

DATE: April 14, 2000

TO: Basis of Estimate Handbook Holders

FROM: Cheryl Adams, CES Coordinator

COPY: Ken Morefield, Freddie Simmons, Bill Albaugh, Greg Xanders, Lex Chance, William Nickas, Duane Brautigam, Billy Hattaway, District Design Engineers, District Project Management Engineers, District Structures Design Engineers, District Construction Engineers, District Traffic Operations Engineers, District Pavement Design Engineers, District Drainage Engineers and District Specifications Engineers

SUBJECT: **Special Update – 2000 Edition of the Basis of Estimate Handbook Summary of Major Changes**

The Coordination Team has made recommendations on the implementation of changes to pay items and specifications that have been developed within the last six months. The implementation plan for each issue has been approved by the appropriate office and concurred in by the Directors for the Offices of Design and Construction. A detailed description on each of these changes and their implementation dates is attached. The following is a summary of the issues addressed in this update:

Group	Issue Description	Effective Letting	Page No.
Pavement	Miscellaneous Asphalt Pavement	Clarification	2
Signals	Grounding Electrode	January 2001	2
(JPA's)	Joint Project Agreements Mobilization, Maintenance of Traffic	January 2001 (or sooner)	3
Pavement	Superpave Base	July 2000	4 - 5
Structures	Preformed Pile Holes, Drilled Shaft Overreaming, Unclassified Extra Depth Shaft Excavation	January 2001	6 - 7
Structures	Piling Furnished, Piling Driven, Test Piles Furnished, Test Piles Driven	January 2001	8 - 9
Structures	Concrete Traffic Railing Barriers and Parapets	January 2001	10 - 12
Drainage	Plastic Erosion Mat - Turf Reinforcement Mat (TRM)	January 2001	13 - 14
Signals	Prestressed Concrete Poles	January 2001	15
Signals	Traffic Signal	January 2001	16 - 17
Lighting	Pole Cable Distribution System (PCDS)	January 2001	18 - 19
Signals	Mast Arms Assemblies	January 2001	20 - 22

Additional Information for the Designer:

339-1 **Miscellaneous Asphalt Pavement**
2339-1 *Miscellaneous Asphalt Pavement*

Revise the BOE, Section 2, Detail for Pay Item Number 339-1 by adding the following:

The pay quantity will be based on the average spread rate or dimensions for the project, limited to a maximum of 105% of the plan quantity. For calculation, a weight of 100 lbs/yd² per inch [22 kg/m² per 10 mm] thickness of asphalt will be used.

620-1-1 **Grounding Electrode**
2620-1-1 *Grounding Electrode*

Revise the BOE, Section 2, Detail for Pay Item Number 620-1-1 as follows:

This item will be mandatory on all signal and lighting plans. Payment will be based on length of ground rod. All couplings, conductors, ~~and~~ connecting devices, and signalization bond wire will be incidental to the cost. For signals, estimate 20' (6m) minimum per location. For lighting, estimates 10' (3m) minimum per location.

This change will define how the conductor used for traffic signal bonding is to be paid. We will include this information in the next Plans Preparation Manual (PPM) update, but this information is included in this memo to alert designers.

Internet site Address: www.dot.state.fl.us
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NOTE: If you are a registered holder of the “2000 Edition of The Basis of Estimates Handbook”, you will receive revised pages for Sections 1 through 4 in July 2000 as part of the regularly scheduled update.

*Effective with the January 2001 letting
(Or sooner if it does not affect production)*

Issue: *Joint Project Agreements
Mobilization and Maintenance of Traffic Pay Items*

History: When a contract contains a Joint Project Agreement (JPA), the pay items for Mobilization and Maintenance of Traffic will **not** be shown on the Summary of Pay Items for the JPA project. The cost of these items will be included in the lead project.

For Contracts with more than one project, the pay items for Mobilization and Maintenance of Traffic will be shown on each project's Summary of Pay Items if the project is NOT a JPA.

Implementation Plan:

Central Office Design:

Update the Plans Preparation Manual Chapter 17 and the Basis of Estimates Handbook Section 2 to reflect this change.

District Design: Update CES and plans (Summary of Pay Items) to reflect the above.

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Effective with the July 2000 letting

Issue: *Superpave Type B-12.5 as Asphalt Base*

History: The Department has decided to use superpave Type B-12.5 beginning with July 2000. Starting with the January 2001 letting, superpave Type B-12.5 will be the only asphalt base selection allowed on English projects.

