outfall locations, which have been mandated by permit for the purpose of maintaining the water quality regulatory requirement.
Drainage water flows into the structure.

Sediment, silt, sand debris falls here as it is heavier than water.

Elevation +2.0 NGVD-Water must reach this minimal elevation to be conveyed through the system.

Cleaner water flows out to wells or bay.

Although this system protects the environment by removing a portion of the pollutants prior to discharge, it also impedes drainage water flow off streets and to its final destination.
• The Town recently constructed three pump stations and nine drainage wells to improve the water quality of the receiving waters (by discharging the drainage water into wells rather than Bay).

• Project was completely funded by FDEP with their goal being reduction of pollutants and not stormwater conveyance. Project was confined to Bay Dr.

• Abbott Avenue is located along the east side of the Town, at the hydraulically most remote point of the drainage basin from the outfall discharge location. It is approximately 2,000 feet away from existing pump stations and outfalls.
SUMMARY OF CAUSES OF FLOODING

1. Abbott Avenue is, hydraulically, the most remote location from outfalls
2. Flat roadway profile and low grades
3. Naturally high ground water elevation
4. Insufficient size of existing conveyance pipe
5. Inadequate number of existing catch basins or storm inlets
6. Presence of permit-mandated water quality weirs within the control structures
7. Capacity of the master drainage system

ABBOTT AVE AT 91ST STREET, OCTOBER 3, 2016 (ESTIMATED 3.0 INCHES OF RAIN)
91ST STREET AT ABBOTT AVE INTERSECTION, OCTOBER 3, 2016 (ESTIMATED 3.0 INCHES OF RAIN)
LEVEL OF SERVICE (LOS) FOR ROADWAY

The following are the expected level of service:

1. Flood elevation or storm stage resulting from 5-year design storm events shall not encroach up to the roadway crown elevation.
2. Roadway spread resulting from 4 inch/hour intensity storm shall not encroach more than half of the travel lane width.
3. Hydraulic grade line resulting from 3-year 1-hour design storm shall not exceed the storm inlet grate elevation.

ABBOTT AVE, JUNE 7, 2017 (ESTIMATED 1.5 INCHES OF RAIN)

ABBOTT AVE, JULY 23, 2018 (ESTIMATED 1.0 INCHES OF RAIN)
LOS 1 - FLOOD ELEVATION OR STORM STAGE RESULTING FROM 5-YEAR DESIGN STORM EVENTS
Flood waters not exceeding more than 1/2 of travel lane width

LOS 2 - ROADWAY SPREAD
RESULTING FROM 4" PER HOUR INTENSITY STORM
Flood waters shall not exceed the storm inlet grate elevation

LOS 3 - HYDRAULIC GRADE LINE
RESULTING FROM A 3-YEAR 1-HOUR DESIGN STORM
WHAT IS REQUIRED FOR PROPER DRAINAGE

Every drainage system has 3 parts:

Collection       Transmission       Discharge

These 3 parts work like links in a chain, and will only operate to a level of service as good as the weakest link in the chain.

**Collection:**
This link determines how the storm water gets into the pipes and consists of road slope and elevation, curb and gutter layout and design and drainage inlets and catch basins.

**Transmission:**
This link determines how the storm water is transmitted from the roadways to its final destination and it consists of the drainage pipes, structures, weirs, baffles and pump stations.

**Discharge:**
This link determines how and where the stormwater ends up and consists of drainage wells, pump stations and Bay outfall discharge pipes. Improving one link while ignoring the others may only have a marginal impact on the Town’s Level of Service Improvement.
Surface runoff enters the underground storm drain system and flows either to a drainage well or into the bay.
Discharge
PROPOSED IMPROVEMENTS

• The study reveals that, regardless of the proposed improvements, complete level of service compliance is not feasible, and the identified deficiencies can’t be completely eliminated.

