TECHNICAL MEMORANDUM

Date: September 15, 2022

To: Leondrae D. Camel, City Manager
Edgar Kerr, Public Works Director

From: Mohan Thampi, PE, Project Manager, CAP Engineering
Rolando Alvarez, EI, Project Engineer, CAP Engineering

RE:_Evaluation of Options for Possible Immediate Road Repairs for NW 6th Avenue, NW 7th Avenue, NW 9th Avenue, NW 10th Avenue, NW 11th Avenue, NW 12th Avenue, SW 5th Avenue, and SW 6th Avenue, and SW 11th Avenue (DRAFT)

1. INTRODUCTION:

At the September 6 Commission meeting, City Commissioner Taranza McKelvin brought up the question of evaluating immediate road repairs for the following roads listed:

1. NW 6th Avenue, 400'Lx26'W
2. NW 7th Avenue, 500'Lx26'W
3. NW 9th Avenue, 1,300'Lx26'W
4. *NW 10th Avenue, 1,300'Lx26'W (already under design and construction in 2023)*
5. NW 11th Avenue, 1,200'Lx26'W
6. NW 12th Avenue, 1,200'Lx26'W
7. SW 5th Avenue, 1,300'Lx26'W
8. SW 6th Avenue, 1,300'Lx26'W
9. SW 11th Avenue 1,200'L x 20'W

The list was transmitted by City Manager to the City Engineer at CAP Engineering for evaluation of road repair options and construction cost estimates. As it turns out only the previous month, City had just authorized CAP Engineering to do an overall Road Evaluation Study Report of all South Bay roads. The City Manager when giving the authorization to start in August 5, 2022, had requested that CAP Engineering identify and list the worst roads for

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repair and provide a preliminary report for grant fund applications. Not surprisingly, the roads listed above match what CAP Engineers have also identified as the roads needing repair priority.

We used data from field inspections conducted over the last month to help evaluate and prepare a preliminary technical memorandum with cost estimates for repairing these roads. Further, as CAP engineers have been involved the last 5 years in design and construction of selected roads from FDOT Small Community grants, thus are knowledgeable of South Bay's road deficiencies and have geotechnical reports on the pavement and limerock base condition from recent road design investigations. It is like riding a rollercoaster because of the large road depressions, cracked asphalt, broken curbs and sidewalks, poor drainage mainly because the road base foundation has failed. The South Bay area has deep layer of muck which needs to be removed and replaced with deeper limerock base foundation with geogrids. It is apparent that majority of South Bay roads need complete reconstruction of the roads, curbs and sidewalks.

Piecemeal or patchwork repairs by asphalt milling and resurfacing are not recommended as the road base foundations have failed entire road lengths due to the deep muck layer beneath all South Bay roads. Ongoing construction photos of road asphalt layers demolished to reconstruct roads like SW 10th Avenue indicate up to 12-inch thick asphalt layers from previous repairs when it should normally be 2-inch thick. Thus, it is known that this type asphalt milling and resurfacing type repair has been done in the past, but the same road problems continue. Asphalt is flexible pavement, such that without reconstructing the road base foundation and demucking, the new asphalt resurfacing repair layer over existing asphalt will continue to sink and crack.

As requested, we inspected and evaluated the list of roads provided for possible immediate repair by: Option 1- Complete Entire Road Reconstruction; Option 2 - Milling and Resurfacing Asphalt of Entire Road; and Option 3 – Partial Milling and Resurfacing of Asphalt in Selected Road Sections. The inspection methods and costs estimates for the road are described in the following sections.

2. INSPECTION METHODOLOGY:

Evaluation inspections for the above-mentioned roads were performed by CAP Engineering, Inc. between August 8th and September 9th, 2022, and are still ongoing for remainder of the other roads in South Bay. The inspections performed documented visible features showing asphalt pavement distress at the road surface and limerock base failure. Measurements of the overall roadway were taken in addition to general sizes of potholes, cracking, and depressions. Only visual inspections were performed. The intent of this report is to provide the City of South Bay an evaluation of current conditions of the worst roads mentioned above and feasibility of immediate repairs. Basically, all the roads evaluated are two lane residential roads with curb and sidewalks as illustrated below:

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The result of the inspection for each road are presented in the attached Appendices and summarized in Table 1. Exhibit 1 shows a typical road cross-section for these South Bay roads. NW 10th Avenue is not evaluated as it is currently under design for complete road, water & sewer replacement and reconstruction.