Implementation Plan:

Central Office Design:

NOTE: Standard Index 514 has been updated by special provision (DASTDS00 and DBSTDS94) for projects starting with the July 2000 letting to allow for the use of either ABC-3 or Type B-12.5 where asphalt base is an option or the only option identified in the plans. These specifications will be effective for projects let between July 2000 and December 2000. Starting with the January 2001 letting, Type B-12.5 will be the only asphalt base allowed by Index 514 for General Use on English Projects.

The English 2000 Edition of the Roadway and Traffic Design Standards reflects Type B-12.5 as the asphalt base to be used for Optional Base. The English Standards will be effective with the January 2001 letting.

The Metric 2000 Edition of the Roadway and Traffic Design Standards will continue to be updated by special provision to reflect Type B-12.5 or ABC-3 as the asphalt base to be used for Optional Base until it is reprinted.

District Design: When Optional Base Group XX is called for on the plans, no change is necessary. When the plans identify asphalt base as an option or the only option, English plans must be updated to reflect the use of Type B-12.5 starting with the January 2001 letting.

Specifications: Specifications will be available for July 2000.

Approved: Bruce Dietrich _____ Date _____
State Pavement Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *Preformed Pile Holes, Drilled Shaft Overreaming, Unclassified Extra Depth Shaft Excavation*

History: The Department has decided to eliminate the pay items, generally used as contingency items, for this work. Payment for this work will be as a function other related work and is covered in the specification. No special plan notes are required. The plans may still designate where preformed piles will be required as is currently done.

Implementation Plan:

Central Office Design:

Permanent Block the following pay items December 31, 2000:

455-15	Preformed Pile Holes	EA
2455-15	<i>Preformed Pile Holes</i>	<i>EA</i>
455-124	Drilled Shaft Sidewall Overreaming	LF
2455-124	<i>Drilled Shaft Sidewall Overreaming</i>	<i>MI</i>
455-125	Unclassified Extra Depth Excavation	LF
2455-125	<i>Unclassified Extra Depth Excavation</i>	<i>MI</i>

District Design: Update plans and CES to indicate the deletion of these pay items on all projects beginning with the January 2001 letting.

Specifications: Specifications will be available for January 2001.

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *Piling Furnished, Piling Driven, Test Piles Furnished, Test Piles Driven*

History: The Department has decided to consolidate the pay items for piling furnished and piling driven into a single pay item. No special notes are required in the plans. Quantities are calculated as currently calculated for piling furnished.

Implementation Plan:

Central Office Design:

Establish the following new pay items April, 2000:

455-34	Prestressed Concrete Piling	LF
2455-34	<i>Prestressed Concrete Piling</i>	<i>MI</i>
455 -35	Steel Piling	LF
2455 -35	<i>Steel Piling</i>	<i>MI</i>
455-143	Test Piles (Prestressed Concrete)	LF
2455-143	<i>Test Piles (Prestressed Concrete)</i>	<i>MI</i>
455-144	Test Piles (Steel)	LF
2455-144	<i>Test Piles (Steel)</i>	<i>MI</i>

Permanent Block the following pay items December 31, 2000:

455-3	Prestressed Concrete Piling Furnished	<i>LF</i>
2455-3	<i>Prestressed Concrete Piling Furnished</i>	<i>MI</i>
455-4	Prestressed Concrete Piling Driven	<i>LF</i>
2455-4	<i>Prestressed Concrete Piling Driven</i>	<i>MI</i>
455-7	Steel Piling Furnished	LF
2455-7	<i>Steel Piling Furnished</i>	<i>MI</i>
455-78	Steel Piling Driven	LF
2455-78	<i>Steel Piling Driven</i>	<i>MI</i>
455-140	Test Piles Furnished	LF
2455-140	<i>Test Piles Furnished</i>	<i>MI</i>

**Addendum to Special Update – 2000 Edition of the Basis of Estimate Handbook
Dated 4/14/00**

Complete Pay Item Structure for New Pay Items :

455-34-xaa Prestressed Concrete Piling LF
2455-34-xaa *Prestressed Concrete Piling* MI

<u>aa=</u>	<u>English</u>	<u>Metric</u>
1	(12" sq.)	(305 mm sq.)
2	(14" sq.)	(355 mm sq.)
3	(18" sq.)	(455 mm sq.)
4	(20" sq.)	(510 mm sq.)
5	(24" sq.)	(610 mm sq.)
6	(30" sq.)	(760 mm sq.)
7	(36" sq.)	(914 mm sq.)
8	(Special)	(Special)