• The study also reveals that noticeable improvements in level of service may be achieved by implementing any one or a combination of the following improvements:

1. increasing conveyance pipe sizes (Transmission),
2. increasing the number of storm inlets (Collection),
3. increasing the roadway profile slope (Collection),
4. adding a pump station at 92nd Street and Abbott Avenue intersection discharging into the Indian Creek (Discharge),
5. adding a pump station and 3 associated drainage wells at the west end of 92nd Street, or replacing the existing pump station of 92nd Street with a new-higher capacity pump Station and drainage wells (Transmission and Discharge).
OPTION 1 IMPROVEMENTS:

a) Provide additional curb inlets along Abbott Avenue between 90st Street and 92nd Street (Collection).

b) Replace and upsize the existing conveyance pipes and storm inlets at 91st street /Abbott Avenue intersection (Collection & Transmission).

c) Replace and upsize the existing conveyance pipes and storm inlets at 92nd street /Abbott Avenue intersection (Collection & Transmission).

d) Provide 24” diameter conveyance pipe along Abbott Avenue between 91st street and the new proposed pump station (Transmission).

e) Provide a Pump Station (2,250 GPM) at the intersection of Abbott Avenue and 92st Street discharging into Indian Creek by a 12” diameter force main (Discharge).

f) The construction constraints for these improvements would be existing underground FPL/AT&T facilities along Abbott Avenue and existing Electric Poles behind back of curb. Relocation of FPL poles and underground FPL and AT&T facilities might be needed for these proposed improvements.
EXISTING UTILITY CONSTRAINTS

ABBOTT AVE AT 92ND STREET (LOOKING SOUTH)

EXISTING GAS MAIN, WATER MAIN, FPL AND AT&T DUCT BANKS ALONG ABBOTT AVE

ABBOTT AVENUE AT 92ND STREET (LOOKING NORTH)

FPL POLES BEHIND BACK OF CURB
OPTION 2 IMPROVEMENTS:

a) Implementation of all improvements of Option 1.
b) Provide three new pressurized drainage wells and a new pump station (10,500 GPM) at the west end of 92nd Street (Discharge).
c) As an alternate option, the existing Pump Station at 92nd Street can be replaced with the new proposed pump station and the new pressurized drainage wells (Discharge).

OPTION 3 IMPROVEMENTS:

d) Implementation of all improvements of Option 1 and Option 2.
e) Provide 48” conveyance Trunk line along 91st Street (Transmission).
f) This option will require extensive utility reconstruction/relocation and complete roadway restoration to construct the proposed 48” drainage pipe.

COST ESTIMATE FOR OPTIONS:

Construction and design cost for option 1 $982,000*
Construction and design cost for option 2 $1,720,000*
Construction and design cost for option 3 $4,971,000*

*Subject to cost fluctuations due to timing of RFP/Bidding and current market conditions.
# OPTION #1

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<td>12</td>
<td>Milling &amp; Resurface</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
<td>$20,000.00</td>
</tr>
<tr>
<td>13</td>
<td>Drainage Pump Station</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
<td>$100,000.00</td>
</tr>
<tr>
<td>14</td>
<td>12&quot; HDPE Drainage FM</td>
<td>2,000</td>
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<td></td>
<td>$170,000.00</td>
</tr>
<tr>
<td>15</td>
<td>Modified Curb &amp; Gutter</td>
<td>900</td>
<td>LF</td>
<td></td>
<td></td>
<td>$17,100.00</td>
</tr>
<tr>
<td>16</td>
<td>Swale / SOD restoration</td>
<td>1,000</td>
<td>SY</td>
<td></td>
<td></td>
<td>$2,500.00</td>
</tr>
<tr>
<td>17</td>
<td>Utility Adjustment/Relocation</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
<td>$100,000.00</td>
</tr>
<tr>
<td>18</td>
<td>3- 24&quot; dia drainage wells and pump station system</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
<td>$500,000.00</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $1,165,005.00

**TOTAL** $1,165,005.00

- 20% Contingency = $233,001.00
- Design/Permitting Services (13%) = $181,740.78
- Construction Engineering & Inspection Services (10%) = $139,800.00

