

### Section 4-03 Summaries

**Disclaimer:** The example summaries presented in this section were chosen to include features which are common to many projects and **they lack the typical connectivity that would be in actual project summaries.**

The summaries were developed using the *2010 Standard Specifications for Road & Bridge Construction*. The designer should use bid items, numbers, pay units, requirements, etc. from the **applicable** Standard Specifications, standard plans, supplementary specifications, special provisions and bid item list and not rely on the examples shown herein.

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## INTRODUCTION

**General:** Summaries are used to quantify and define the project work in terms of location, station, length, total quantity, etc., for each specific pay item. The general contract provisions and summaries are supplemented by all other contract documents including, but not limited to, the following:

- Standard Specifications
- Supplementary Specifications
- Special Provisions
- Typical Sections
- Plan & Profile Sheets
- Detail Sheets
- Pit Layout Sheets
- Bridge Plans
- Standard Plans

Prospective bidders use the summarized pay quantities and supporting documents to prepare the project bid estimate.

**Pay Items:** Projects are divided up into units of work called pay items or bid items. A bid item defines appurtenances (sidewalk, fence, guardrail, surfacing, etc.) by unit of measurement such as length, area, weight, lump sum, etc. Contract bid prices define the payment amount per unit. The field engineer inspects, verifies, measures and documents that each item is in place and has been correctly constructed prior to processing payment for the work.

When a bid item includes a high cost component, the component is bid as a separate bid item so that the quantity used and cost of the item can be verified. Hot Plant Mix is an example where the Asphalt Binder is a high cost component that is bid as a separate item in addition to the bid item Hot Plant Mix.

Separation of trades or subcontractor's may also promote dividing a piece of the work into two or more bid items. Structural concrete may be bid as volume of concrete and weight of reinforcing steel or lump sum for each item. This separates and quantifies two unique and different operations (i.e., tying steel versus forming and placing concrete).

Breaking a job into bid items reduces the bidder's risk and promotes lower, more competitive, project bids that are beneficial to the State.

**If possible avoid making work items incidental to other contract bid items.** Incidental work is easily missed during the bidding process and difficult to estimate. If the use of an incidental task cannot be avoided, make the work incidental to a related contract bid item.

Engineering Services maintains a current list of standard WYDOT bid items that are available upon request. **Bid items (number, name, unit, etc) included in summaries must be shown exactly as they appear in the standard bid item list.** If a new bid item is necessary, a request for approval must be submitted to the Bid Item Committee through one of the current members. The committee consists of the Highway Development Engineer, Contracts and Estimates Engineer and State Construction Engineer. However, if a basic bid item is already established such as **RC STOCK PASS 60 X 91 in, pay unit FT**, and a different size of stockpass is needed, then a new bid item can be issued by Engineering Services without committee approval.

Numbers assigned to bid items refer to a corresponding section in WYDOT's Standard Specifications for Road & Bridge Construction. Construction methods, material specifications, equipment requirements, measurement methods, payment methods, etc., for commonly used bid items are given in the Standard Specifications. If a Standard Plan is associated with a particular bid item, the Standard Plan number also corresponds in general with the bid item number.

If a bid item is not described in the Standard Specifications or if the information in the Standard Specifications has not been updated, a Supplementary Specification or a Special Provision is required. Supplementary Specifications contain additions and/or changes to the Standard Specifications and are included with a project based on the applicable remarks in the indexes. Supplementary Specifications are frequently updated or deleted and information concerning current Supplementary Specifications can be obtained from Engineering Services.

Special provisions are required to describe non-standard materials, new bid items, or existing bid items that require special provisions; or to describe special requirements not covered in the standard or supplementary specifications. Refer to Chapter 4, Section 4-04 - Contract Documents, for direction in the Special Provision development process.

Bid items which require additional information are noted in the bid item list by the following codes:

- S) Requires either a Supplementary Specification or a Special Provision.
- E) Requires an explanation note.
- D) Requires a detail or note to define thickness, width, etc.

In cases of discrepancy the documents have the following order of precedence:

- Contract Amendments (Form E-61) in order of issuance, most recent first.
- Addenda.
- Contract (Form E-82A).

- Document-obtained agreements.
- Proposal (Form E-91)
- Special Provisions.
- Supplementary documents.
- Plans.
- Supplementary specifications.
- Standard plans.
- Standard Specifications.
- Electronic CADD files.

The designer should make every effort to anticipate all of the tasks that must be done and include the appropriate bid items to pay the contractor. If necessary items of work are not set up during the design phase, an extra work order will be required that complicates construction and delays the payment process. Therefore, make sure that all project work items are included to avoid the need for extra work orders.

**Sequence of Summaries:** The sequence of summaries will vary depending on the type of project, individual summaries involved and the economical placement of summaries to minimize the number of sheets required. However, do not compromise readability by over reducing or crowding summaries to minimize the number of plan sheets. The following sequence is recommended as a general guideline:

1. Summary Reference Table.
2. Total Estimated Quantities.
3. Materials and Rates with Surfacing Notes.
4. General Notes.
5. Length of Project.
6. Miscellaneous Items.
7. Various Accumulation Summaries.
8. Major summaries in the general sequence that the bid items they represent will be constructed (i.e., Grading before Surfacing).
9. Structure Summary.
10. Highway Sign and Traffic Control summaries.
11. Electrical summaries.
12. Highway Monument summaries.
13. Outside entity Summaries (i.e., Sanitary Sewer, Water Lines, Landscaping)

**Format of Summaries:** Individual summaries are developed using spreadsheet software and imported on to 11" x 17" plan sheets. Create summaries using the following criteria:

- Font = calibri
- Title text = 16 point, bold capital letters
- Summary text = 12 point, capital letters
- Note text = 12 point, capital letters
- Bold text for summary titles, headings, and Total and For Estimate rows
- Row height = 18 (Titles), 16 (Text)
  
- Bold lines on the outside border of the summary, below column headings and units of measure, and above subtotal or total rows.
  
- Center numbers in columns except for station numbers.
  
- Place summaries on plan sheets to read from top to bottom whenever possible. Do not crowd summaries. Maintaining a reasonable spacing between summaries is necessary for readability. If necessary, reduce, split or rotate summaries to best fit the plan sheet.

Avoid rotating summaries, if possible. However, if rotation is necessary, always rotate the summary 90 degrees counterclockwise.

- Place each spreadsheet summary on 11" x 17" plan sheets that are created in Microsoft Power Point. Highlight each summary and use the Paste Special - Paste Link commands to copy and link the summary to the sheet. Linking the summaries allows them to be updated automatically when changes are made to the original spreadsheet summaries. If spreadsheet revisions are made that expand the size of the summary/notes, then some of the information might be lost on the pasted/linked summary. **After pasting or revising summaries always check the pasted/linked summary to make sure that none of the summary data or notes were cut off. If information is lost, re-paste and link the summary to insure that all the data is shown.**
  
- When the summaries are pasted into Power Point the highlighted border is scaled at 100% vertical and 100% horizontal. To reduce the summary size change the border scale. For example, to reduce a summary by 20% set border scale at 80% vertical and 80% horizontal. To maintain an acceptable text height for readability its recommended to not exceed the following reduction limits:

**Vertical limits:** 20% reduction - (80% scale setting)

**Horizontal limits:** 35% reduction - (65% scale setting)

Large summaries that require reduction beyond the specified limits must be split into sections or rotated. See Exhibit 1 for a typical summary reduced to the maximum limits.

**65% HORZ. SCALE SETTING**

**80% VERT. SCALE SETTING**

SUMMARY	TON							SY
	HOT PLANT MIX	ASPHALT BINDER (PG 58-28)	PRIME COAT	EMULSIFIED ASPHALT	SEAL COAT	HYDRATED LIME	CRUSHED BASE	CHIP SEAL
U.S. 189 & WYO 240 GRADING								
WYO 240 SURFACING	1604	88	7	1	1	15	1611	2986
APPROACH	202	11	3			2	985	
U.S. 189 SURFACING	41994	2309	104	16	13	392	25989	85721
TOPSOIL AND SEEDING								
<b>TOTAL</b>	<b>43800</b>	<b>2408</b>	<b>114</b>	<b>17</b>	<b>14</b>	<b>409</b>	<b>28585</b>	<b>88707</b>
<b>FOR ESTIMATE</b>	<b>43800</b>	<b>2410</b>	<b>114</b>	<b>17</b>	<b>14</b>	<b>409</b>	<b>28600</b>	<b>88800</b>

**HORZ. REDUCTION - 35% (BORDER SCALE SET AT 65%)**  
**VERT. REDUCTION - 20% (BORDER SCALE SET AT 80%)**

**EXHIBIT 1**  
SUMMARY REDUCTION LIMITS - (11 X 17 PLAN SHEETS)

- It is also recommended that the reduction criteria given in Exhibit 1 be applied to summaries in 8½" x 11" plan sets. If additional reduction is necessary do not reduce the text height beyond what is easily readable and keep the percentage of reduction as consistent as possible within a given project.

**Numbers in Summaries:** Numbers throughout the summaries should meet the following guidelines:

- Utilize a fixed format without commas. (Metric numbers should utilize the metric format specified in the Metric Conversion Manual.)
- Internal computer values should be rounded accordingly to avoid subsequent errors in the summation of various quantities. For example: in the Surfacing Summary, if the tons of crushed base are shown to the nearest ton, but the internal value is extended to hundredths of a ton, the total summation of the tons of crushed base may appear erroneous.
- Rounding up the Total Quantity to obtain the For Estimate can range from no rounding to a 1% increase depending on the item. For Estimate quantities are always equal to or greater than the Total Quantity. Do not round Total Quantity prior to rounding up to obtain the For Estimate quantity.

- For Estimate quantities should generally be shown as whole numbers. However, there may be instances where the quantity is extremely small or the unit price is large, or both, thus making it reasonable to establish the For Estimate quantity to the nearest decimal place. Always consider the individual item, quantity and unit price to determine if rounding is appropriate. Examples:

40.4 FT of fencing: Use 41 FT - the unit price is small and 0.6 is a small percentage of 41 FT.

1.3 CY of concrete repair: Use 1.3 CY - 2 CY or 1 CY would significantly misrepresent the quantity of work and the unit cost is probably rather expensive.

50.3 CY of concrete repair: Use 51 CY - the large quantity makes it immaterial what the unit cost is.

**Exceptions:** Quantities received from other Programs must be shown as received from the originator.

- For Estimate quantities for fabricated items (i.e., guardrail, pipe, etc.) should reflect the actual quantity required for construction.
- Quantities for a non-fabricated item (i.e., grading, surfacing, etc.) are typically increased by 1% or less and then rounded to obtain the For Estimate quantity. Normally, two digit numbers are rounded to 1 or 2 significant figures, three digit numbers are rounded to 2 significant figures and four digit numbers or greater are rounded to 3 significant figures. See example below:

NUMBERS WITH 2 OR MORE DIGITS	ROUNDED FOR ESTIMATE	ROUND TO
60 - increased by 1% = 60.6	60 or 61	1 OR 2 Significant Figures.
469 - increased by 0.5% = 471.3	470	2 Significant Figures.
3715 - increased by 0.25% = 3724.3	3720	3 Significant Figures.
52295 - increased by 0.75% = 52678.2	52700	

Bid items with total quantities that are not likely to change with construction (i.e., drainage pipe, flare ends, manholes, inlets, concrete pavement, etc.) are typically not rounded up or they can be increased by less than 1% and rounded.

- Hand check quantities for “ball park” accuracy to eliminate major errors caused by incorrect computer solutions.



## SUMMARY REFERENCE TABLE

**General:** Include a Summary Reference Table to assist plan users in locating particular summaries when there are approximately six or more pages of summaries. List the summary names in alphabetical order and place the Summary Reference Table on the first summary plan sheet.

SUMMARY REFERENCE TABLE	
SUMMARIES AND NOTES	SHEET NO.
ACCUMULATION	S6
AGGREGATE DEAD HAUL	S7
APPROACH	S12
CATTLE GUARD	S12
CLEARING AND GRUBBING	S7
CULVERT	S9
EQUIPMENT	S7
EROSION CONTROL BLANKET	S13
FENCE	S14
FENCE REMOVAL	S14
GENERAL NOTES	S5
GRADING	S8
GUARDRAIL	S13
HIGHWAY MONUMENT	S19 - S21
HIGHWAY SIGN	S17 - S18
LENGTH OF PROJECT	S5
MATERIALS AND RATES	S3 - S4
MATERIALS AND RATES NOTES	S4
MISCELLANEOUS	S5
OILING NOTES	S4
PERMANENT SIGNING NOTES	S16
REMOVING AND RESETTING MAILBOXES	S12
SIGN	S16
STRIPPING PITS	S7
STRUCTURE	S15
SURFACING	S10 - S11
SURFACING ACCUMULATION	S6
TEMPORARY FENCE	S14
TOPSOIL AND SEEDING	S13
TOTAL ESTIMATED QUANTITIES	S2
TRAFFIC CONTROL	S16

**EXHIBIT 2**

## **TOTAL ESTIMATED QUANTITIES**

**General:** The Total Estimated Quantities (TEQ) contains the For Estimate quantity of every bid item that will be incorporated into a particular project. Contracts and Estimates uses these quantities to prepare the Engineer's estimate and the Bid Proposal. The contractor then assigns a unit price to each of the items in the Bid Proposal to arrive at the total contract bid price for the project.