455-35-xaa Steel Piling LF
2455-35-xaa *Steel Piling* MI

<u>aa=</u>	<u>English</u>	<u>Metric</u>
1	(HP 8 x 36)	(HP 203 x 54)
2	(HP 10 x 36)	(HP 254 x 54)
3	(HP 10 x 42)	(HP 254 x 62)
4	(HP 12 x 53)	(HP 310 x 79)
5	(HP 14 x 73)	(HP 360 x 108)
6	(HP 14 x 89)	(HP 360 x 132)
7	(HP 14 x 102)	(HP 360 x 152)
8	(HP 14 x 117)	(HP 360 x 174)
9	(Special)	(Special)
20	(18" Dia Pipe)	(455 mm Dia Pipe)
21	(20" Dia Pipe)	(508 mm Dia Pipe)
22	(24" Dia Pipe)	(610 mm Dia Pipe)
23	(30" Dia Pipe)	(760 mm Dia Pipe)

455-143-xaa	Test Piles (Prestressed Concrete)	LF
2455-143-xaa	<i>Test Piles (Prestressed Concrete)</i>	<i>LF</i>

<u>aa=</u>	<u>English</u>	<u>Metric</u>
1	(12" sq.)	(305 mm sq.)
2	(14" sq.)	(355 mm sq.)
3	(18" sq.)	(455 mm sq.)
4	(20" sq.)	(510 mm sq.)
5	(24" sq.)	(610 mm sq.)
6	(30" sq.)	(760 mm sq.)
7	(36" sq.)	(914 mm sq.)
8	(Special)	(Special)

455-144-xaa	Test Piles (Steel)	LF
2455-144-xaa	<i>Test Piles (Steel)</i>	<i>M1</i>

<u>aa=</u>	<u>English</u>	<u>Metric</u>
1	(HP 8 x 36)	(HP 203 x 54)
2	(HP 10 x 36)	(HP 254 x 54)
3	(HP 10 x 42)	(HP 254 x 62)
4	(HP 12 x 53)	(HP 310 x 79)
5	(HP 14 x 73)	(HP 360 x 108)
6	(HP 14 x 89)	(HP 360 x 132)
7	(HP 14 x 102)	(HP 360 x 152)
8	(HP 14 x 117)	(HP 360 x 174)
9	(Special)	(Special)
20	(18" Dia Pipe)	(455 mm Dia Pipe)
21	(20" Dia Pipe)	(508 mm Dia Pipe)
22	(24" Dia Pipe)	(610 mm Dia Pipe)
23	(30" Dia Pipe)	(760 mm Dia Pipe)

455-141 Test Piles Driven LF
2455-141 *Test Piles Driven* MI

District Design: Update plans and CES to indicate the new pay items on all projects beginning with the January 2001 letting.

Specifications: Specifications will be available for January 2001.

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: **Concrete Traffic Railing Barriers and Parapets**

History: The Department has decided to move all concrete traffic railing barriers and parapets to Section 521 of the Standard Specifications. Metal traffic railing barriers will be addressed under Section 460. Construction and acceptance criteria for concrete barriers already exist in Section 521. Standards in English units will be available in April 2000, standards in metric units will be available for select shapes directly from the Structures Design Office.

Implementation Plan:

Central Office Design:

Establish the following new pay items April, 2000:

521-5-xxa	Concrete Traffic Railing Barrier (Bridge)	LF
a=	1 (32" F-shape)	
	2 (Reserved)	
	3 (32" Median, Double Face)	
	4 (32" Vertical Face)	
	5 (42" Vertical Face)	
	6 (Corral with curb)	
	7 (Corral w/o curb)	
	8 (Retrofit- Vertical Face)	
	9 (Special)	
2521-5-xxa	Concrete Traffic Railing Barrier (Bridge)	MI
a=	1 (815mm F-shape)	
	2 (Reserved)	
	3 (815mm Median, Double Face)	
	4 (815mm Vertical Face)	
	5 (1065mm Vertical Face)	
	6 (Corral with curb)	
	7 (Corral w/o curb)	
	8 (Retrofit-Vertical Face)	
	9 (Special)	
521-6-xxa	Concrete Parapet	LF
a=	1 (Pedestrian/Bicycle)	
	2 (Special)	