3. REPAIR OPTIONS EVALUATED :

Option 1: Complete Replacement and Reconstruction of Entire Road: This is the current recommended repair option for most South Bay Roads. This method removes and replaces the entire limerock road base, with new and deeper limerock base and sub-base with geogrid reinforcement after demucking a foot more, and then paved over with new asphalt, new curbs and sidewalks, stormwater inlet refurbishment/replacement, and new road signs and markings. This the recommended method for South Bay roads because of the severe depressions and crack. Design and construction costs of doing this reconstruction for each road is presented in the following Table 1. Construction management and inspection costs are not included.

Option 2: Asphalt Milling & Resurfacing of Entire Road: This repair method basically removes about 4 inches of existing asphalt by milling and replaces with up to 4 to 6 inches of new asphalt where severe depressions may need up 12 -inches. This repair method is not recommended for roads with severe base failure as this option does not address the underlying road base foundation problem and road distress will continue to be present shortly after completion. However, a design and construction cost for doing Option 2 work for each road is presented in Table 1.

Option 3: Milling and Filling Depressions in Selected Road Sections with Asphalt: This is a patchwork and piecemeal repair by filling depressions with asphalt just like pothole repairs except that these are very large road depressions than standard potholes. This will only serve as a temporary patch and must be done after sections of sunken curbs are rebuilt. Like Option 2, this option does not address the underlying road base foundation problem and road distress will continue to be present shortly after completed. However, none of the roads evaluated were found to have partially poor sections whereas the entire road was poor and needed to be repaired by Option 1 or 2. So this repair was determined not feasible.

4. ROAD EVALUATION FINDINGS

Based on the methodology described above and findings for each road described in this memorandum and appendices, the costs and recommendation for the road repair options the roads evaluated are summarized in the following Table 1.

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Table 1- Summary of Findings

Road	Option 1 Cost	Option 2 Cost	Option 3 Cost	Recommendation
1. NW 6th Avenue	**$423,500**	**$169,400**	**Not Applicable**	**Option 1**
2. NW 7th Avenue	**$528,847**	**$211,541**	**NA**	**Option 1**
3. NW 9th Avenue	**$1,375,000**	**$550,000**	**NA**	**Option 1**
4. NW 11th Avenue	**$1,269,400**	**$508,200**	**NA**	**Option 1**
5. NW 12th Avenue	**$1,269,400**	**$508,200**	**NA**	**Option 1**
6. SW 5th Avenue	**$1,375,000**	**$550,000**	**NA**	**Option 1**
7. SW 6th Avenue	**$1,375,000**	**$550,000**	**NA**	**Option 1**
8. SW 11th Avenue	**$1,269,400**	**$508,200**	**NA**	**Option 1**
** NW 10th Avenue*	*$1,375,000*	*NA*	*NA*	*Option 1 - under design with FDOT grant for construction in 2023*

**Not evaluated as already under design for construction next year in 2023.*

5. RECOMMENDATION

All South Bay roads in the list studied are in very poor condition for their entire lengths. Even though the asphalt layer is cracked and looks drivable, the large road depressions makes driving feel like a rollercoaster ride with sharp jolts The main cause of road depressions is road limerock base foundation failure because of the muck layer found under South Bay. These roads road need complete replacement and reconstruction of the entire road, curbs, and sidewalk and stormwater improvements which is Option 1. A temporary repair could be made just milling and resurfacing the entire road with asphalt like in Option 2 but the problem will reoccur shortly after repair. Piecemeal repair of selected sections of the road as in Option 3 is not considered for any of these eight roads evaluated as the problem is over the entire length of all these roads.

Attachments: Exhibit 1- Typical Road Cross-section
Appendices 1 to 8 – Road Evaluations.