When compiling the TEQ, place the bid items (number, item name and unit) into the summary electronically with the TEQ builder, or copy and paste the bid item directly into the summary. **Do not hand type bid item numbers.**

The following bid items are generally carried over to the TEQ from the Miscellaneous Summary. Most of the other bid items in the TEQ reflect calculated quantities of materials that are used on the project, but these items are associated with the bidding or construction processes and are obtained from the sources noted below:

- FIELD LABORATORY - This item is an appropriately equipped trailer, supplied by the contractor, in which all required material tests are performed.
- CONTRACTOR TESTING - For Hot Plant Mix or Concrete Pvmt (\_\_\_in), when recommended by Materials Program or District.
- RAILROAD INSURANCE - When the contractor's operations are in close proximity to any railroad, the contractor is required to purchase insurance to cover potential damages to the railroad property.
- CONTRACTOR STORM WATER CONTROL - This item is the amount of money that will be required for storm water control items to protect adjacent properties and natural waterways from being polluted by sediment from the construction site or material pits. Storm water control measures must meet the requirements given in the National Pollution Discharge Elimination System (NPDES) legislation.

If the NPDES plan is to be developed by the contractor, Storm Water Control will be set up as a Lump Sum bid item. The storm water control lump sum should only be shown under the major work code column.

DEPARTMENT STORM WATER CONTROL - If the NPDES plan is developed by WYDOT as part of the plans, Storm Water Control will be set up as a Force Account bid item and individual bid items are not included in the contract. Individual pollution prevention items should be paid for separately, if possible. If there is a WYDOT pit permit, then a NPDES plan is needed.

- **MOBILIZATION** - Mobilization is the amount of money required by the contractor to move their equipment to the job site and begin the construction. Mobilization is normally estimated at approximately 10 percent of the total project cost. Show the mobilization lump sum under the major work code column.
- **TEST STRIP** - This item is a test section of plant mix pavement that is constructed at the beginning of a project to ensure that all aspects of the proposed paving process (aggregate gradations, asphalt content, roller patterns, etc.) will result in a pavement which satisfies WYDOT standards.

Details and summaries for construction traffic control (Category I, II, III and IV TCD Units), permanent signing (Sign Posts Wood, Aluminum Sign Panels, Delineators Type II & III, etc.) and electrical items are supplied by the Traffic Program for inclusion in the project plans.

Quantities for structure items like Structural Steel, Concrete Class B and Reinforcing Steel are taken from the Bridge Program's title sheets and are used to compile the Structure Summary.

**Elements:** Refer to Exhibits 3 and 4.

- [1] On many projects different construction features are charged to different project numbers. Include separate columns in the TEQ and calculate separate quantities for each construction project number.
- [2] On federally funded projects the items associated with structures (bridges, box culverts, etc.) are noted in a separate column that has a structure code different than the roadway items. The Improvement Type Codes are shown in Exhibit 4. On State-funded projects, the roadway and structure codes are not required and all items associated with each project can be shown under one column. However, if the project might change from state to federal funding, then separate quantities per required Improvement Codes.

TOTAL ESTIMATED QUANTITIES					
ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES		
			1904006		1904A01
			ROADWAY CODE 03	STRUCTURE CODE 14	ROADWAY CODE 06
106.05100	FIELD LABORATORY	EA	1		
106.05200	CONTRACTOR TESTING	LS	LUMP SUM		LUMP SUM
107.07000	RAILROAD INSURANCE	LS	LUMP SUM		
109.04000	FORCE ACCOUNT WORK	\$\$	\$10,000		\$1,000
109.08000	MOBILIZATION	LS	LUMP SUM		LUMP SUM
199.00000	CONTROLS FOR LEAD PAINT REMOVAL	LS		LUMP SUM	
202.03165	REMOVAL OF GUARDRAIL AND BARRIER	FT	4060	336	
202.03305	MILLING PLANT MIX	SY	40500		
202.03600	CUTTING BIT PVMT	FT	150		1280
203.02000	BORROW SPECIAL EXCAVATION	CY	1320		
203.02500	UNCLASSIFIED EXCAVATION	CY	40000		1660
207.03100	TOPSOIL STORING	CY	26700		600
207.03200	TOPSOIL PLACING	CY	33000		600
209.01000	WATER	MG	3500		132
213.03100	OVERBURDEN REMOVAL	CY	25300		
213.03110	OVERBURDEN PLACING	CY	25300		
215.01000	CONTRACTOR STORM WATER CONTROL	LS	LUMP SUM		LUMP SUM
215.01010	DEPARTMENT STORM WATER CONTROL	\$\$	\$3,000		
216.03100	SEEDING(PLS)	LB	1080		20
216.03120	FERTILIZER TYPE I	LB	2000		35
216.03900	DRY MULCH	TON	101		2
216.03955	COCONUT FIBER DITCH LINING	SY	14200		
217.01010	GEOTEXTILE, EROSION CONTROL	SY	300		
217.01065	BIAXIAL GEOGRID	SY	15800		
221.01000	DUST CONTROL AGENT	TON	596		9
301.01000	PIT RUN SUBBASE	TON	9750		
301.01080	CRUSHED BASE	TON	16000		815
401.02000	HOT PLANT MIX	TON	15600		1330
401.02040	TEST STRIP	EA	1		
401.02055	HOT PLANT MIX APPROACHES	TON	405		166
401.03322	ASPHALT BINDER (PG 64-28)	TON	1230		90
407.01000	TACK COAT	TON	21		2
413.01000	HYDRATED LIME	TON	200		15
499.03040	REUSED SURFACING	CY	7000		
503.01000	BRIDGE RAILING	FT		336	
513.00015	CLASS B CONCRETE	LS	LUMP SUM	LUMP SUM	
514.00010	MECHANICAL SPLICES	EA		596	
514.00025	REINFORCING STEEL (COATED)	LS		LUMP SUM	
515.02720	BRIDGE DECK REPAIR CLASS I-B	SY		10	
515.02800	SILICA FUME MODIFIED CONCRETE	CY		1.4	
603.01018	PIPE 18 in	FT	96		90
603.01024	PIPE 24 in	FT	582		
603.03024	PIPE FE SECT 24 in	EA	14		
606.05000	BOX BEAM GUARDRAIL	FT	2908		
606.05013	BOX BEAM END TERM (WYBET)	EA	8		
614.01000	EROSION CONTROL CONCRETE	CY	20		
701.29800	ELECTRICAL CONDUCTORS	LS	LUMP SUM		
701.73000	ROADWAY LIGHTING SYSTEM	LS	LUMP SUM		
702.30105	SIGN POSTS, WOOD 4 X 6 in	FT	350		70
702.30300	SIGN POST, SQ TUBULAR STL	EA			2
702.30400	SIGN PANELS, PLYWOOD	SF	148		
702.30500	SIGN PANELS, ALUMINUM	SF	284		131
702.50200	DELINEATORS, TYPE II	EA	40		
703.03100	FLAGGING	HR	3600		
703.03110	TEMPORARY TRAFFIC CONTROL	LS	LUMP SUM		

## EXHIBIT 3

**IMPROVEMENT TYPE CODES [2]**

<b>Code</b>	<b>Name/Description</b>
<b>01</b>	<b>New Construction Roadway</b> Construction of a new roadway that will not replace an existing roadway. A new roadway will provide: (1) a roadway where none existed, or (2) an additional and alternate roadway to an existing roadway that will remain open and continue to serve through traffic.
<b>03</b>	<b>Reconstruction, Added Capacity</b> Construction on approximate alignment of an existing route where the old pavement structure is substantially removed and replaced. Such reconstruction includes widening to provide continuous additional through lane(s), or adding, or revising interchanges, replacing other highway elements such as a grade separation to replace an existing grade intersection. Also included, where necessary, are other incidental improvements such as drainage and shoulder improvements.
<b>04</b>	<b>Reconstruction, No Added Capacity</b> Widening the lanes and/or shoulders of an existing roadway without adding through lanes. May include reconstructing the existing pavement and other incidental improvements such as shoulder and drainage improvements.
<b>05</b>	<b>4R Maintenance Resurfacing</b> Placement of additional surfacing material over the existing roadway to improve serviceability or to provide additional strength. There may be some upgrading of unsafe features and other incidental work in conjunction with resurfacing. Where surfacing is constructed by separate project as a final stage of construction, the type of improvement should be the same as that of the preceding stage B new route, relocation, reconstruction, minor widening, etc.
<b>06</b>	<b>4R Maintenance - Restoration &amp; Rehabilitation</b> Work required to return existing pavement (including shoulders) to a condition of adequate structural support or to a condition adequate for placement of an additional stage of construction. There may be some upgrading of unsafe features or other incidental work in conjunction with restoration and rehabilitation. Typical improvements would include replacing spalled or malfunctioning joints; substantial pavement stabilization prior to resurfacing; grinding/grooving of rigid pavements; replacing deteriorated materials; reworking or strengthening bases or sub-bases, and adding under-drains.
<b>07</b>	<b>4R Maintenance - Relocation</b> Construction of a roadway at a new location that replaces an existing roadway. The new roadway carries all the through traffic with the previous facility closed or retained as a land-service road only.

**EXHIBIT 4**  
(Page 1 of 5)

**IMPROVEMENT TYPE CODES [2]**

<b>Code</b>	<b>Name/Description</b>
<b>08</b>	<b>Bridge, New Construction</b> Construction of a new bridge that does not replace or relocate an existing bridge.
<b>**10</b>	<b>Bridge Replacement, Added Capacity</b> Total replacement of a structurally inadequate or functionally obsolete bridge with a new structure constructed with additional lanes in the same general traffic corridor to current geometric construction standards. Incidental roadway approach work is included. The use of this code requires the reporting of the National Bridge Inventory (NBI) structure number in the data field identified Bridge Numbers.
<b>**11</b>	<b>Bridge Replacement, No Added Capacity</b> Total replacement of a structurally inadequate or functionally obsolete bridge with a new structure without adding lanes constructed in the same general traffic corridor to current geometric construction standards. A bridge removed and not replaced or replaced with a lesser facility is considered a bridge replacement. Incidental roadway approach work is included. Widening the lanes and/or shoulders of an existing structure without adding through lanes. The use of this code requires the reporting of the NBI structure number in the data field identified Bridge Numbers.
<b>**13</b>	<b>Bridge Rehabilitation, Added Capacity</b> The major work required to restore structural integrity of a bridge as well as work necessary to correct major safety defects. Bridge deck replacement (both partial and complete) and widening of bridges including addition of through lanes to specified standards are included. Construction of a dual structure to alleviate a capacity deficiency is also included. Work required to correct minor structure and safety defects or deficiencies, such as deck patching, resurfacing, protective systems, upgrading railings, curbs and gutters, and other minor bridge work. If HBRRP funds are involved, the use of this code requires the reporting of the NBI structure number in the data field identified Bridge Numbers.
<b>**14</b>	<b>Bridge Rehabilitation, No Added Capacity</b> The major work required to restore structural integrity of a bridge as well as work necessary to correct major safety defects. Bridge deck replacement (both partial and complete) and widening of bridges without adding through lanes to specified standards are included. Work required to correct minor structure and safety defects or deficiencies, such as deck patching, resurfacing, protective systems, upgrading railings, curbs and gutters, and other minor bridge work. If HBRRP funds are involved, the use of this code requires the reporting of the NBI structure number in the data field identified Bridge Numbers.
<b>*15</b>	<b>Preliminary Engineering</b> Funding for the preparation of plans, specifications, and estimates (PS&E), traffic, and related studies including field inspections, surveys, material testing, and borings.

**EXHIBIT 4**

(Page 2 of 5)

**IMPROVEMENT TYPE CODES [2]**

<b>Code</b>	<b>Name/Description</b>
<b>16</b>	<b>Right of Way</b> Purchase of land, improvements and easements, in addition to the cost of moving and relocating buildings, businesses, and persons.
<b>*17</b>	<b>Construction Engineering</b> Oversight of construction of roadways, structures, and traffic services facilities including additional design work after construction project is let.
<b>18</b>	<b>Planning</b> For Planning related purposes.
<b>19</b>	<b>Research</b> For Research related purposes.
<b>20</b>	<b>Environmental Only</b> This category includes improvements that do not provide any increase in the level of service, in the condition of the facility or in safety features. Typical improvements, which would fall in this category, would be noise barriers, beautification and other environmentally related features not built as a part of any other improvement type.
<b>21</b>	<b>Safety</b> A project or a significant portion of a project which provides features or devices to enhance safety. For example, expenditures on projects designed to improve the safety of at-grade railroad crossings or for the construction of facilities dedicated to the enforcement of vehicle weight regulations.
<b>22</b>	<b>Rail/Highway Crossing</b> Improvements to crossing warning Protective Devices such as signs, marking, and cross bucks; flashing light additions/improvements; and improvements to track circuitry.
<b>23</b>	<b>Transit</b> For transit and transit-related purposes.
<b>24</b>	<b>Traffic Management/Engineering - HOV</b> Traffic operation improvements that are designed to reduce traffic congestion and to facilitate the flow of traffic, both people and vehicles, on existing systems, or to conserve motor fuels. Include automated toll collection equipment, road and bridge surveillance and control systems, etc.
<b>25</b>	<b>Vehicle Weight Enforcement Program</b> Vehicle weight enforcement.
<b>26</b>	<b>Ferry Boats</b> Ferry boats.