2521-6-xxa	Concrete Parapet	MI
a=	1 (Pedestrian/Bicycle)	
	2 (Special)	
460-71-xxa	Metal Traffic Railing Barrier	LF
a=	1 (Thrie Beam Retrofit)	
	2 (Steel Post and Rail)	
2460-71-xxa	Metal Traffic Railing Barrier	MI
a=	1 (Thrie Beam Retrofit)	
	2 (Steel Post and Rail)	

Permanent Block the following pay items December 31, 2000:

400-148	Traffic Railing (Furnish and Install)	LF
2400-148	Traffic Railing (Furnish and Install)	MI
400-160	Pedestrian/Bicycle Parapet	LF
2400-160	Pedestrian/Bicycle Parapet	MI

Standard Drawings:

Standards in English units will be available on the Internet and Infonet at the FDOT Structures Web site in April 2000. Standards in metric units will be available for select shapes directly from the Structures Design Office, contact Bob Nichols at (850) 414-4283 or SC 994-4283.

District Design: Update plans and CES to indicate the new pay items on all projects beginning with the January 2001 letting. When using the new pay item include the new Standard Drawings in the plans.

Specifications: Specifications will be available for January 2001.

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

*Effective with the January 2001 letting
(or sooner, Contact State Drainage Office)*

Issue: *Plastic Erosion Mat – Turf Reinforcement Mat (TRM)*

History: The Department has approved a pay item and specification for a permanent geosynthetic rolled erosion control product that retains soil, moisture and seed and promotes vegetative growth while preventing erosion in ditches, channels and spillways. To be used where conditions prevent vegetation that lasts past a single growing season. See Standard Index 199, 2000 Edition English for applications for Types of TRM. (An Interim Index 199 is available on the Internet for Metric Projects)

Implementation Plan:

Central Office Design:

Establish the following new pay item on April, 2000:

571-1-xab	Plastic Erosion Mat	SY
2571-1-xab	<i>Plastic Erosion Mat</i>	<i>M2</i>

a = 1 Turf Reinforcement Mat

b = 1 Type 1
2 Type 2
3 Type 3

Permanent Block existing pay items below on December 31, 2000:

571-1	Plastic Erosion Mat	SY
2571-1	<i>Plastic Erosion Mat</i>	<i>M2</i>

District Design: Turf Reinforcement Mats are included in the English 2000 Standards. When using the new pay item for Metric projects, include The Interim Index 199 that is available from the Internet.

Specifications: Specifications will be available for January 2001.

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *Prestressed Concrete Poles*

History: The Department has added a new strain pole Type N-VIII to the Standards, at the request of several district structures offices.

Implementation Plan:

Central Office Design:

Revise Standard Index 17725 to include the new pole type and place on the Internet.

Expand the current pay item list April, 2000:

641-1ab-xcc	Prestressed Concrete Poles	EA
2641-1ab-xcc	<i>Prestressed Concrete Poles</i>	EA
<i>b=</i>	<i>7 (Type N-VIII)</i>	

District Design: Update plans and CES to indicate the new pay item if applicable beginning with the January 2001 letting. When using the new pay item include Interim Index 17725 in the plans.

Specifications: Specifications will be available for January 2001.

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *New Traffic Signal Pay Items*

History: The standard light source for signal indications has been the incandescent lamp. The Department is now adopting the Light Emitting Diode (LED) as the standard for the red indication. The yellow and green indications will continue to use the incandescent lamp. This will be the Department standard for traffic signals; however, if requested by the local maintaining agency and approved by the Department, the incandescent lamp may be used for all indications. For those situations where the standard arrangement is not used, the information should be shown on the plans and the pay item number will be coded as a special.

Implementation Plan:

Central Office Design:

Establish the following new pay item number on April, 2000:

650-5a-bcd	Traffic Signal	AS
2650-5a-bcd	<i>Traffic Signal</i>	AS
a=	1 (Furnish and Install)	
	2 (Furnish)	
	3 (Install)	
	4 (Relocate)	
b=	Number of Sections on Each Face	
c=	Number of Directions	
d=	Type	
	1 (Standard)	
	2 (Light Weight)	
	3 (Special)	

Permanent Block the following pay items December 31, 2000:

650-1-abc	Traffic Signal 12" (Standard)	AS
2650-1-abc	<i>Traffic Signal 12" (Standard)</i>	AS
650-2-abc	Traffic Signal 12" (Opt Prog)	AS
2650-2-abc	<i>Traffic Signal 12" (Opt Prog)</i>	AS

650-3-abc	Traffic Signal 12" (Lightweight)	AS
2650-3-abc	<i>Traffic Signal 12" (Lightweight)</i>	AS
650-4-abc	Traffic Signal 8" (Standard)	AS
2650-4-abc	<i>Traffic Signal 8" (Standard)</i>	AS
650-8-abc	Traffic Signal 12" (Lightweight)	AS
2650-8-abc	<i>Traffic Signal 12" (Lightweight)</i>	AS
650-9 -abc	Traffic Signal 12" (Standard)	AS
2650-9 -abc	<i>Traffic Signal 12" (Standard)</i>	AS

Central Office Traffic Operations:

Require the use of LED only for red on the Approved Products List (APL). Send a notification letter of this change to Vendors and copy Florida Transportation Builders Association (FTBA).