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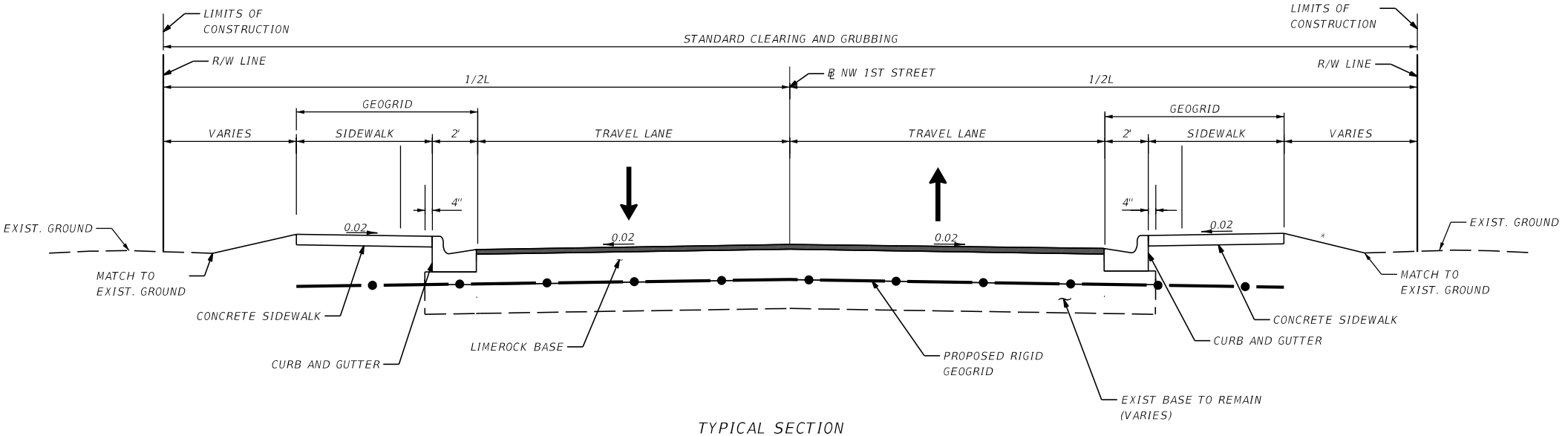
EXHIBIT 1



TYPICAL SECTION

APPENDIX 1

1. **NW 6th Ave Evaluation**

ROADWAY OVERALL QUALITY:
The overall pavement quality found on NW 6TH avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk have sunk and lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 1.0 and Figure 1.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 1.0

Figure 1.1

DEPRESSIONS:
Depressions found on NW 6th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 1.2 and Figure 1.3 are of main concern along NW 6th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 1.2

Figure 1.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 1.4

Figure 1.5

Figure 1.6

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along NW 6th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 1.7 and 1.8 represent typical deficiencies found.

Figure 1.7

Figure 1.8

REPAIR OPTIONS for NW 6th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire NW 6th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire NW 6th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire NW 6th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money, and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR NW 6th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR NW 6th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$385,000.00 (construction) $38,500.00 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$154,000.00 (construction) $15,400.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 2

NW 7th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on NW 7TH avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations, sidewalk is leaning back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 2.0 and Figure 2.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 2.0

Figure 1.1

DEPRESSIONS:

Depressions found on NW 7th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 2.2 are of main concern along NW 7th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