**EXHIBIT 4**  
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**IMPROVEMENT TYPE CODES [2]**

<b>Code</b>	<b>Name/Description</b>
<b>27</b>	<b>Administration</b> Administration for National Recreational Trails Projects, Commercial Vehicles, and other similar projects.
<b>*28</b>	<b>Facilities for Pedestrians and Bicycles</b> An independent project (not part of any other Federal-aid Highway project) to construct a facility to accommodate bicycle transportation and pedestrians.
<b>*29</b>	<b>Acquisition of Scenic Easements and Scenic or Historic Sites</b> A project consisting of easement and fee-simple purchase of sites of historic significance and/or considered worthy of preserving due to their scenic qualities within the view shed of a transportation facility.
<b>*30</b>	<b>Scenic or Historic Highway Programs</b> A project consisting of scenic highway program and implementation activities not included in safety and other related improvements.
<b>*31</b>	<b>Landscaping and Other Scenic Beautification</b> A project involving landscaping and other scenic beautification through planting and related work. This includes vegetation management to assure the sustain ability of landscape areas.
<b>*32</b>	<b>Historic Preservation</b> A project consisting of purchasing and restoring/rehabilitating a building, structure, or facility (other than transportation buildings, structures and facilities) that is directly related to the transportation system.
<b>*33</b>	<b>Rehabilitation and Operation of Historic Transportation Buildings, Structures, or Facilities</b> A project consisting of purchasing and restoring/rehabilitating, and/or operating transportation buildings, structures, or facilities considered to be of historic significance.
<b>*34</b>	<b>Preservation of Abandoned Railway Corridors</b> A project to preserve an abandoned railway corridor. It is expected that most of these projects will accommodate bicycle and pedestrian use. This code may be used for any railway corridor conversion project, including those used by equestrians, skaters, and skiers. Do not use this code for National Recreational Trails projects.
<b>*35</b>	<b>Control and Removal of Outdoor Advertising</b> A project to purchase outdoor advertising for permanent removal, to remove illegal outdoor advertising, or to develop an outdoor advertising control plan.
<b>*36</b>	<b>Archaeological Planning &amp; Research</b> A project involving the identification, evaluation, planning, and/or research of historic or archaeological planning and research under Transportation Enhancements.

**EXHIBIT 4**

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**IMPROVEMENT TYPE CODES [2]**

<b>Code</b>	<b>Name/Description</b>
<b>*37</b>	<b>Mitigation of Water Pollution Due to Highway Runoff</b> Mitigation of water pollution due to highway runoff.
<b>*38</b>	<b>Safety and Education for Pedestrians/Bicycles</b> Safety and education for pedestrians and bicyclists.
<b>*39</b>	<b>Establishment of Transportation Museums</b> Establishment of transportation museums.
<b>*40</b>	<b>Special Bridge</b> This category includes bridge inventory, inspection and classification and other special bridge projects, such as load posting, not covered by another type of improvement code.
<b>*41</b>	<b>Youth Conservation Service</b> Youth conservation service.
<b>*42</b>	<b>Training</b> Training; Supportive Services; TRAC; On the Job Training.
<b>43</b>	<b>Utilities</b> Utilities
<b>44</b>	<b>Other</b> Miscellaneous work such as National Recreational Trails construction, noise barriers, etc.
<b>45</b>	<b>Debt Service</b> Interest payments and retirement of principal under an eligible bond issue (including capitalized interest) and any other cost incidental to the sale of an eligible bond issue (including issuance costs, insurance or other credit enhancement fees, and other bond-related costs as determined).

**EXHIBIT 4**

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\* Transportation Enhancement Projects (Program Codes with fund source 33B0, Q220) must use these Type of Improvements.

\*\* Projects using these Type of Improvements must report a National Bridge Inventory Structure Number.

## MATERIALS AND RATES

**General:** The purpose of the Materials and Rates Summary is to tabulate the basic properties of many of the pay items that are used in the development of estimated quantities for a particular project. The Materials and Rates Summary contains data concerning the materials used for excavation, embankment, topsoil, surfacing, and revegetation. Other materials may be included as needed.

**Elements:** Refer to Exhibits 5 and 6.

- [1] The water rate required to compact the embankment material to optimum density is given in the Soil Profile, which is developed by the Geology Program. It typically falls in the range of 25 to 40 gal/CY [ $0.124$  to  $0.198 \text{ m}^3/\text{m}^3$ ].
- [2] It is standard WYDOT practice to include an additional amount of water equal to 5 gal/CY [ $0.025 \text{ m}^3/\text{m}^3$ ], for dust control during embankment construction.
- [3] Data concerning the surfacing materials to be used on a particular project is given in the surfacing recommendations, which are developed by the Materials Program.
- [4] Calculate the water (opt. moisture) rate to match the bid units for the crushed base or subbase, etc. For example:
  - When the crushed base is bid by the **TON** [t], the rate for water (opt. moisture) is calculated in **GAL/TON** [ $\text{m}^3/\text{t}$ ].
  - When crushed base is bid by the **CY** [ $\text{m}^3$ ], the rate for water (opt. moisture) is calculated in **GAL/CY** [ $\text{m}^3/\text{m}^3$ ].

(In metrics, it is a ratio of the kilograms of water per  $\text{m}^3$  to the kilograms of crushed base per  $\text{m}^3$  to obtain the  $\text{m}^3$  of water per metric ton of crushed base.)
- [5] It is standard WYDOT practice to include an additional amount of water equal to 5 gal/ton [ $0.021 \text{ m}^3/\text{t}$ ] or 10 gal/CY [ $0.050 \text{ m}^3/\text{m}^3$ ] for finishing during the placement of crushed base.
- [6] The water (total) value is used in the Surfacing Summary for calculating the amount of water necessary to compact the crushed base to optimum density.
- [7] Application rates for prime, dust control agent, tack, seal, etc. are listed in Exhibit 6 which is provided by the Materials Program.
- [8] The Materials Program specifies the material sources. There are three types of sources: restricted, available, and contractor furnished.

- [9] Materials agreement numbers are obtained from the Contracts and Estimates Program or the District Program.
- [10] Dead haul distances from the material source to the project or plant site are obtained from the field (engineer's recommendation).
- [11] Dust Control Agent can be used as an alternative to using a Prime Coat. Dust Control is applied to the full top width of the crushed base and Prime Coat is applied to the full top width of the crushed base plus 6" [150 mm] beyond the toes of the bituminous pavement.
- [12] Mix properties, level of control options, etc., are specified by the Materials Program.
- [13] Tack Coat is normally applied between lifts of bituminous pavement to the width of the surfaces being joined. If the primed crushed base is used by traffic, then a coat of tack may also need to be applied to the primed crushed base prior to placement of the bituminous pavement. This is usually a field decision and is not quantified in the plans unless specifically requested.
- [14] Selecting the type of wearing surface, chip seal material versus a plant mix wearing course, is made by the Materials Program and the District. The width of the chip seal is determined in accordance with Chapter 7 Road Design Memorandums titled Chip Seals. Plant mix wearing course is placed over the full top width of the roadway.
- [15] Before the chip seal aggregate is placed, the emulsified asphalt is applied to the pavement surface at a width equal to the finished width of the chip seal aggregate.

Seal Coat material used with the Plant Mix Wearing Course (PMWC) is applied at the same width as the PMWC. *Note: The seal coat is always applied to the pavement surface prior to placing the plant mix wearing course. Wearing courses are designed to be porous to improve traction in wet conditions by conveying the water through the wearing course structure to the roadway shoulder. The seal coat prevents water from penetrating the pavement beneath the wearing course.*

- [16] Fog Seal is used on bituminous pavement surfaces that are not covered by a wearing course (i.e. shoulders and pavement tapers plus 6" [150 mm]), when recommended by the Materials Program.

- [17] The depth of topsoil removal is normally 4" [100 mm], but always verify the removal depth with the District and/or Environmental Services Program. Revegetation recommendations for topsoil placement, seed type and dust control are provided by the Environmental Services agronomist.
- [18] The revegetation recommendations contain materials and rates associated with reclaiming areas disturbed by construction.
- [19] Revegetation is normally accomplished by dry seeding methods, which requires drilling or broadcasting the seeding/fertilizer and applying dry mulch to the disturbed areas. It is typical to drill seed slopes that are 1V:3H or flatter and to broadcast or hydraulic seed slopes that are steeper than 1V:3H. Broadcast seed is applied at 1.5 to 2.0 times the recommended rate for drill seeding. The seeding recommendations and rates are obtained from the Environmental Services agronomist.
- [20] On projects that have relatively large areas of steep slopes or on some urban projects, the agronomist may recommend hydraulic seeding. In this process, the slopes to be revegetated are treated with a slurry containing the seed, fertilizer, mulch, and mulch tack. On urban projects, special revegetation procedures may be required. For example, the use of hydraulic mulching will minimize mulch blowing onto adjacent properties and the use of shorter grasses will improve the visual appearance as well as minimize insect problems.
- [21] On projects that have high erosion areas, the agronomist may recommend an erosion control blanket, ditch liner, or netting.
- [22] The water sources for a particular project are obtained by field personnel. The designer estimates the quantity of construction water needed. Agreement numbers are assigned by the Contracts and Estimates Program.
- [23] Any applicable notes not included in the body of the Materials and Rates Summary and any additional Surfacing Notes recommended by the Materials Program are included at the bottom of the summary or in close proximity to the Materials and Rates Summary.
- [24] Aggregate used for chip seal must be approved by the Materials Program. Typically, the aggregate for chip seal is set up as a contractor-furnished source. However, if the project also includes an available material source that is also approved for chip seal aggregate, then add a note to indicate that the project materials pit is an approved contractor-furnished source for the chip seal aggregate.

**MATERIALS AND RATES**

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RATES AND WEIGHTS SHOWN ARE APPROXIMATE AND ARE SUBJECT TO ADJUSTMENT ON CONSTRUCTION.

ITEM	GRADE	ESTIMATED RATE	REMARKS
<b>EXCAVATION AND EMBANKMENT</b>			AVAILABLE MATERIAL SOURCE: FROM WITHIN R/W, CONST. PERMITS, & CROSS PIT (REJECTS).
EMBANKMENT WATER		40 GAL/CY EMB. COMPACTION [1] 5 GAL/CY FOR DUST CONTROL [2]	
<b>PIT RUN SUBBASE [3]</b> AGGREGATE WATER (OPT. MOISTURE) PIT RUN SUBBASE  WATER WATER	MAX. SIZE 1.5 IN	139.4 LB/CF DRY 8.8 LB/CF (6.3% OF 139.4) 148.2 LB/CF COMPACTED  14.2 GAL/TON (OPT. MOISTURE) [4] 5 GAL/TON (FOR FINISHING) [5] 19.2 GAL/TON [6]	AVAILABLE MATERIAL SOURCE: CROSS PIT [8] AGREEMENT. NO 37300 [9] DEAD HAUL = 3.0 MILES FROM PIT TO STA. 1+00 [10]
<b>CRUSHED BASE [3]</b> AGGREGATE WATER (OPT. MOISTURE) CRUSHED BASE  WATER WATER WATER (TOTAL)	W	139.2 LB/CF DRY 8.9 LB/CF (6.4% OF 139.2) 148.1 LB/CF COMPACTED  14.4 GAL/TON (OPT. MOISTURE) [4] 5 GAL/TON (FOR FINISHING) [5] 19.4 GAL/TON [6]	AVAILABLE MATERIAL SOURCE: CROSS PIT [8] AGREEMENT NO 37300 [9] DEAD HAUL = 3.0 MILES FROM PIT TO STA. 1+00 [10]
DUST CONTROL AGENT	MAGNESIUM BRINE	6.6 LB/SY (MAINLINE) [7]	WIDTH = VARIABLE [11]
<b>HOT PLANT MIX [3]</b> <b>HOT PLANT MIX APPROACHES</b> AGGREGATE TYPE II FILLER HYDRATED LIME ASPHALT BINDER HOT PLANT MIX  TACK COAT  ASPHALT BINDER	1/2 IN NOMINAL MAX.  (PG 70-28)      (PG 58-28)	131.2 LB/CF DRY 6.9 LB/CF (5% OF 138.1) 1.4 LB/CF (1.0% OF 138.1) 8.3 LB/CF (5.60% OF 147.8) 147.8 LB/CF COMPACTED  0.25 LB/SY [7]  2.5 LB/SY	AVAILABLE MATERIAL SOURCE: CROSS PIT AGEEMENT NO 37300 [8] [9] DEAD HAUL = 3.0 MILES TO STA. 15+00. [10] FILLER: A MAX OF 10% MINUS #4 MIX PROPERTIES: CLASS III-M LEVEL OF CONTROL: 2 (OPTION 1) LEVEL OF CONTROL: 3 (OPTION 2) DENSITY REQUIREMENT: I (OPTION 1) DENSITY REQUIREMENT: II (OPTION 2) APPROACHES: PER STD. SEC. 401.4.20.2 } [12]  WIDTH = VARIABLE [13]  FOR PAVING FABRIC
<b>PLANT MIX WEARING COURSE [3] [14]</b> AGGREGATE HYDRATED LIME ASPHALT BINDER PLANT MIX WEARING COURSE  SEAL COAT	(PG 70-28)	126.5 LB/CF DRY 1.3 LB/CF (1.0% OF 126.5) 8.6 LB/CF (6.30% OF 136.4) 136.4 LB/CF COMPACTED  0.6 LB/SY [7]	AVAILABLE MATERIAL SOURCE: CROSS PIT [8] AGREEMENT NO. 37300 [9] DEAD HAUL= 3.0 MILES [10]  WIDTH = VARIABLE [15] [16]

