City Council Agenda Item Report

June 18, 2013

Agenda Item No. _____

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SUBJECT: Staff Report - Update on the Bonita Vista Subdivision Phase 1 Street Reconstruction.

1. BACKGROUND/HISTORY

The City had the Bonita Vista Subdivision Phase 1 streets reconstructed in 2007 by Austin Bridge and Road (ABR).

The streets have experienced pavement failures for the past 5 years. These failures necessitate the streets will need to be reconstructed.

The Attorney for the City, Denton, Navarro Rocha & Bernal retained Chester Drash with Drash Consultants as the expert witness for the City of Buda on the pavement design and construction of the project.

The City filed suit against ABR and the trial was concluded on March 15, 2013. The City of Buda did not receive a favorable verdict from the jury.

2. FINDINGS/CURRENT ACTIVITY

The City contacted Drash Consultants to provide a new pavement design for reconstructing the Bonita Vista streets based on the soil borings obtained during the geotechnical investigation for the ABR trial. Drash Consultants agreed to enter into an agreement to provide several new pavement design recommendation options with the City.

Staff received the geotechnical design recommendations from Drash Consultants on May 31, 2013. There were a total of 8 pavement design options provided. The installation of a root barrier is recommended for the pavement design options that do not include chemical injection for subgrade treatment.

Options 1 & 2 have 2” of Type D Hot-Mix Asphalt, 6” of processed asphalt and aggregate base placed over a geogrid fabric. Option 1 has 18” of

moisture conditioned subgrade and Option 2 has 5' of moisture or chemical injected subgrade.

Options 3 & 4 have 2" of Type D Hot-Mix Asphalt, 4" of new aggregate base placed over a geogrid fabric. Option 3 has 18" of moisture conditioned subgrade and Option 4 has 5' of moisture or chemical injected subgrade.

Options 5 & 6 have 2" of Type D Hot-Mix Asphalt, 4" of processed asphalt and aggregate base and 4" of new aggregate base placed over a geogrid fabric. Option 5 has 5' of moisture or chemical injected subgrade and Option 6 has 18" of moisture conditioned subgrade.

Option 7 has 2" of Type D Hot-Mix Asphalt, 5" of Type B Hot-Mix Base placed over a geogrid fabric and 6" of moisture conditioned subgrade.

Option 8 has 6" of Reinforced Concrete pavement over 6" of moisture conditioned subgrade.

Staff is currently evaluating these pavement design options to determine the best construction option for the City. The City will also need to have a new set of construction plans prepared before moving to the bidding and construction phases of the project.

A copy of the pavement design options by Drash Consultants is attached.

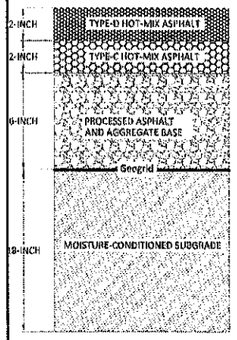
3. FINANCIAL IMPACT

TBD.

4. ACTION OPTIONS/RECOMMENDATION

No action is required.

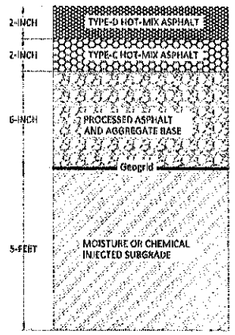
OPTION-1



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate 21 inches of subgrade soils and stockpile.
- Proofroll the exposed subgrade.
- After proofrolling, Place the excavated on-site soils to an elevation of 10 inches below the design pavement surface elevation.
- Place Geogrid.
- Place 6 inches of processed asphalt and aggregate base material over the moisture conditioned compacted soil.
- Place 2 inches of Type-C Hot Mix Asphalt Concrete.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