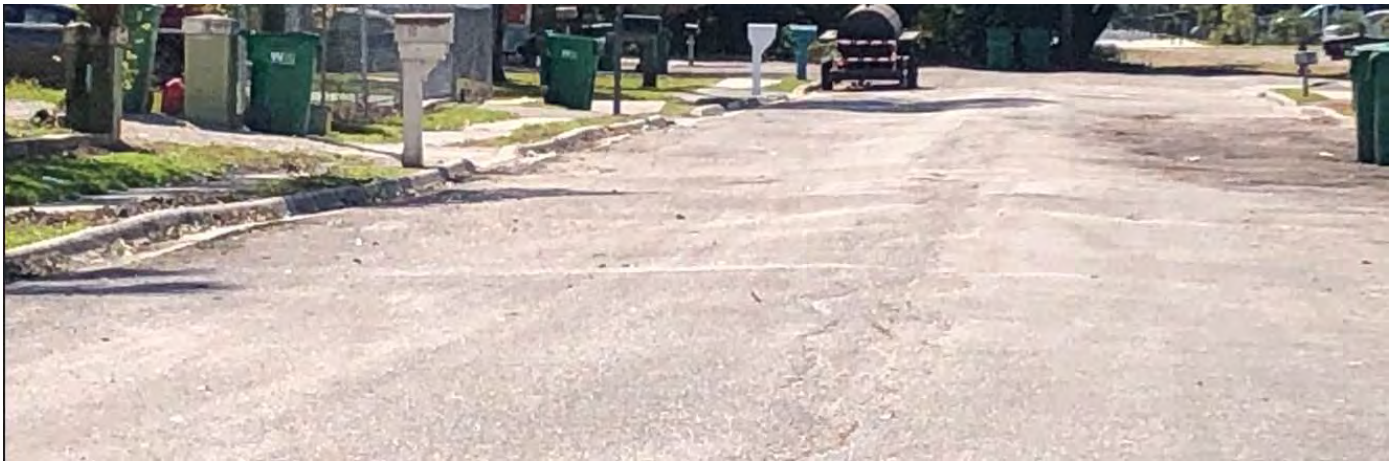


Figure 2.2

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below show some of the conditions mentioned above.

Figure 2.3

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along NW 7th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 2.4 and 2.5 represent typical deficiencies found.

Figure 2.4

Figure 2.5

REPAIR OPTIONS for NW 7th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire NW 7th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire NW 7th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and

resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire NW 7th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money, and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR NW 7th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR NW 7th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$480,770.00 (construction) $48,077.00 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$192,310.00 (construction) $19,231.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 3

1. NW 9th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on NW 9TH avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations sidewalk lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 3.0 and Figure 3.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 3.0

Figure 3.1

DEPRESSIONS:
Depressions found on NW 9th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 3.2 are of main concern along NW 9th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 3.2

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 3.4

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along NW 9th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 3.5-3.9 represent typical deficiencies found.

Figure 3.5

Figure 3.6

Figure 1.7

Figure 3.8

Figure 3.9

REPAIR OPTIONS for NW 9th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire NW 9th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire NW 9th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire NW 9th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money, and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR NW 9th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR NW 9th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,250,000.00 (construction) $125,000.00 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$500,000.00 (construction) $50,000.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 4

1. NW 11th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on NW 11th avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations sidewalk lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 4.0 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 4.0

DEPRESSIONS:
Depressions found on NW 11th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 4.1, Figure 4.2, and Figure 4.3 are of main concern along NW 11th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 4.1

Figure 4.2

Figure 4.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 4.4

Figure 4.5

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along NW 11th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figures 4.6, 4.7, 4.8, and 4.9 represent typical deficiencies found.

Figure 4.6

Figure 4.7

Figure 1.8

Figure 4.9

REPAIR OPTIONS for NW 11th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire NW 11th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire NW 11th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire NW 11th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also, sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money not fixing the real underlying problem and it is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR NW 11th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR NW 11th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,154,000.00 (construction) $115,400.00 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$462,000.00 (construction) $46,200.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 5

1. NW 12th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on NW 12TH avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations sidewalk lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 7.0 and Figure 7.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 7.0

Figure 7.1

DEPRESSIONS:
Depressions found on NW 12th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 7.2 and Figure 7.3 are of main concern along NW 12th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 7.2

Figure 7.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 7.4

Figure 7.5

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along NW 12th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 7.6, 7.7 and 7.8 represent typical deficiencies found.

Figure 7.6

Figure 1.7

Figure 7.8

REPAIR OPTIONS for NW 12th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire NW 12th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire SW 6th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire NW 12th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also, sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money, and is not at all recommended.