**EXHIBIT 5**

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## MATERIALS AND RATES

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CHIP SEAL AGGREGATE EMULSIFIED ASPHALT MODIFIED FOG SEAL	TYPE C	3.3 LB/SY 0.5 LB/SY	AVAILABLE MATERIAL SOURCE: CONTRACTOR FURNISHED - See Note 2. WIDTH: VARIABLE WIDTH: VARIABLE
RIPRAP MACHINE-PLACED RIPRAP		CY	AVAILABLE MATERIAL SOURCE: CROSS PIT [8] AGREEMENT NO. 37300 [9] DEAD HAUL= 3.0 MILES [10]
CONCRETE PVMT(10 inch) [3]			AVAILABLE MATERIAL SOURCE: CONTRACTOR FURNISHED MAINLINE: DOWELED: NO TEXTURE: BROOM JOINT SEAL: SILICONE ASR REQUIREMENTS: NO DESIGN FLEXURAL STRENGTH: 650 PSI LEVEL OF CONTROL: IV (OPTION 1) } [12] LEVEL OF CONTROL: II (OPTION 2)
TOPSOIL WATER SEEDING [18] DRYLAND TURF [19] SODAR STREAMBANK WHEATGRASS BRIGHTSTAR PERENNIAL RYEGRASS CANBAR CANBY BLUEGRASS BLACK SHEEP FESCUE BAD RIVER BLUE GRAMA TOTAL SEEDING (PLS):		4 IN ± [17] 5 GAL/CY [17]  5 LB PURE LIVE SEED/ACRE 5 LB PURE LIVE SEED/ACRE 2 LB PURE LIVE SEED/ACRE 2 LB PURE LIVE SEED/ACRE 2 LB PURE LIVE SEED/ACRE 16 LB PURE LIVE SEED/ACRE	SALVAGE & REPLACE TOPSOIL. WATER FOR DUST CONTROL.  DRILL THE DRYLAND TURF MIXTURE AT A DEPTH OF .5 IN TO .25 IN. INACCESSIBLE AREAS , BROADCAST 2X THE DRILL RATE WHEN BROADCASTING, LIGHTLY RAKE TO COVER SEED. [19]
FERTILIZER  HYDRAULIC MULCHING [20] FIBER MULCH MULCH TACK WATER  EROSION CONTROL BLANKET [21]	TYPE I  RECYCLED/VIRGIN WOOD TYPE MC	40 LB AVAILABLE NITROGEN/ACRE  1 TON/ACRE 1 TON/ACRE 125 LB/ACRE 4 MG/ACRE  TYPE EX-2	URBAN AREAS (TO ABOUT STA 49+00) APPLY WITHIN 24 HOURS OF SEEDING. NO PAPER (CELLOULOSE) ADDITIVES IN THE RECYCLED WOOD FIBER. [20]

WATER SOURCE: CLEAR CREEK, AGREEMENT NO. 32457 [22]

## NOTES: [23]

1. PLANT SITE TO BE LOCATED IN THE CROSS PIT, AGREEMENT NO. 40669.
2. THE CROSS PIT HAS BEEN APPROVED AS A CONTRACTOR FURNISHED SOURCE FOR THE CHIP SEAL AGGREGATE. [23] [24]

[23] ADD "SURFACING NOTES" WHEN RECOMMENDED BY THE MATERIALS PROGRAM, SEE SECTION ON "SURFACING NOTES" FOR AN EXAMPLE.

## EXHIBIT 5

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**REFERENCE TABLE**  
(MATERIALS APPLICATION RATES)

ITEM	MATERIALS	ESTIMATED RATES <sup>(1)</sup>	
		ENGLISH	METRIC
		LB/SY	kg/m <sup>2</sup>
CRUSHED BASE, MAINLINE	PRIME COAT	3.2	1.7
	DUST CONTROL AGENT	6.6	3.6
	BLOTTER	10	5.4
CRUSHED BASE, HAUL ROADS	DUST CONTROL AGENT	6.6	3.6
HOT PLANT MIX, LEVELING APPROACHES, AND MAINT.	TACK COAT	0.25	0.14
PAVING FABRIC	PERFORMANCE GRADED (ASPHALT BINDER)	2.5	1.4
FOG SEAL		0.5	0.27
PLANT MIX WEARING COURSE	SEAL COAT	0.6	0.33
CHIP SEAL AND CHIP SEAL (OVERSHOOT)	<b>TYPE B</b>	31 <sup>(2)</sup>	17 <sup>(2)</sup>
	EMULSIFIED ASPHALT	3.6	2
	EMULSIFIED ASPHALT MOD.	3.6	2
	EMULSIFIED ASPHALT (OVERSHOOT)	0.5	0.27
	<b>TYPE C</b>	28 <sup>(2)</sup>	15 <sup>(2)</sup>
	EMULSIFIED ASPHALT	3.3	1.8
	EMULSIFIED ASPHALT MOD.	3.3	1.8
	EMULSIFIED ASPHALT (OVERSHOOT)	0.25	0.14
	<b>TYPE D</b>	28 <sup>(2)</sup>	15 <sup>(2)</sup>
	EMULSIFIED ASPHALT	3.6	2
	EMULSIFIED ASPHALT MOD.	3.6	2
	<b>TYPE E</b>	20 <sup>(2)</sup>	11 <sup>(2)</sup>
	EMULSIFIED ASPHALT	2.6	1.4
	EMULSIFIED ASPHALT MOD.	2.6	1.4
	<b>TYPE S</b>	18 <sup>(2)</sup>	10 <sup>(2)</sup>
	EMULSIFIED ASPHALT	CALL LAB	CALL LAB
	EMULSIFIED ASPHALT MOD.	CALL LAB	CALL LAB
	<b>TYPE K</b>	24 <sup>(2)</sup>	13 <sup>(2)</sup>
	EMULSIFIED ASPHALT	CALL LAB	CALL LAB
	EMULSIFIED ASPHALT MOD.	CALL LAB	CALL LAB

(1) THESE RATES ARE TO BE USED AS GUIDELINES FOR ALL PROJECTS, UNLESS OTHERWISE RECOMMENDED BY THE LAB.

(2) THE WEIGHTS FOR CHIP SEAL AGGREGATE AS SHOWN ABOVE ARE FOR ESTIMATING PURPOSES ONLY AND THEY ARE NOT TO BE INCLUDED IN THE MATERIALS AND RATES.

## EXHIBIT 6

**SURFACING NOTES**

**General:** The surfacing notes are obtained from the Surfacing Recommendations that are provided by the Materials Program. The recommendations are typically divided into two sections: 1) notes that are to be shown in the plans (may be specification requirements or informational) and 2) notes directed to the designer. Place notes intended for the plans as close as possible to the Materials and Rates Summary.

**Elements:** Refer to Exhibit 7.

- [1] If possible, do not retype the Surfacing Notes. Copy and paste the Surfacing Notes verbatim from the Surfacing Recommendations to the summary sheet. Minor editorial changes may be necessary to be consistent with typical plan terminology.
- [2] Show mix design data for various properties to the same number of significant digits as the Surfacing Recommendations. Although a number may have zeroes at the end, it represents a level of accuracy required for the property, so do not omit them.
- [3] Include the International Roughness Index (IRI) in the surfacing notes when recommended or required by the Materials Program.



**SURFACING NOTES [1]**

FOLLOWING ARE THE MATERIALS PROPERTIES AND MARSHALL MIX DESIGN RESULTS FOR THE AVAILABLE SOURCE SHOWN ON THE PLANS ACHIEVED USING THE AGGREGATE PROPORTIONS AND GRADATIONS SHOWN BELOW. (NOTE: THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. (IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRODUCE AND PROPORTION MATERIALS TO MEET THE SPECIFICATION.)

**RECYCLE PLANT MIX PAVEMENT, GRADING "A"**

PROPERTY	MIX DESIGN DATA [2]
MARSHALL BLOWS, NO.	75
ASPHALT CONTENT, %	5
MARSHALL STABILITY, LBS.	2600
MARSHALL FLOW, 0.01 IN.	8
V.M. A., %	14.2
AIR VOIDS, %	4
TENSILE STRENGTH RATIO, %	93
DUST TO ASPHALT RATIO	1.0
FILM THICKNESS, $\mu\text{m}$	9
L. A. WEAR GRADING, "B"	21

**FARIS PIT**

SIEVE SIZE	COURSE (CRUSHED)	FINES (CRUSHED)	(1) RAP (CORES)	COMBINED
1"	100			100
3/4"	100			100
1/2"	65			80
3/8"	31	100	100	61
#4	6	88	60	34
#8	4	66	42	25
#30	2	39	26	15
#200	0.7	8.9	11.6	4.9

- (1) THE VIRGIN PLANT MIX PAVEMENT MIX DESIGN IS NOT AVAILABLE. THE RECYCLED PLANT MIX PAVEMENT DESIGN, WITH VIRGIN MATERIAL FROM THE FARIS PIT, IS INCLUDED FOR INFORMATION PURPOSES. THE GRADING "C" MIX DESIGN INFORMATION IS NOT AVAILABLE FOR THIS SOURCE.
- (2) LIMESTONE IS NOT ALLOWED FOR THE PLANT MIX WEARING COURSE AGGREGATE. AGGREGATE FOR THE PLANT MIX WEARING COURSE WILL ONLY BE ALLOWED IF THE INSOLUBLE RESIDUE IS GREATER THAN 70% WHEN TESTED IN ACCORDANCE WITH ASTM D 3042.
- (3) THE IRI (ROUGHNESS) DATA AVAILABLE FOR THIS PROJECT IS SHOWN BELOW. (NOTE: THIS DATA IS FOR INFORMATION PURPOSES ONLY. THIS DATA WAS COLLECTED FOR THE PAVEMENT MANAGEMENT SYSTEM IN 1998. ENSURE THAT THE PAVEMENT SURFACE MEETS THE SPECIFICATIONS.)

MP	EBL		WBL	
	IRI AVG. INCH/MILE [3]	IRI AVG. m/km [3]	IRI AVG. INCH/MILE [3]	IRI AVG. m/km [3]
275.3 - 276.0	100	1.58	87	1.37
276.0 - 276.5	68	1.07	70	1.10
276.5 - 277.0	64	1.01	62	0.98
277.0 - 277.5	67	1.06	58	0.92
277.5 - 278.0	76	1.20	74	1.17
278.0 - 278.5	81	1.28	99	1.56

**EXHIBIT 7**

**OILING NOTES**

**General:** The Oiling Notes provide the application width requirements for various asphalt products, blotter material, etc.

The examples shown are a combination of various typical notes and would not all occur on any given project.

**Elements:** Refer to Exhibit 8.

- [1] Dust Control Agent can be used as an alternative to using a Prime Coat. Dust Control is applied to the full top width of the crushed base and Prime Coat is applied to the full top width of the crushed base plus 6" [150 mm] beyond the toes of the bituminous pavement.
- [2] This note would normally be used when plant mix wearing course is used on a project.
- [3] This note would normally be used when chip seal is used on the project.

**OILING NOTES**

APPLY PRIME COAT TO THE FULL TOP WIDTH OF THE CRUSHED BASE PLUS 6 IN BEYOND THE TOES OF THE BITUMINOUS PAVEMENT. [1]

APPLY TACK COAT BETWEEN LIFTS OF BITUMINOUS PAVEMENT TO THE WIDTH OF THE SURFACES BEING JOINED.

APPLY FOG SEAL TO THE FULL TOP WIDTH OF THE BITUMINOUS PAVEMENT AND ITS TAPERS PLUS 6 IN BEYOND.