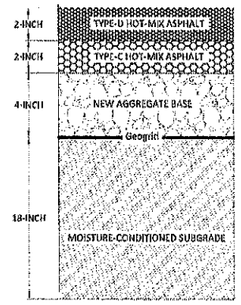
OPTION-2



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate addition 3 inches of material and remove from the site. The exposed subgrade may consist of aggregate base or lime-treated clay subgrade soils.
- Inject water or potassium based chemical to a depth of five (5) feet as measured from the exposed excavation bottom.
- Proofroll the exposed subgrade.
- Place Geogrid.
- Place 6 inches of processed asphalt and aggregate base material over the moisture conditioned compacted soil.
- Place 2 inches of Type-C Hot Mix Asphalt Concrete.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

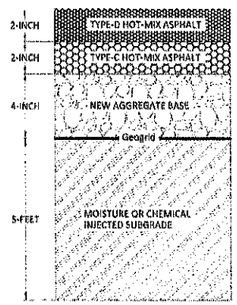
OPTION-3



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate 19 inches of subgrade soils and stockpile.
- Proofroll the exposed subgrade .
- After proofrolling, Place the excavated on-site soils to an elevation of 8 inches below the design pavement surface elevation.
- Place Geogrid.
- Place 4 inches of new granular base material over the moisture conditioned compacted soil.
- Place 2 inches of Type-C Hot Mix Asphalt Concrete.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

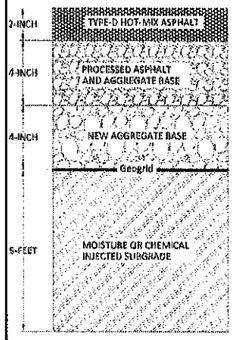
OPTION-4



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate addition 1 inche of material and remove from the site. The exposed subgrade may consist of aggregate base or lime-treated clay subgrade soils.
- Inject water or potassium based chemical to a depth of five (5) feet as measured from the exposed excavation bottom.
- Proofroll the exposed subgrade.
- Place Geogrid.
- Place 4 inches of new granular base material over the moisture conditioned compacted soil.
- Place 2 inches of Type-C Hot Mix Asphalt Concrete.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

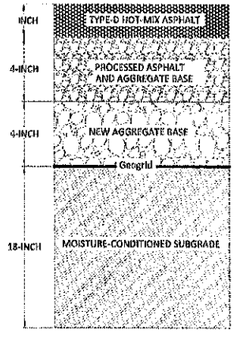
OPTION-5



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate additional 3 inches of material and remove from the site. The exposed subgrade may consist of aggregate base or lime-treated clay subgrade soils.
- Inject water or potassium based chemical to a depth of five (5) feet as measured from the exposed excavation bottom.
- Proofroll the exposed subgrade.
- Place Geogrid.
- Place 4 inches of new granular base material over the moisture conditioned compacted soil.
- Place 4 inches of processed asphalt and aggregate base material.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

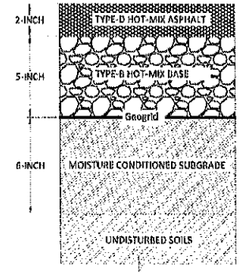
OPTION-6



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Stockpile the excavated materials.
- Over-excavate 21 inches of subgrade soils and stockpile.
- Proofroll the exposed subgrade .
- After proofrolling, Place the excavated on-site soils to an elevation of 10 inches below the design pavement surface elevation.
- Place Geogrid.
- Place 4 inches of new granular base material over the moisture conditioned compacted soil.
- Place 4 inches of processed asphalt and aggregate base material.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.

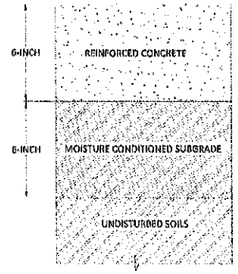
OPTION-7



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 7 inches below the existing asphalt surface.
- Proofroll the exposed subgrade.
- After proofrolling, moisture condition the upper 6 inches of soil to moisture between +1 and +4 percentage points of the optimum moisture content and compacted to between 93 and 97 percent of the maximum dry density as determined by the Standard effort (ASTM D 698).
- Place Geogrid.
- Place 5 inches of Type-B HMAC black base over the moisture conditioned compacted soil.
- Place 2 inches of Type-D Hot Mix Asphalt Concrete.
- Install Root-barrier along and adjacent to outside edge of curb.