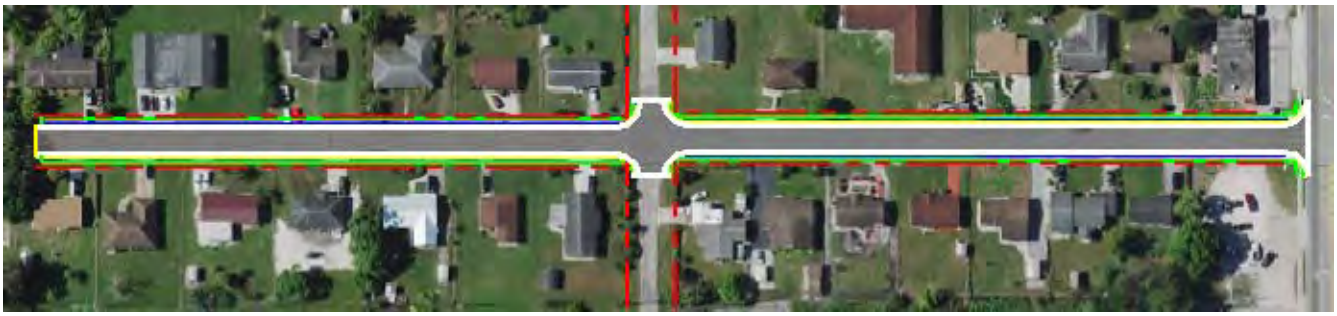
ROAD CONSTRUCTION COST ESTIMATE FOR NW 12th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR NW 12th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,154,000.00 (construction) $115,400 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$462,000.00 (construction) $46,200.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 6

1. **SW 5th Ave Evaluation**



ROADWAY OVERALL QUALITY:
The overall pavement quality found on SW 5th Avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk have sunk and lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 6.0 and Figure 6.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 6.0

Figure 6.1

DEPRESSIONS:
Depressions found on SW 5th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 6.2 and Figure 6.3 are of main concern along SW 5th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 6.2

Figure 6.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 6.4

Figure 1.5

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along SW 5th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 6.6 and 6.7 represent typical deficiencies found.

Figure 6.6

Figure 6.7

REPAIR OPTIONS for SW 5th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire SW 5th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire SW 5th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire SW 5th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also, sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR SW 5th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR SW 5th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,250,000.00 (construction) $125,000 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$500,000.00 (construction) $50,000 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 7

1. SW 6th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on SW 6TH Avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations sidewalk lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 5.0 and Figure 5.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 5.0

Figure 5.1

DEPRESSIONS:
Depressions found on SW 6th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 5.2 and Figure 5.3 are of main concern along SW 6th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 5.2

Figure 5.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 5.4

Figure 5.5

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along SW 6th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 5.6, 5.7 and 5.8 represent typical deficiencies found.

Figure 5.6

Figure 5.7

Figure 5.8

REPAIR OPTIONS for SW 6th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire SW 6th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire SW 6th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire SW 6th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also, sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR SW 6th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR SW 6th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,250,000.00 (construction) $125,000 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$500,000.00 (construction) $50,000 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.

APPENDIX 8

1. SW 11th Ave Evaluation

ROADWAY OVERALL QUALITY:
The overall pavement quality found on SW 11TH avenue is deficient with poor rideability. Significant depressions on the roadway and curbs are present which contribute to ponding water and poor drainage. In addition to previous patch work, there is a section of the road that appears to have been filled with asphalt millings. Sidewalks were found to be in poor shape and in noncompliance with ADA standards. Areas of sidewalk are broken from cars crossing traffic. Some locations sidewalk lean back with occasional slab protruding from the ground creating a tripping hazard.

CRACKING:
Figure 7.0 and Figure 7.1 below displays typical longitudinal cracks running a course approximately parallel to the centerline of the roadway. These cracks are result from earth movements, particularly on embankments. Two or more closely-spaced longitudinal cracks as shown in the figures below indicate bending stress induced by rutting. Longitudinal cracks can also occur as a result of movement in the pavement beneath the asphalt pavement layer (base and subbase settlement).

Figure 7.0

Figure 7.1

DEPRESSIONS:
Depressions found on SW 11th avenue can mainly be attributed to movement of the roadway base and subbase. Consolidation or lateral movement under traffic in one or more of the underlying causes, or by displacement in the surface layer itself can cause similar depressions to form. Depressions such as those seen in Figure 7.2 and Figure 7.3 are of main concern along SW 11th avenue. These current conditions are currently causing drainage deficiencies that further affect the longevity of the road.