APPLY SEAL COAT TO THE SAME WIDTH AS THE PLANT MIX WEARING COURSE. [2]

APPLY FOG SEAL TO THE PORTION OF THE SHOULDERS NOT COVERED BY THE CHIP SEAL INCLUDING THE PAVEMENT TAPER PLUS 6 IN BEYOND. ALLOW THE SHOULDER FOG SEAL TO CURE A MINIMUM OF 24 HOURS PRIOR TO PLACING THE TRAVELWAY EMULSIFIED ASPHALT AND CHIP SEAL AGGREGATE. [3]

**EXHIBIT 8**

**GENERAL NOTES**

**General:** The General Notes provide basic project design parameters such as the project scope, functional classification, minimum design speed, radius of curvature, stopping sight distance, clear zone, current and projected traffic data, seasonal traffic data if applicable and **minor** notes pertaining to construction requirements that are specific to the job. In general, construction requirements should be placed in the applicable special provision.

Design parameters should be shown on the first Typical Section sheet of intermediate plan issuances, just for reference, until the summary sheets are developed.

**Elements:** Refer to Exhibit 9.

- [1] The minimum stopping sight distance given in the General Notes is the value specified in the AASHTO Green Book, for the project's minimum design speed, even though greater stopping sight distances may be available throughout the length of the project.
- [2] If complex construction procedures are necessary, they should be addressed in a special provision.

**GENERAL NOTES**

PROJECT SCOPE = 3R

FUNCTIONAL CLASSIFICATION = RURAL MAJOR COLLECTOR

MINIMUM DESIGN SPEED = 65 MPH

MINIMUM HORIZONTAL CURVE RADIUS = 1500 FT (OBTAINED 2200 FT)

[1] MINIMUM VERTICAL STOPPING SIGHT DISTANCES = 690 FT (OBTAINED 1000 FT)

CLEAR ZONE = 30FT (OBTAINED 30 FT)

TRAFFIC DATA

CURRENT (2000) = 3060 AADT

PROJECTED (2020) = 5660 AADT

DESIGN HOURLY VOLUME = 13%

TRUCKS = 30%

[2] EXISTING RIGHT-OF-WAY MARKERS TO REMAIN IN PLACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

**EXHIBIT 9**

## LENGTH OF PROJECT SUMMARY

**General:** This is not a summary of pay quantities. Its purpose is to note the location of important features on the project, as well as equations, for the contractor's information.

The information for this summary is generally taken directly from the Title Sheet or may supplement the Title Sheet information.

**Elements:** Refer to Exhibit 10.

- [1] Note the beginning and ending stations of the project (reference markers may be used in some situations).
- [2] Include stations at each end of bridges on the project. Note the structure lengths in a separate column.
- [3] Include equations encountered on the project.

LENGTH OF PROJECT SUMMARY		
	STATION	FT
		ROADWAY      STRUCTURE
[1]	52+50.00 BEGIN PROJECT	→ 101.00
[2]	65+00.82 BRIDGE END	
[2]	66+01.82 BRIDGE END	
[3]	98+42.52 BK = EQUATION 98+59.58 AH	
	→ 3240.70	
	→ 3264.42	
[1]	131+24.00 END PROJECT	
	<b>SUBTOTAL</b>	<b>7755.94      101.00</b>
	<b>TOTAL</b>	<b>7856.94</b>
		<b>MILES</b>
	<b>SUBTOTAL</b>	<b>1.469      0.019</b>
	<b>TOTAL</b>	<b>1.488</b>

**EXHIBIT 10**

## MISCELLANEOUS SUMMARY

**General:** Bid items that are not associated with a specific summary should be included in the Miscellaneous Summary. The Miscellaneous Summary serves as an easily located collection point for these bid items.

**Elements:** Refer to Exhibit 11.

- [1] The manner in which Force Account Work funds are to be used should be stated specifically with a note under the summary. Minimal amounts of Force Account Work should be used for the following reasons:
  - a) Extensive field documentation is required for payment of force account items.
  - b) The FHWA discourages its use because there is no incentive for the contractor to utilize the most economical construction practices for this type of work.
- [2] The description of Force Account Work should always end with “..... and other unforeseen work.” This avoids needless extra work orders for minor work during construction.

MISCELLANEOUS SUMMARY		
ITEM	UNIT	TOTAL AND FOR ESTIMATE
FIELD LABORATORY	EA	1
[1] FORCE ACCOUNT WORK (1)	\$\$	\$2,500
MOBILIZATION	LS	LUMP SUM
SCALING (MANUAL)	CRWH	20
TEST STRIP	EA	1
CONTRACTOR TESTING	LS	LUMP SUM

(1) FOR CONSTRUCTION OF THE OVERLAND TRAIL MARKER PATH, ERECTION OF SPECIAL SIGNS, AND OTHER UNFORESEEN WORK. [2]

**EXHIBIT 11**

## WATER SUMMARY

**General:** The Water bid item is used to pay for water associated with work bid items such as embankment compaction, compaction of surfacing, base materials, dust control and/or handling of topsoil, etc.

The Water bid item is also used to pay for water that is associated with a sub-part work item such as crusher dust control, plant mix scrubbers, etc., or for water royalties associated with a State-furnished water source. See Exhibit 13 for typical water rates used to calculate these types of water use items.

**Elements:** Refer to Exhibit 12 and 13.

[1] MG is a unit of 1,000 gallons of water.

WATER SUMMARY	
SUMMARY / DESCRIPTION	MG [1] WATER
U.S.189 & WYO 240 GRADING	5866
WYO 240 SURFACING	31
U.S.189 SURFACING	494
APPROACHES	18
TOPSOIL AND SEEDING	236
PLANT MIX SCRUBBER	657
CRUSHER DUST CONTROL	340
<b>TOTAL</b>	<b>7642</b>
<b>FOR ESTIMATE</b>	<b>7650</b>

**EXHIBIT 12**

**REFERENCE TABLE  
TYPICAL WATER RATES FOR PAY QUANTITIES**

ITEM	RATE
DUST CONTROL	5 GAL/CY [0.025 m <sup>3</sup> /m <sup>3</sup> ]
EMBANKMENT COMPACTION	25 - 40 GAL/CY [0.124 - 0.198 m <sup>3</sup> /m <sup>3</sup> ]
AGGREGATE COMPACTION	20 - 35 GAL/TON [0.083 - 0.146 m <sup>3</sup> /t]
FINISHING	5 GAL/TON [0.021 m <sup>3</sup> /t]
TOPSOIL PLACING	5 GAL/CY [0.025 m <sup>3</sup> /m <sup>3</sup> ]
PLANT MIX SCRUBBER (1)	15 GAL/TON OF PLANT MIX [0.063 m <sup>3</sup> /t]
MILLING PLANT MIX	25 GAL/CY [0.124 m <sup>3</sup> /m <sup>3</sup> ]
LIME SLURRY (1)	3 to 1 RATIO OF WATER TO LIME - BY WEIGHT
CRUSHER DUST CONTROL (1)	5 GAL/TON [0.021 m <sup>3</sup> /t]
CONCRETE MILLING	30-35 GAL/CY [0.149 - 0.173 m <sup>3</sup> /m <sup>3</sup> ]

CONVERSIONS FACTORS: 1 GAL/CY = 0.004951 m<sup>3</sup>/m<sup>3</sup> AND 1 GAL/TON = 0.004172 m<sup>3</sup>/t

(1) NOT CALCULATED WHEN THE MATERIALS SOURCE IS CONTRACTOR FURNISHED.

## EXHIBIT 13

## ACCUMULATION OF QUANTITIES

**General:** Bid items that occur multiple times, such as water, asphalt binder, prime coat, hot plant mix, seal coat, emulsified asphalt, crushed base, etc., are either carried to an accumulation summary or they are quantified in their own specific summary.

The process used is strictly a Design Squad preference.

**Elements:** Exhibits 14, 14A and 14B

- [1] Exhibit 14 shows an example where the surfacing additives were calculated as part of their related summary and the subtotals were carried to the accumulation summary where the Total and For Estimate is calculated.
- [2] Exhibit 14A shows an example where the surfacing additives are calculated and shown in a Surfacing Additive Summary. In this case the additive quantities would not be shown or calculated in the related summary. For example the bid item Hot Plant Mix would be calculated in the Surfacing Summary, but the related additive asphalt binder (PG 58-28) that is part of the hot plant mix would be shown and calculated in the Surfacing Additives Summary only.
- [3] Exhibit 14B shows an example where the quantities for water items are calculated and shown in the Water Summary. In this case, the water quantities would not be shown or calculated in the related summary. For example, the bid item Crushed Base would be calculated in the Surfacing Summary, but the related Water for finishing the crushed base would be shown and calculated in the Water Summary only.

### [1] ACCUMULATION SUMMARY

SUMMARY	TON							SY
	HOT PLANT MIX	ASPHALT BINDER (PG 58-28)	PRIME COAT	EMULSIFIED ASPHALT	SEAL COAT	HYDRATED LIME	CRUSHED BASE	CHIP SEAL
WYO 240 SURFACING	1604	88	7	1	1	15	1611	2986
APPROACH	202	11	3			2	985	
U.S. 189 SURFACING	41994	2309	104	16	13	392	25989	85721
<b>TOTAL</b>	<b>43800</b>	<b>2408</b>	<b>114</b>	<b>17</b>	<b>14</b>	<b>409</b>	<b>28585</b>	<b>88707</b>
<b>FOR ESTIMATE</b>	<b>43800</b>	<b>2410</b>	<b>114</b>	<b>17</b>	<b>14</b>	<b>409</b>	<b>28600</b>	<b>88800</b>

### EXHIBIT 14

**[2]SURFACING ADDITIVES SUMMARY**

SUMMARY	DESCRIPTION	TON				
		ASPHALT BINDER (PG 64-28)	DUST CONTROL AGENT	HYDRATED LIME	TACK COAT	SEAL COAT
APPROACHES	HOT PLANT MIX APPROACHES	61		10	1	1
	CRUSHED BASED		10			
MAINLINE PLANT MIX	HOT PLANT MIX	780		124	12	22
	HOT PLANT MIX LEVELING	264		42	8	
	PLANT MIX WEARING COURSE	149		21		
MAINLINE BASE	CRUSHED BASED		36			
PLANT MIX	PLANT MIX (COMMERCIAL)				0.1	
DUST CONTROL AGENT			334			
<b>TOTAL</b>		<b>1254</b>	<b>380</b>	<b>197</b>	<b>21.1</b>	<b>23</b>
<b>FOR ESTIMATE</b>		<b>1260</b>	<b>385</b>	<b>198</b>	<b>22</b>	<b>23</b>

**EXHIBIT 14A****WATER SUMMARY**

SUMMARY / DESCRIPTION	MG <b>[1]</b>
	WATER
U.S.189 & WYO 240 GRADING	5866
WYO 240 SURFACING	31
U.S.189 SURFACING	494
APPROACHES	18
TOPSOIL AND SEEDING	236
PLANT MIX SCRUBBER	657
CRUSHER DUST CONTROL	340
<b>TOTAL</b>	<b>7642</b>
<b>FOR ESTIMATE</b>	<b>7650</b>

**EXHIBIT 14B**



## EQUIPMENT SUMMARY

**General:** It is often difficult to calculate quantities associated with certain types of work on a particular project, such as old road obliteration, modification of the existing terrain for landscaping purposes, etc. In such instances, this work is paid for with various equipment bid items, such as Scraper, Motor Grader, etc. The purpose of the Equipment Summary is to indicate the number of units required to perform these specialized tasks. These items may alternatively be placed in the Miscellaneous Summary if it is more convenient.

Normally, equipment quantities are recommended by the Resident Engineer. There are certain equipment items that require another type equipment. For example, if a Truck is set up, then a Loader is also necessary.

**Elements:** Refer to Exhibit 15.

- [1] Some equipment units are based on the capacity times the hours used. In the example shown, if the average scraper capacity is 30 cubic yards and the scraper is needed for 30 hours of work, then the pay unit calculation is **hours of work × scraper capacity or 30HR × 30CY = 900 CYHR**.
- [2] The tasks for which the equipment units are to be used should be clearly defined in the plans, usually with a note under the summary.

EQUIPMENT SUMMARY		
STATION - STATION	CYHR	HR
	SCRAPER	MOTOR GRADER
STA 368+96 TO STA 384+00	900 [1]	35
<b>TOTAL AND FOR ESTIMATE</b>	<b>900</b>	<b>35</b>

EQUIPMENT UNITS HAVE BEEN INCLUDED FOR USE IN OBLITERATING THE EXISTING ROAD. [2]

**EXHIBIT 15**

## CLEARING AND GRUBBING SUMMARY

**General:** The Clearing and Grubbing bid item is used to compensate the contractor for the removal of heavy brush, small trees, etc. Clearing and Grubbing is not used on normal grading projects, where the removal of thin underbrush, grass, weeds, etc. is considered incidental to the Topsoil Storing bid item. Trees can also be removed using the Clearing Trees \_\_\_ in bid item, pay unit EA.

Clearing and Grubbing can be bid on the basis of an area or a lump sum. The example Clearing and Grubbing Summary utilizes the lump sum method of payment.