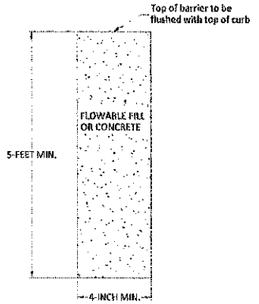
OPTION-8



GENERAL CONSTRUCTION SEQUENCE

- Excavate the existing Asphalt and Aggregate Base to a depth of 6 inches below the existing asphalt surface.
- Proofroll the exposed subgrade.
- After proofrolling, moisture condition the upper 6 inches of soil to moisture between +1 and +4 percentage points of the optimum moisture content and compacted to between 93 and 97 percent of the maximum dry density as determined by the Standard effort (ASTM D 698).
- Place 6 inches of reinforced concrete.
- Install Root-barrier along and adjacent to outside edge of curb.

ROOT-BARRIER DETAIL



PAVEMENT NOTES AND SPECIFICATIONS

MATERIALS AND SPECIFICATIONS

Presented below are selection and preparation requirements for various materials that shall be used to construct the pavement sections. Submittals shall be made for each pavement material. The submittals shall be reviewed by the Geotechnical Engineer of record and any appropriate members of the Project Team. The submittals shall provide test information necessary to verify full compliance with the Project plans and specifications.

Hot Mix Asphaltic Concrete Surface Course - The asphaltic concrete surface course shall be plant mixed, hot laid Type C or Type D or both as noted, meeting the master specification requirements of 2004 TXDOT Standard Specifications Item 341. Item SS 3224 (2011) and specific criteria for the job mix formula. The mix shall be compacted between 92 and 95 percent of the maximum theoretical density as measured by TEX-227-F. The asphalt cement content by percent of total mixture weight shall fall within a tolerance of ±0.3 percent asphalt cement from the specific mix. In addition, the mix shall be designed so 75 to 85 percent of the voids in the mineral aggregate (VMA) are filled with asphalt cement. The grade of the asphalt cement shall be PG 64-22 or higher performance grade. Aggregates known to be prone to stripping shall not be used in the hot mix. The mix shall have at least 70 percent strength retention when tested in accordance with TEX-531-C.

Pavement specimens, which shall be either cores or sections of asphaltic pavement, will be tested according to Test Method TEX-207-F. The nuclear-density gauge or other methods which correlate satisfactorily with results obtained from Project pavement specimens can be used when approved by the Geotechnical Engineer. The Contractor shall be responsible for obtaining the required pavement specimens at their expense and in a manner and at locations selected by the Geotechnical Engineer.

Type B Hot Mix Base - The Type B hot mix base shall be plant mixed, hot laid Type B , meeting the master specification requirements of 2004 TXDOT Standard Specifications Item 341, Item SS 3224 (2011) and specific criteria for the job mix formula. The mix shall be compacted at least 95 percent of the maximum theoretical density as measured by TEX-227-F.

New Granular Base Material - Base material shall be composed of crushed limestone base meeting all of the requirements of 2004 TxDOT Item 247, Type A, Grade 2; the material shall have no more than 15 percent of the material passing the No. 200 sieve.The base material shall be compacted to at least 98 percent of the maximum dry density determined in accordance with the Standard effort (ASTM D 698) at moisture contents ranging between -2 and +3 percentage points of the optimum moisture content.

Existing Asphalt and Aggregate Base Mix - The existing asphalt and aggregate base material shall be milled and mixed in accordance with applicable recycling methods. After processing, the maximum asphalt dimensions shall not be greater than 3 inches in size. The asphalt and aggregate base mix material shall be compacted to at least 98 percent of the maximum dry density determined in accordance with the Standard effort (ASTM D 698) at moisture contents ranging between -2 and +3 percentage points of the optimum moisture content.