**Cost Total** $1,716,547.38
## OPTION #3

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
<th>UNIT</th>
<th>UNIT PRICE MAT. &amp; LAB</th>
<th>ESTIMATED AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization</td>
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<td>LS</td>
<td>5%</td>
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<tr>
<td>2</td>
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<td>LS</td>
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<tr>
<td>3</td>
<td>Pavement Marking &amp; Signage</td>
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<td>LS</td>
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<tr>
<td>7</td>
<td>Storm Inlets</td>
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<td>EA</td>
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<tr>
<td>8</td>
<td>Storm Manholes</td>
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<tr>
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<td>LF</td>
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<tr>
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<td>LS</td>
<td>$20,000.00</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>13</td>
<td>Drainage Pump Station</td>
<td>1</td>
<td>LS</td>
<td>$100,000.00</td>
<td>$100,000.00</td>
</tr>
<tr>
<td>14</td>
<td>12' HDPE Drainage FM</td>
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<td>$85.00</td>
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<td>15</td>
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<td>$19.00</td>
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</tr>
<tr>
<td>16</td>
<td>Swale / SOD restoration</td>
<td>100</td>
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<td>$2.50</td>
<td>$250.00</td>
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<td>$100,000.00</td>
<td>$100,000.00</td>
</tr>
<tr>
<td>18</td>
<td>3- 24&quot; dia drainage wells and pump station system</td>
<td>1</td>
<td>LS</td>
<td>$300,000.00</td>
<td>$300,000.00</td>
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<tr>
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<td>21</td>
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</tr>
</tbody>
</table>

**SUBTOTAL** $3,367,564.10

**TOTAL** $3,367,564.10

20% Contingency = $673,512.82

Design/Permitting Services (13%) = $525,340.00

Construction Engineering & Inspection Services (10%) = $404,107.69

Cost Total $4,970,524.61
### Resultant Road Flooding Depth above Edge of Pavement (5 Year Frequency Storm**)

<table>
<thead>
<tr>
<th>Areas of Concern/Sub-Basin</th>
<th>Existing Flooding Conditions</th>
<th>Inches of Flooding Option 1</th>
<th>Inches of Flooding Option 2</th>
<th>Inches of Flooding Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbott Ave (Basin 3)</td>
<td>10.68” to 16.08”</td>
<td>9.84” to 15.60”</td>
<td>5.16” to 12.00”</td>
<td>3.48” to 9.60”</td>
</tr>
<tr>
<td>Abbott Ave (Basin 4)</td>
<td>11.88” to 17.28”</td>
<td>11.04” to 16.80”</td>
<td>8.40” to 13.20”</td>
<td>5.52” to 10.80”</td>
</tr>
</tbody>
</table>

**The rainfall depths of 5-year/1-hour and 5-year/24-hour storm events are 3.20 inches and 6.50 inches respectively.**
### Resultant Road Flooding Depth above Road Crown (5 Year Frequency Storm**)

<table>
<thead>
<tr>
<th>Areas of Concern/ Sub-Basin</th>
<th>Existing Flooding Conditions</th>
<th>Inches of Flooding Option 1</th>
<th>Inches of Flooding Option 2</th>
<th>Inches of Flooding Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbott Ave (Basin 3)</td>
<td>0.00” to 5.28”</td>
<td>0.00” to 4.80”</td>
<td>0.00” to 1.20”</td>
<td>0.00” to 0.00”</td>
</tr>
<tr>
<td>Abbott Ave (Basin 4)</td>
<td>1.08” to 6.48”</td>
<td>0.24” to 6.00”</td>
<td>0.00” to 2.40”</td>
<td>0.00” to 0.00”</td>
</tr>
</tbody>
</table>

**The rainfall depths of 5-year/1-hour and 5-year/24-hour storm events are 3.20 inches and 6.50 inches respectively.
RECOMMENDATIONS

It is recommended that improvements be constructed as presented in this analysis with an emphasis on practical improvement, not in an attempt to meet the full level of service requirements.

Option 1 will provide a mechanism to remove stormwater from Abbott Ave with some reduction of peak stages. However, it does not provide full level of service requirements. The ICPR model indicates that the peak stages resulting from 5-year/1-hour and 5-year/24-hour storm events reach the road crown elevation along Abbott Ave.
Option 2 should be viewed as a necessary part of reducing flood stages and is recommended by this drainage study. Pipes or pipe replacement sizes would be subject to further design analysis and practical matters like existing utility conflicts. The ICPR model indicates that the peak stages resulting from 5-year/1-hour storm are below the road crown elevation. However, the peak stages resulting from 5-year/24-hour storm events reach the road crown elevation along Abbott Ave.

Due to the magnitude of site disturbance and total reconstruction requirement of roadways, drainage and existing utilities, Option 3 is not recommended by this study. However, it can be considered if the Town desires to make incremental improvements to its master drainage system over time with the ultimate goal of eventually meeting the level of service requirements at some point in the future.