**Elements:** Refer to Exhibit 16.

- [1] The number and diameter of trees to be removed and/or the area of brush to be removed under the Clearing and Grubbing bid item should be listed for the contractor's use for estimating purposes only. This information is provided by the Field.

### CLEARING AND GRUBBING SUMMARY

STATION - STATION	LS	REMARKS [1]
	CLEARING AND GRUBBING	
24+00 - 30+00 RT	LUMP SUM	19± - 4 TO 8 in, TREES
24+00 - 44+00 LT	LUMP SUM	25± - 4 TO 8 in, TREES
57+50 - 65+00 LT	LUMP SUM	2± - 4 TO 8 in, TREES
81+50 - 91+00 LT	LUMP SUM	20± - 4 TO 8 in, TREES 17± - OVER 8 TO 12 in, TREES
94+80 - 103+00 RT	LUMP SUM	48± - 4 TO 8 in, TREES 54± - OVER 8 TO 12 in, TREES
106+00 - 106+50 LT	LUMP SUM	2± - 4 TO 8 in, TREES
132+00 - 145+00 LT	LUMP SUM	12± - 4 TO 8 in, TREES
272+00 - 273+00 RT	LUMP SUM	1 - OVER 60 in, TREE
331+50 - 353+50 RT	LUMP SUM	6± - 4 TO 8 in, TREES
427+00 - 441+50 RT	LUMP SUM	26± - 4 TO 8 in, TREES 22± - OVER 8 TO 12 in, TREES
437+50 - 438+50 LT	LUMP SUM	38± - 4 TO 8 in, TREES
444+00 - 450+00 LT	LUMP SUM	8± - 4 TO 8 in, TREES
<b>TOTAL AND FOR ESTIMATE</b>	<b>LUMP SUM</b>	

### EXHIBIT 16

**OVERBURDEN SUMMARY**

**General:** Overburden is the material that must be removed in order to reach the acceptable aggregate material in the surfacing pit. Overburden depths are shown on the Materials Deposit Layout Sheet (T-146), which also includes the overlaying topsoil material. Topsoil associated with the revegetation of the pit is a separate work item that is paid for using the Topsoil Storing and Topsoil Placing bid items. Because topsoil is included in the overburden depth, the volume of stored topsoil must be deducted from the calculated volume of overburden.

The overburden work item is paid for using the Overburden Removal and Overburden Replacing bid items.

The procedure for calculating overburden quantities is as follows:

- 1) The depths of overburden and aggregate are shown on the T-146 sheets at test hole locations. This data is used to calculate average depths of overburden and aggregate in the area of the pit most likely to be used by the contractor.
- 2) The total weights of the different types of surfacing materials on a particular project are obtained from the various surfacing summaries. The portion of aggregate in a particular type of surfacing material is determined by using the unit weight of aggregate divided by the total unit weight, as shown in the Materials and Rates. The total weight of aggregate to be obtained from the pit must include the material wasted during production.
- 3) The total required weight of aggregate is converted to a volume by using the in-place unit weight shown on the T-146. If a unit weight is not provided on the T-146, an estimated in-place unit weight of 145 lbs/ft<sup>3</sup> (2.3 t/m<sup>3</sup>) can be used.
- 4) The area of the pit to be excavated is calculated by dividing the total aggregate volume by the average aggregate depth.
- 5) The volume of overburden to be removed is calculated by multiplying the excavated area by the average depth of overburden. The overburden depths shown on the T-146 includes the topsoil material which will have to be separated from the calculated overburden volume.

**Elements:** Refer to Exhibit 17.

- [1] The pay quantity for overburden is the sum of the volume of overburden to be removed and the volume to be replaced. Normally, the removal and placing volumes are equal. Occasionally, the overburden material is removed and stockpiled on one project and replaced on a later project. In such cases, the appropriate bid item Overburden Removal or Overburden Placing would be used.

OVERBURDEN SUMMARY		
LOCATION	CY	
	OVERBURDEN [1]	
	REMOVAL	PLACING
MILLER PIT	16420	16420
<b>TOTAL</b>	<b>16420</b>	<b>16420</b>
<b>FOR ESTIMATE</b>	<b>16600</b>	<b>16600</b>

**EXHIBIT 17**

## AGGREGATE DEAD HAUL SUMMARY

**General:** Usually the plant site is located at the aggregate source. However, on some projects the location where the surfacing materials are produced is different from the plant site(s). On these projects, an Aggregate Dead Haul Summary is included in the plans to provide the haul quantities for transporting the aggregate to the plant site.

Aggregate quantities should **not** include any increase for natural moisture.

**Elements:** Refer to Exhibit 18.

[1] This summary has no pay item, it is for estimating purposes only.

AGGREGATE DEAD HAUL SUMMARY					
PLANT SITE	TON			MILES	TMI
	HOT PLANT MIX (AGGREGATE)	PLANT MIX WEARING COURSE (AGGREGATE)	TOTAL	HAUL DISTANCE	HAUL (E)
ELK MTN EAST INTERCHANGE	7747	1578	9325	36.914	344223
WAGONHOUND INTERCHANGE	8420	1976	10396	14.994	155878
<b>TOTAL</b>					<b>500101</b>

HAUL DISTANCES ARE MEASURED FROM THE BROKAW PITCHER PIT TO THE INDICATED PLANT SITE.  
(E) FOR ESTIMATING PURPOSES ONLY.

**EXHIBIT 18**

## CUTTING BITUMINOUS AND CONCRETE PAVEMENT SUMMARIES

**General:** The purpose of this summary is to give the length of bituminous or concrete pavement to be cut for sections of pavement to be widened, or long lengths associated with temporary crossovers or detour removal.

Longitudinal cut locations are usually determined by the Resident Engineer and/or the Materials Program based on the condition of the edge of pavement. Typically, the cut line is placed one foot [0.30 meters] inside the edge of pavement to allow the outside wheel of the cutting machine to ride on a level surface instead of on the pavement taper. If possible, avoid making longitudinal cuts in the wheel path.

The pay length for cutting bituminous or concrete pavement is the actual length of cut being made. Refer to Exhibit 19.

CUTTING BITUMINOUS PAVEMENT SUMMARY		
STATION - STATION	FT	
	CUTTING BIT PVMT	
	LEFT	RIGHT
1093+50.00 - 1094+00.00		50
1096+00.00 - 1591+86.00	49586	49586
1593+86.00 - 1594+36.00		50
<b>SUBTOTAL</b>	49586	49686
<b>TOTAL</b>	<b>99272</b>	
<b>FOR ESTIMATE</b>	<b>99300</b>	

  

CUTTING CONCRETE PAVEMENT SUMMARY	
STATION	FT
	CUTTING CONCRETE
93+50.00	50
527+86.00	50
<b>TOTAL</b>	<b>100</b>
<b>FOR ESTIMATE</b>	<b>100</b>

**EXHIBIT 19**

**REMOVAL OF SURFACING SUMMARIES**

**General:** Removal of the existing concrete or bituminous surfacing can be handled in many ways, depending on the project and whether or not the surfacing is to be reused for other purposes.

Section 202 - Removal of the Standard Specifications addresses removal bid items that should be used when the existing surfacing is not intended to remain within the project limits. An example would be an urban project where the existing surfacing, curb and gutters, and/or sidewalks are being replaced and the existing material cannot be incorporated into the fill. In this case, a square yard measurement using the Removal of Surfacing bid item could be used to remove everything from back of sidewalk to back of sidewalk to minimize the number of removal bid items needed.

Milled surfacing material is often stockpiled for use by the County or District Maintenance Program when it's not designated for use on the project.

The method of measurement and intended use of the material should be discussed with the Resident Engineer during design. A square yard measurement is the least labor intensive for the Field and can normally be used if the thickness of the removal is constant. If the thickness varies, a cubic yard measurement can be simplified by either specifying a theoretical measurement based on the typical sections or stockpiling the material for measurement. Measuring removal by the ton is the most labor intensive and generally used only if no other options are acceptable.

**Elements:** Refer to Exhibits 20 and 21.

- [1] A description should be provided regarding what is to be done with the material to be removed. Any haul distance involved should be included for estimating purposes. When the material is to become the property of the contractor no description is needed.
- [2] If theoretical measurements are to be used, a note should be included to define how the bid item will be paid for.
- [3] Cold milling bituminous pavement or concrete requires the use of water to support the mill operation. Calculate the water quantity based on the cubic yards of material being removed. See Exhibit 13 for applicable water use rates.

## MILLING PLANT MIX SUMMARY

STATION - STATION	IN	FT		SY	MG
	THICKNESS	AVERAGE WIDTH	LENGTH	MILLING PLANT MIX	WATER
WEST BOUND MAINLINE					
2294+15 - 2327+55	2	23.50	3340	8721	12
2294+15 - 2327+55	4	13.75	3340	5103	14
2333+53 - 2438+28	2	23.50	10475	27351	38
2333+53 - 2438+28	4	13.75	10475	16003	44
2443+63 - 2536+57	2	23.50	9294	24268	33
2443+63 - 2536+57	4	13.75	9294	14199	39
SUBTOTAL				95645	180
EAST BOUND MAINLINE					
2294+15 - 2327+55	2	23.50	3340	8721	12
2294+15 - 2327+55	4	13.75	3340	5103	14
2333+53 - 2438+28	2	23.50	10475	27351	38
2333+53 - 2438+28	4	13.75	10475	16003	44
2443+63 - 2536+57	2	23.50	9294	24268	33
2443+63 - 2536+57	4	13.75	9294	14199	39
SUBTOTAL				95645	180
TOTAL				191290	360
FOR ESTIMATE				191500	(w)

(W) SEE WATER SUMMARY.

DEAD HAUL = 0.64 MILES FROM STA 2440+95 TO THE PLANT SITE. [1]

HAUL MATERIAL REMOVED FROM THE DRIVING LANE TRENCH TO THE PLANT SITE FOR RECYCLING. [1]

MILLING PLANT MIX IS PAID FOR BASED ON THE THEORETICAL DIMENSIONS SHOWN ON THE TYPICAL SECTIONS. [2]

WATER QUANTITY IS BASED ON A RATE OF 25 GAL/CY. [3]

## EXHIBIT 20



**REMOVAL OF SURFACING SUMMARY**

STATION - STATION	IN	FT		CY
	THICKNESS	AVERAGE WIDTH	LENGTH	REMOVAL OF SURFACING
<b>WESTBOUND MAINLINE</b>				
2294+15 - 2327+55	2	23.5	3340	485
2294+15 - 2327+55	4	13.75	3340	567
2333+53 - 2438+28	2	23.5	10475	1520
2333+53 - 2438+28	4	13.75	10475	1778
2443+63 - 2536+57	2	23.5	9294	1348
2443+63 - 2536+57	4	13.75	9294	1578
<b>SUBTOTAL</b>				<b>7276</b>
<b>EASTBOUND MAINLINE</b>				
2294+15 - 2327+55	2	23.5	3340	485
2294+15 - 2327+55	4	13.75	3340	567
2333+53 - 2438+28	2	23.5	10475	1520
2333+53 - 2438+28	4	13.75	10475	1778
2443+63 - 2536+57	2	23.5	9294	1348
2443+63 - 2536+57	4	13.75	9294	1578
<b>SUBTOTAL</b>				<b>7276</b>
<b>TOTAL</b>				<b>14552</b>
<b>FOR ESTIMATE</b>				<b>14600</b>

DEAD HAUL = 0.64 MILES FROM STA 2440+95 TO THE PLANT SITE.

HAUL MATERIAL REMOVED FROM THE DRIVING LANE TRENCH TO THE PLANT SITE  
FOR RECYCLING. [1]

REMOVAL OF SURFACING IS PAID FOR BASED ON THE THEORETICAL DIMENSIONS SHOWN  
ON THE TYPICAL SECTIONS. [2]

**EXHIBIT 21**

**GRADING SUMMARY**

**General:** The Grading Summary is the single most misunderstood and difficult summary presented in the plans. Therefore, the Designer should make every effort possible to understand and to present each entry of the summary in a format that is easily comprehended by the user.

Only actual measured volumes of excavation and embankment are obtained from the GEOPAK earthwork. The actual volumes of excavation are shown as Obtained From quantities under the Unclassified Excavation portion of the summary. Adjusted volumes of excavation (volumes to which the shrink factor has been applied) are given in the Used For portion of the Unclassified Excavation.

The most common pay quantities associated with the grading operation are:

- Unclassified Excavation
- Topsoil Storing and Placing (usually shown on the Topsoil and Seeding Summary)
- Water

**Elements:** Refer to Exhibit 22.

- [1] Station to station limits of excavation and embankment quantities are normally given for each balance point on the project to provide the contractor with basic information concerning the location of the excavation and embankment, direction of haul, etc.
- [2] Normally excavation is paid for as Unclassified Excavation. Other excavation bid items are available under special circumstances, such as Borrow Special Excavation, Rock Excavation, or Muck Excavation.