Geogrid - The geogrid shall consist of Tensar TX-5 or equivalent.

Concrete - Concrete should have a minimum 28-day design compressive strength of 4,000 psi.

Pavement Joint and Reinforcement -

- Contraction Joint Spacing - 10 feet each way.
- Contraction Joint Depth - at least ¼ of pavement thickness.
- Contraction Joint Width - shall be ⅛ inch or as required by joint sealant manufacturer.
- Construction Joint Depth/Width - Full depth of pavement thickness. Construct sealant reservoir along one edge of the joint. Width of reservoir to be ¼ inch or as required by joint sealant manufacturer. Depth of reservoir to be at least ¼ of pavement thickness.
- Construction Joint Dowel Information -
  1. Dowel Diameter - ¾ inch diameter (No. 6 bar)
  2. Dowel Spacing - 12 inches on-center
  3. Dowel Length - 14 inches
  4. Dowel Embedment - 6 inches
- Isolation Joint Spacing - as required to isolate pavement from structures, curbs, etc.
- Isolation Joint Depth - full depth of pavement thickness.
- Isolation Joint Width - shall be ½ to 1 inch or as required by the joint sealant manufacturer.
- Distributed Steel - No. 3 reinforcing steel bars at 12 inches on-center each way, Grade 60. Steel shall be centered in section.

Proofrolling - Proofrolling the subgrade shall be done with at least a 20-ton roller, or equivalent equipment, to evidence any weak yielding zones. A technical representative of the testing firm shall be present to observe proofrolling operations. If any weak yielding zones are present, they shall be over excavated, both vertically and horizontally, to expose competent soil. This excavated soil can be used to restore grade provided that the material is relatively free and clean of deleterious material or materials exceeding 3 inches in maximum dimension. The excavated soils shall be moisture conditioned between +1 and +4 percentage points of the optimum moisture content and compacted to between 93 and 97 percent of the maximum dry density as determined by the Standard effort (ASTM D 698).

Placement of on-site soils - After proofrolling, the excavated on-site soils shall be placed in maximum 6-inch compacted lifts to an elevation as specified. Each lift of on-site soil shall be moisture conditioned between +1 and +4 percentage points of the optimum moisture content and compacted to between 93 and 97 percent of the maximum dry density determined by the Standard compaction effort (ASTM D 698).

Chemical and Moisture Injected Subgrade - Injections should be performed on a center to center spacing of about two and a half (2.5) feet. Injection intervals shall not exceed 12 inches. A soil boring shall be drilled at an interval of 500 feet within the injection treatment area. at least 3 swell tests shall be performed from each boring and moisture-content on each recovered sample. The treatment should be considered acceptable if the average swell of all the individual swell test results does not exceed one (1) percent swell, and no more than ten percent of individual swell test results exceed two (2) percent swell. The Geotechnical Engineer of Record should choose sampling locations and choose the actual soil specimen for laboratory testing.

Root-Barrier - Root-Barrier shall be installed at the locations selected by the Geotechnical Engineer and the City of Buda Engineer. Root-Barrier trench shall be at least 4 inches wide and 5 feet deep. The root-barrier trench shall be backfilled with low strength flowable fill or concrete at a 7 to 9 inch slump. Note: Root-Barrier will not be needed if chemical injection is selected for subgrade treatment.

SHEET G-1

Drash
1045 Central Parkway North, Suite 103 • San Antonio, Texas 78232
Office: 210.340.3904 • Facsimile: 210.340.3909
TBPE Firm Registration F-13654

Project No.	Scale:	Date:
113G1057	NOT TO SCALE	5-31-13

Project Mngr:	CJD
Drawn By:	SR
Checked By:	SR
Approved By:	CJD

PAVEMENTS

BONITA VISTA SUBDIVISION-PHASE 1 STREET RECONSTRUCTION
BONITA VISTA, CASA LOMA, EL SECRETO, AND LAS CRUCES STREETS
BUDA, TEXAS