District Design: Update plans and CES to indicate the new pay items on all projects beginning with the January 2001 letting.

Specifications: No Specification Change Necessary.

Approved: Jack Brown _____ Date _____
State Traffic Operations Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *Pole Cable Distribution System (PCDS)*

History: The original PCDS is not required for barrier wall mounted or bridge mounted poles, since these are not break-away. The specifications, Section 992, will be revised by special provision to specify the wiring requirement for these poles. The Design Standards will also be revised to add a note that states that poles mounted on barrier wall or bridges will be wired according to Section 992 of the specs.

Any poles mounted on bridges or barrier wall shall use the new pay item (2)715-500-3 for the PCDS. This will include the wiring from the pull-box to the luminaire.

Implementation Plan:

Central Office Design:

Expand the following pay item number: Add #3 under "a"

715-500-a	Pole Cable Distribution System	EA
2715-500-a	<i>Pole Cable Distribution System</i>	<i>EA</i>

a = Type
3 = Wall Mounted

District Design: Update plans and CES to indicate the new pay item on all projects beginning with the January 2001 letting.

Specifications: Specifications will be available for January 2001.

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: William N. Nickas _____ Date _____
State Structures Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer

Effective with the January 2001 letting

Issue: *Mast Arm Assemblies*

History: The Structures Design Office is developing a Traffic Signal Mast Arm Standard and a new pay item number has been established for use with the mast arms. A Plans Preparation Manual (PPM) update will provide detailed instructions on use of the new standard and information to be shown in plans. The standard will be implemented with the January 2001 letting. At the Districts option, projects with mast arm design underway can be completed with the current practice; however, the new pay item must be used and coded as a special design. The new standard is mandatory for all projects beginning with the July 2001 letting. Use of the new standard is encouraged as early as possible, since this will eliminate the need for shop drawings.

Implementation Plan:

Central Office Design:

Establish the following new pay items April, 2000

649-abc-dee	Mast Arm Assembly	EA
2649-abc-dee	<i>Mast Arm Assembly</i>	<i>EA</i>

a= Operation

1= Furnish and Install

2= Furnish

3= Install

b= Structure Type

1= Single Arm Without Luminaire

2= Double Arm Without Luminaire (angle between arms 90° or 270°)

3= Single Arm With Luminaire

4= Special Design (c,d,ee= special design or angle between arms not 90° or 270°)

c= First arm type

1= A1

2= A2

3= A3

4= A4

5= Special Design

- d= Second arm type
 - 0= No Second Arm
 - 1= A1
 - 2= A2
 - 3= A3
 - 4= A4
 - 5= Special Design
- ee= Upright Pole Type
 - 01= P1
 - 02= P2
 - 03= P3
 - 04= P4
 - 05= P5
 - 06= P6
 - 07= P7
 - 08= P21 Lum
 - 09= P22 Lum
 - 10= P23 Lum
 - 11= P24 Lum
 - 12= Special Design

Permanent Block the following pay items December 31, 2000

- 646- Mast Arms EA
- 2646- *Mast Arms EA*

- 647- Mast Arm Combinations, STD. EA
- 2647- *Mast Arm Combinations, STD. EA*

- 648- Mast Arm Combinations, Special. EA
- 2648- *Mast Arm Combinations, Special. EA*

District Design: Update plans and CES to indicate the new pay item on all projects beginning with the January 2001 letting. When using the new pay item include the Interim Index in the plans.

Specifications: Specifications will be available for January 2001.

Approved: William N. Nickas _____ Date _____
 State Structures Design Engineer

Approved: Billy L. Hattaway _____ Date _____
State Roadway Design Engineer

Approved: Greg Xanders _____ Date _____
State Construction Engineer

Approved: Lex Chance _____ Date _____
State Estimates Engineer

Approved: Duane F. Brautigam _____ Date _____
State Specifications Engineer