Unclassified Excavation quantities are broken down into subcategories identifying where each quantity of excavation is “OBTAINED FROM” and what it is “USED FOR.” This provides the contractor’s with detailed information about each quantity of excavation required on a particular project. Subcategories may include, but are not limited to, the following categories:

- Moisture and Density Control (MDC) in Cut Areas
- Roadway
- Borrow
- Waste
- Approaches
- Detours

- [3] Embankment Compaction is considered incidental to the Unclassified Excavation. Quantities of embankment compaction are only given for the contractor's use in bidding the project.

Each subcategory of “USED FOR” material shown under the Unclassified Excavation should have a corresponding subcategory of “USED FOR” material shown under the Embankment Compaction. The exception to this would be any subcategory that will not require the particular material to be compacted to a specific moisture and density, such as waste material.

Each quantity of “USED FOR” material shown under the Embankment Compaction should correspond directly to a quantity of “USED FOR” material shown under the Unclassified Excavation by multiplying the embankment compaction quantity times the shrink factor to obtain the unclassified excavation quantity.

- [4] Earthwork haul CYMI [ $\text{m}^3\text{km}$ ] is a measure of the amount of effort required to transport the excavated material to its final location in the roadway embankment. Haul along the length of the project is the area under the mass haul diagram on a 1V:1H scale. This column should be used to sum up the amount of haul required for the entire project to transport borrow, waste and approach materials, etc. from or to the location where they are obtained or placed. Internal haul is calculated along the centerline of survey. It may also be necessary to haul material outside the limits of the project (external borrow or waste) and this haul should be estimated as well. Earthwork haul quantities are only given for the contractor's use in the estimating process. Haul is considered to be incidental to the Unclassified Excavation.

- [5] In addition to embankments, WYDOT requires a minimum depth of MDC in cut areas to provide compacted material beneath the surfacing section. The Designer needs to be aware that fill sections also require MDC during construction, but the only volume of MDC specifically delineated in the earthwork and summary is the MDC in cut areas because it represents extra excavation required in excess of the actual template requirements. The required depth of MDC in cut areas can be obtained from the Soil Survey Profile, if available; or, in some cases, is arbitrarily decided between the Designer and the Resident Engineer, with consultation from the Materials and Geology Programs.

As an example, if the depth of MDC is 24 inches [600 mm], then only 18 inches [450 mm] of earthwork volume is actually removed and shown in the unclassified excavation “OBTAINED FROM” quantities. This same volume of MDC should also be shown in the embankment compaction and multiplied by the shrink factor to obtain the “USED FOR” unclassified excavation

quantity. The bottom 6 inches [150 mm] of MDC in cut areas is only scarified and compacted in place and is not shown in the earthwork volumes, does not have shrink applied to it, and is not included in the pay quantity.

- [6] The roadway excavation and embankment volumes are the materials associated with the construction of the earth grade roadway prism, not including MDC, waste, etc.
- [7] Borrow is the amount of material that must be obtained outside of the roadway prism to construct a roadway within a particular balance.
- [8] Quantities of excavation in the “OBTAINED FROM” columns should accumulate from left to right to obtain the Total Unclassified Excavation for each balance.

Quantities of excavation in the “USED FOR” columns should accumulate from right to left to obtain the same Total Unclassified Excavation for each balance.

In determining the Total Unclassified Excavation, the Designer must be sure that each handling of the material is paid for once and only once. In the example given, the detour quantities were paid for once to build the detour and again to waste the quantity when the detour is removed.

- [9] Waste is the amount of excess excavated material that is not incorporated into the roadway prism. The shrink factor is not applied to the waste quantity if it is not required to be compacted.
- [10] The shrink factor for a particular quantity is the volume of “USED FOR” excavation divided by the volume of “USED FOR” embankment. Soil-like materials have shrink factors  $> 1$ . For example, 1.20 CY [m<sup>3</sup>] of excavated soil is required to construct 1.00 CY [m<sup>3</sup>] of embankment. Rock-like materials swell; i.e., they have shrink factors  $< 1$ . For example, 0.95 CY [m<sup>3</sup>] of excavated rock is required to construct 1.00 CY [m<sup>3</sup>] of embankment.

The shrink factor can be obtained from the Soil Survey Profile, if available; or, in some cases, is arbitrarily decided between the Designer and the Resident Engineer, with consultation from the Geology Program.

- [11] Quantities of embankment compaction in the “USED FOR” columns should accumulate from left to right to obtain the Total Embankment Compaction for each balance.
- [12] The average haul is the Total amount of Haul divided by the Total amount of Unclassified Excavation. The average haul is only given for the contractor's use in bidding.

- [13] The amount of water required for embankment compaction and dust control is given in the Materials and Rates. Both rates are multiplied times the Total Embankment Compaction quantity to obtain the water quantities required.
- [14] A Seismic Velocity Table is given for informational purposes only when cuts are to be made in rock material. The Soil Survey Profile should contain all the necessary seismic information.

The inclusion of a Seismic Velocity Table does not imply that Rock Excavation has to be included in the plans. Rock Excavation should only be used if blasting or other non-conventional excavation techniques are expected to be absolutely necessary. Rock Excavation should be considered for seismic velocities above 4,000 ft/sec [1,200 m/sec], but the final determination should be made by the Geology Program.

## GRADING SUMMARY

STATION-STATION [1]	CY									SHRINK FACTOR [10]	CY				CYMI
	UNCLASSIFIED EXCAVATION [2]										EMBANKMENT COMPACTION [3]				HAUL [4]
	OBTAINED FROM MDC IN CUT AREAS [5]	OBTAINED FROM ROADWAY [6]	OBTAINED FROM BORROW [7]	OBTAINED FROM DETOUR	TOTAL UNCLASSIFIED EXCAVATION [8]	USED FOR MDC IN CUT AREAS [5]	USED FOR ROADWAY [6]	USED FOR DETOUR	WASTE [9]		USED FOR MDC IN CUT AREAS [5]	USED FOR ROADWAY [6]	USED FOR DETOUR	TOTAL EMBANKMENT COMPACTION [11]	
204+99 - 563+09	4995	5759	21403		32157	4745	27412			0.95	4995	28855		33850	36052
563+09 - 605+38	2043	2091	16920		21054	2451	18603			1.2	2043	15503		17546	30567
605+38 - 613+16	1154	901	9786		11841	1385	10456			1.2	1154	8713		9867	20601
DETOUR			3395		3395			3395		1.2			2829	2829	12592
DETOUR REMOVAL				2829	2829				2829						1415
EXTERNAL HAUL (1)															25752
TOTAL	8192	8751	51504	2829	71276	8581	56471	3395	2829		8192	53071	2829	64092	126979
FOR ESTIMATE					71300										(E)

AVERAGE HAUL = 1.782 MILES [12]

(1) EXTERNAL HAUL IS CALCULATED FROM THE PARRISH BORROW TO THE BEGINNING STATION OF EACH BORROW LOCATION.

(E) FOR ESTIMATING PURPOSES ONLY.

(W) SEE WATER SUMMARY.

PERFORM MDC TREATMENT IN CUT SECTIONS TO THE BOTTOM OF THE DITCH.

## SEISMIC VELOCITY TABLE [14]

LINE	STATION - STATION	LAYER	FT		FPS
			DEPTH TO LAYER		VELOCITY
			AHEAD (1)	BACK (1)	
MP-1	382+00 - 391+00	1			8225
	400' LT - 350' LT	2	1.3	0.3	8835
MP-2	429+00 - 433+50	1			5591
	525' LT - 650' LT	2	9.8	16.4	6591
MP-3	450+00 - 454+00	1			4537
	650' LT - 750' LT	2	1.6	2	6414
MP-4	456+00 - 459+00	1			5105
	260' LT - 300' LT	2	6.6	6.6	5879

ALL VELOCITIES ARE IN FEET PER SECOND.

(1) "AHEAD" UNDER "DEPTH TO LAYER" REFERS TO THE FIRST STATION SHOWN UNDER "LOCATION" AND "BACK" REFERS TO THE FOLLOWING STATION UNDER "LOCATION".

ITEM	UNIT	TOTAL	FOR ESTIMATE
WATER [13]			
EMB COMP	MG	2564	(W)
DUST CONTROL	MG	320	(W)

## EXHIBIT 22

**CULVERT SUMMARY**

**General:** Size each culvert to adequately carry the basin flows for Class III and IV designs in accordance with Chapter 3-04 Culvert Design. Use water tight joints for storm sewer and irrigation piping.

A 24 inch [600 mm] diameter pipe should be the minimum size used under the mainline on interstate, primary, secondary and county highways. An 18 inch [450 mm] diameter pipe should be the minimum size used under the mainline on all other highways, approaches, ramps and permanent crossovers. Irrigation pipes may be smaller.

Approach culverts are normally 18 inch [450 mm] diameter, except when the approach culvert is sized to carry a design discharge.

For cleanout purposes, the minimum size of a storm sewer pipe should be 18 inch [450 mm] diameter. Twelve inch [300 mm] diameter feeder pipes may be used on very short runs of storm sewer when cleaning will not be a problem. An example would be when a curb inlet or slotted drain is connected to a trunk line by a short feeder pipe.

The type of culvert that is to be used at any particular site is governed by:

- Minimum cover;
- Maximum fill height (See Element 12);
- Corrosion resistance number (See Element 13);
- Hydraulic characteristics; or

The Designer should establish the gradeline of a roadway and the top of culvert to meet minimum cover requirements for the culverts specified in the summary. Minimum cover depths are established to prevent a localized failure of a pipe beneath a wheel load. Thus, minimum cover depths are measured between the edges of the pavement. Minimum cover depths for all types of culverts are given in the Standard Plans.

Minimum cover depths for metal culverts depend on the following:

- Type of culvert - round or arch;
- The material the culvert is made of - steel or aluminum; and
- Size of corrugation of the CMP.

Culvert lengths are determined to the nearest two foot (whole meter) increment and are not rounded up for the For Estimate quantity. Provide ample room between the culvert end and the right-of-way boundary for culvert maintenance access.

Culvert ends within the clear zone must have traversable end treatments or be shielded by guardrail.

Install pipe extensions that are the same base material as the in-place pipe and bid accordingly to prevent the galvanic reaction that could take place between dissimilar materials. Pipe extensions should not be generically bid as Pipe\_\_\_in. Contact the Resident Engineer to field verify the existing culvert type and bid a like material pipe extension. The minimum length of pipe extensions should normally be 6 feet [2.0 m].

Use Pipe Collars to connect pipe extensions to existing culverts in accordance with the Standard Specifications.

Use watertight joints for all irrigation piping and extend the piping through the full width of the right-of-way. This practice provides the owner of the irrigation system access to pipe ends for cleaning and maintenance. The Project Development Engineer's approval is required to deviate from piping irrigation water within the right-of-way. In special cases, concrete lined ditches may be used for a portion of the irrigation facility length within the right-of-way, providing approval is given.

Normally, the bid item Pipe\_\_\_in is used to allow the contractor to furnish either metal or concrete pipe, based on the allowable Corrosion Resistance (CR) number per the Standard Specifications. CR numbers are provided by the Materials Program in the "Report of Tests on Alkali." If a Structural Plate Pipe (SPP) is to be used, its gage thickness is obtained from the Standard Plans and the corrosion resistance treatment is obtained from the "Report of Tests on Alkali." See Element [17].

Maximum and minimum fill height requirements must be met for both metal and concrete alternatives when using the Pipe\_\_\_in bid items.

**Elements:** Refer to Exhibits 23 and 24.

- [1] If the Pipe\_\_\_in bid item is used, the size specified is for the metal pipe which furnishes the required flow capacity. The hydraulically equivalent RCP size is given in a separate column to allow the contractor to bid concrete pipe as competitively as possible.
- [2] Pipe Arch may be specified for particular reasons, such as providing the required hydraulic capacity when the height of the profile grade is restricted.
- [3] CMP can be specified for particular reasons, such as reducing outlet velocities in culverts with steep slopes, extending an existing CMP, etc.
- [4] CMP Arch and Structural Plate Pipe-Arch can be specified for particular reasons, such as limiting outlet velocities, providing the required flow capacity when the height of the profile grade is restricted, etc.



Currently, there is a moratorium on the installation of metal arch pipes equal to or larger than 128 inches x 83 inches [3200 mm x 2075 mm] because of excessive deflections experienced during installation and in service. Therefore, large CMP Arch and Structural Plate Pipe-Arch should only be used as a last resort and should only be installed when the necessary geologic investigation has been completed and with the approval of the Project Development Engineer.

Minimum fill heights are somewhat larger for CMP Arch than those of comparable circular pipes.

Maximum allowable fill heights are much less for CMP Arch than those of comparable circular culverts.

The maximum allowable fill height for CMP Arch depends on the allowable corner pressure. A 3 ton/ft<sup>2</sup> [300 kPa] corner pressure should be used only with written approval from the Geology Program.

- [5] RCP can be specified for particular reasons, such as to provide the required hydraulic capacity when the grade cannot be raised, for use at a site with a high CR number, when the minimum cover requirements for a CMP cannot be met, etc.

Even though RCP can accommodate very large fill heights using imperfect trench installation procedures, such installations should be avoided if possible.