Figure 7.2

Figure 7.3

DEFICIENT DRAINAGE:
Proper drainage is essential to preserve the design life of the roadway. Although not shown due to dry conditions at the time of inspection, standing water on the pavement is a constant issue in this roadway due to the sinking observed at the intersection causing water to flow away from the inlets. Sinking of the road around inlets and curb and gutter has also severely impacted the ability to drain properly. Figures below some of the conditions mentioned above.

Figure 7.4

Figure 7.5

SIDEWALKS AND CURBS:
Sidewalk damage can be seen at multiple instances along SW 11th avenue. Conditions such are cracking and uneven settlement were observed. Probable causes to sidewalk deficiencies observed can be attributed to weak soil structure and or vehicular load. Many locations were observed to be unsafe and are a potential trip hazard that need to be addressed as soon as feasible. Conditions shown Figure 7.6, 7.7 and 7.8 represent typical deficiencies found.

Figure 7.6

Figure 1.7

Figure 7.8

REPAIR OPTIONS for SW 11th Avenue:

Three road repair methods were evaluated as described below with the construction cost estimate provided in the next section for feasible options.

Option 1: Complete Replacement and Reconstruction of Entire Road: Completely remove and replace existing pavement, sidewalks, curbs, and limerock base for entire SW 11th Avenue road length. Storm drainage inlets will have to be desilted and adjusted. Also, additional foot of muck removal is considered below the existing road base. It is recommended that geosynthetic reinforcing is placed between remaining natural soil layer and the rehabilitated roadway section. This option is similar to recent road reconstruction completed on SW 7th Avenue and SW 1st Street, and the current ongoing SW 10th Avenue reconstruction project.

Option 2: Asphalt Milling & Resurfacing of Entire Road: Milling and asphalt resurfacing up to 4-inches depth for the entire SW 6th Avenue road length is the repair method evaluated here. But it has issues during construction as significant depression found in the road more than 4-inches will not allow milling equipment to reach all low areas which is required for proper bonding for new asphalt layer. Also, the depressed areas of curbs must be redone prior to milling and resurfacing and storm drainage inlets desilted and adjusted. However, this option is a temporary fix which does not address the underlying limerock road base foundation problem. Road pavement distress and depressions will continue to reoccur shortly after milling and resurfacing construction of the entire road. Recent construction of a similar road like SW 10th Avenue under construction and SW 7th Avenue and SW 1st Avenue in the past indicate that this repair method has been tried before from the multiple layers of asphalt resurfaced that the it is up to 12 inches or more thick.

Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt: Instead of the milling and asphalt resurfacing the entire SW 11th Avenue road length like in Option 2, this Option 3 repairs selected road area sections with problems by milling and filling depressions with up to 4 to 6 inches thick asphalt. This repair is not recommended due to the current depressed condition of the entire road length which needs to be replaced. Also, sections of sunken curbs, broken and uneven sidewalks must be rebuilt. This repair will only serve as a temporary patch as this Option 3 does not address the underlying limerock road base foundation problem which will continue to. Road pavement distress and depressions will continue to be present shortly after completion. This option is considered not feasible as it is a complete waste of money and is not at all recommended.

ROAD CONSTRUCTION COST ESTIMATE FOR SW 11th AVENUE OPTIONS:

The following are road construction cost for the options evaluated in table below. The estimates are based upon recent 2021 bids in South Bay and adjusted for the steep price increases in 2022**.**

OPTIONS FOR SW 11th AVENUE	ROAD CONSTRUCTION COST	RECOMMENDATION & REMARKS
Option 1: Complete Replacement and Reconstruction of Entire Road	$1,154,000.00 (construction) $115,400 (design)	Yes. Further, PBCWUD has plans to replace water & sewer lines when road is replaced.
Option 2: Asphalt Milling & Resurfacing of Entire Road	$462,000.00 (construction) $46,200.00 (design)	No. Will not fix underlaying road base foundation problem which will cause same pavement failure repaired to reoccur within a year.
Option 3: Milling and Filling Depressions in Selected Road Areas with Asphalt	Not feasible as discussed before.	No.