- [6] Culvert Excavation is calculated for pipes in accordance with the Standard Specifications and details shown in the Standard Plans. Culvert excavation is not paid for directly, but is considered incidental to the pipe. It is included in the summaries (as For Estimate Only) for the contractor's use in bidding.
- [7] Culvert Subexcavation may be recommended by the Geology Program for pipe locations with poor foundation conditions. Placement of Geotextile Material Separation, Crushed Base, etc. may also be required in the subexcavated area as noted in the Geology Report. The Trench Excavation and Culvert Excavation items are normally considered incidental to the pipe installation items; however, Culvert Subexcavation should be paid for in accordance with the Standard Specifications.
- [8] Unclassified Excavation or Muck Excavation is paid outside the limits of Culvert Excavation for modifications to the inlet and/or exit channels.

- [9] Wire-Encl Riprap, Machine-Placed Riprap, Hand-Placed Riprap or Erosion Control Concrete may be used at the inlet or outlet of a pipe to help prevent erosion and scour.

- [10] See the Standard Plans for details, quantities, etc., for Head Wall (Conc) and Cut-Off Wall (Conc) for various types of pipe culvert installations. The design, details and quantities will have to be developed for any head wall or cut-off wall types that are not given in the Standard Plans. The Designer should coordinate this design with the Bridge Program. Reinforcing steel quantities are shown in the Standard Plans and are considered incidental to the Head Wall (Conc) or Cut-Off Wall (Conc) bid items.

Cut-off walls and slope paving used with flared or beveled ends usually result in a better end treatment than full height vertical head walls.

- [11] Skew Angle is normally rounded to the nearest 1°.
- [12] Maximum allowable fill heights are established to prevent overall collapse of the culvert under the weight of the overlying fill material.

The maximum fill height is measured wherever it occurs along the length of the culvert, not necessarily beneath the roadway pavement. Base the fill height for pipe extensions on the maximum fill over just the extension, not the mainline portion of the pipe being extended.

It is the contractor's responsibility to furnish a culvert whose maximum allowable fill height, as given in the Standard Plans, is greater than the actual fill height given in the Culvert Summary.

- [13] Corrosion resistance (CR) numbers are obtained from alkali samples taken at each pipe location and documented in the "Report of Tests on Alkali." The contractor is required to supply a pipe of the specified type that meets or exceeds the site CR value given in the summaries. See element [17] if SSP is being used.

CR numbers are often not needed for pipe extensions. Discuss their need with the Resident Engineer and Materials Program early in the design process.

- [14] Concrete pipe recommendations are obtained from the "Report of Tests on Alkali" and should be given for pipe locations where concrete pipe is allowed or specifically required due to high alkali requirements.
- [15] Ensure the Remarks column includes information such as end finishes required, multiple pipe installations and extension requirements.

[16] A step bevel end finish is normally used for round metal pipes greater than 54 inches (1350 mm) in diameter. The step bevel end finish is included as part of the pay length for the pipe. Full bevel end finishes are normally used for metal arch pipe. See Standard Plans for details.

[17] The corrosion resistance application table for Structural Plate Pipe (SPP) is a standard table provided by the Materials Program as part of the "Report of Tests on Alkali" as shown in Exhibit 23. For example, if a SPP is installed at a site with a corrosion level of CR4, then the modifications required to protect the pipe include increasing the thickness of the pipe and adding a bituminous coating to both sides of the pipe. In this case, add a reference note below the Culvert Summary to say, "In order to meet CR4 requirements, provide a bituminous coating on both sides and increase the thickness by decreasing the required gage number by 2. For example, if the standard plan requires a 12-gage pipe to meet the specified fill height, then provide a 10-gage pipe.

CR NUMBER	APPLICATION [17]						ALL MATERIAL TYPES (INCLUDING STRUCTURAL PLATE, ETC.)
	NEW INSTALLATION OR REPLACEMENT OF EXISTING					EXTEND EXISTING	
	METALLIC & NON-METALLIC	STRUCTURAL PLATE (REQUIRED MODIFICATIONS)					
		NO MODIFICATIONS	BITUMINOUS COATING BOTH SIDES	(1) DECREASE GAGE BY 2	USE GRANULAR BACKFILL		
1	USE ACCEPTABLE MATERIAL PER WYDOT STANDARD SPECIFICATIONS AND CONCRETE REQUIREMENTS AS SHOWN ABOVE	X					IF PIPE OR STRUCTURE CONDITION IS <i>SATISFACTORY</i> , USE EXISTING TYPE, SIZE AND BACKFILE. OTHERWISE, MODIFY EXISTING SYSTEM.
2			X				
3			X	X			
4			X	X			
5			X	X	X		
6						X	
7						X	

(1) DECREASE THE GAGE SIZE TO INCREASE PLATE THICKNESS: FOR EXAMPLE IF THE STANDARD PLANS INDICATE A 12 GAGE THICKNESS THEN PROVIDE A 10 GAGE THICKNESS.

**EXHIBIT 23 SPP**  
CORROSION RESISTANCE TABLE

## CULVERT SUMMARY

STATION	FT					EA			IN	CY		
	PIPE [1]	PIPE ARCH [2]	CMP [3]	CMP ARCH [4]	RCP [5]	PIPE FE SECT	PIPE ARCH FE SECT	CMP ARCH FE SECT	EQUIVALENT RCP SIZE	CULVERT EXCAVATION [6]	CULVERT SUBEXCAVATION [7]	UNCLASSIFIED EXCAVATION [8]
	24 in	35 X24 in	60 in	71 X47 in	30 in	24 in	35 X24 in	71 X47 in				
328+08					60					26		
656+17			30							262		392
984+25	20					2			24	13		
1312+36					30					65		
1640+42		42					2		36X23	13		
1804+46				60				2		46	29	
<b>TOTAL</b>	<b>20</b>	<b>42</b>	<b>30</b>	<b>60</b>	<b>90</b>	<b>2</b>	<b>2</b>	<b>2</b>		<b>425</b>	<b>29</b>	<b>392</b>
<b>FOR ESTIMATE</b>	<b>20</b>	<b>42</b>	<b>30</b>	<b>60</b>	<b>90</b>	<b>2</b>	<b>2</b>	<b>2</b>		<b>(E)</b>	<b>29</b>	<b>(G)</b>

(E) FOR ESTIMATING PURPOSES ONLY.

(G) SEE GRADING SUMMARY.

## CULVERT SUMMARY (CONT.)

STATION	CY			SKEW ANGLE [11]	FT	CORROSION RESISTANCE NO.		CONCRETE PIPE RECOMMENDATIONS [14]	REMARKS [15]
	MACHINE - PLACED RIPRAP [9]	HEAD WALL (CONC) [10]	CUT-OFF WALL (CONC) [10]		FILL HEIGHT [12]	METALLIC [13]	NON-METALLIC [13]		
328+08		6.0		10° RT	5.6		CR6	TYPE V CEMENT GRANULAR BACKFILL	DOUBLE INSTALLATION
656+17	64		2.4	0°	11.5	CR5			STEP BEVEL END FINISH [16]
984+25				20° LT	13.1	CR4	CR4	TYPE II CEMENT	
1312+36		3.8		15° LT	22.6		CR6	TYPE V CEMENT GRANULAR BACKFILL	
1640+42				0°	13.5	CR3	CR2	TYPE II CEMENT	
1804+46				0°	9.2	CR3			
<b>TOTAL</b>	<b>64</b>	<b>9.8</b>	<b>2.4</b>						
<b>FOR ESTIMATE</b>	<b>64</b>	<b>10</b>	<b>2.4</b>						

## EXHIBIT 24

**IRRIGATION SUMMARY**

**General:** The purpose of this summary is to note the locations and quantities associated with the construction of the irrigation systems. This information is often included in the Culvert Summary.

See the Culvert Summary discussion for information concerning many of the bid items shown in the example Irrigation Summary. Only those items which are unique to irrigation work are discussed below.

**Elements:** Refer to Exhibit 25.

- [1] Diversion boxes - The Bridge Program designs and details each different type of diversion box that is being utilized on a particular project. A different diversion box type letter should be used for each different type of box used.
- [2] In most cases RCP is used for irrigation crossings. However, the designer has the option to bid the installation as a Pipe\_\_\_ in bid item, which allows the contractor to furnish a metallic or non-metallic type of pipe based on the Standard Specifications for Corrosion Resistance Acceptability.
- [3] Details are necessary to show the widths, thicknesses, etc. of concrete ditch paving installations. The placing of the concrete is paid for with the bid item Ditch Paving (CONC). The grading work associated with constructing the ditch grade is measured and paid for only when Unclassified Excavation is a project bid item (see "Referenced Sections for Direct Payment" items). When Unclassified Excavation is not a project bid item the grading work is subsidiary to the pay item Ditch Paving (CONC). A typical section of the ditch should be included with the other typical sections for the project or as a specific detail on the plans.
- [4] CR numbers are obtained from alkali samples taken at each pipe location and documented in the "Report of Tests on Alkali;" provide CR numbers for metallic or non-metallic pipe options allowed in the plans.
- [5] Concrete pipe cement type requirements are obtained from the "Report of Tests on Alkali" and should be given for pipe locations where concrete pipe is allowed or specifically required due to high alkali requirements.

## IRRIGATION SUMMARY

STATION	EA	FT		SY	CY	EA		CY	FT	CORROSION RESISTANCE		SLIDE GATE 30 in X 18 in	NON-PAY ITEM 2 in X 6 in X 42 in PLANKS	
	DIVERSION BOXES [1] TYPE X	RCP[2]		DITCH PAVING (CONC) [3] (1)	HEAD WALL (CONC)	RCP FE SECT		CULVERT EXCAVATION	HEIGHT OF FILL	CR NO. [4]	RCP TYPE OF CEMENT REQUIRED [5]			
		18 in	24 in			18 in	24 in							
67+06		1	79		17		1		28	11	CR1	TYPE II CEMENT	2	1
94+91		1		79	11			1	35	8	CR1	TYPE II CEMENT	1	2
95+05	RT	1			17								1	1
103+54	RT	1			11									1
104+40	LT	1			17									1
108+60	RT	1			11								1	1
108+69	LT				11									
113+58		1		79	11			1	71	12	CR6	TYPE V CEMENT		
118+60		1	161		17		1		301	12	CR6	TYPE V CEMENT	1	
126+35	(1)	1	118		17				222	18	CR1	TYPE II CEMENT	1	
288+29		2		79	5				61	12	CR1	TYPE II CEMENT	2	
292+03		1		79	5		1		91	15	CR1	TYPE II CEMENT		1
TOTAL		12	358	316	150		2	3	809				9	8
FOR ESTIMATE		12	(A)	(A)	150		(A)	(A)	(E)				9	

(A) SEE ACCUMULATION SUMMARY.

(E) FOR ESTIMATING PURPOSES ONLY.

(1) ONE HEAD WALL REQUIRED.

PROVIDE WATER TIGHT JOINTS ON IRRIGATION PIPE.

## EXHIBIT 25

**STORM SEWER SUMMARY**

**General:** The purpose of this summary is to note the requirements and quantities associated with the construction of the storm sewer system. Pipe sizes, inlet types and locations, and other design elements are obtained from the Hydraulics Section, which is responsible for the initial storm sewer designs. Project Development is responsible for detailing and quantifying the system as specified in Chapter 3-04 Culvert Design.

**Elements:** Refer to Exhibit 26.

- [1] Install inlets at all sag points in the vertical alignment and other locations specified by Hydraulics Section.
- [2] Identify flow direction at each inlet so that the grate vanes are placed correctly. Flow direction is defined in the Standard Plans as the direction of water flow when facing the curb.
- [3] Use water tight joints on storm sewer culverts. Specify that water tight joints are require in a note below the summary.

## STORM SEWER SUMMARY

NAME	STATION	FT		EA		CURB TYPE (2)	GRATE TYPE (3)	FLOW DIRECTION FACING CURB [1]	FT	EA MANHOLE TYPE A	FT		EA RCP FE SECT 36 in	CY TRENCH EXCAVATION	CR NUMBER	REMARKS
		DISTANCE (1) LEFT	RIGHT	A	X						18 in	24 in				
IN1	10+25.00		25	1		C	D	RIGHT						6		
IN1-IN2											50			38	1	
IN2	10+25.00	25		1		C	D	LEFT						6		
IN2-IN4											474			357	1	
IN4	15+00.00	25		1		C	D	RIGHT						6		
IN3-IN4											50			38	1	
IN3	15+00.00		25	1		C	D	LEFT						6		
IN4-IN6											624			468	1	
IN6	21+23.40	25			1	O	F	4.50						7		SAG POINT [1]
IN5	21+23.40	25		1	O	F		4.45						8		SAG POINT [2]
IN5-IN6											50			38	1	
IN6-MH1									300					233	2	
MH1	24+23.40									1				40		
EX-MH1	24+25.00		500						520					404	2	CONNECT EXISTING STORM SEWER TO MANHOLE MH1
MH1- OUT1												500		519	2	
OUT1	24+50.00	515											1		2	OUTLET INTO EXISTING DRAINAGE.
IN8-MH1												254		197	2	
IN8	26+76.40	25		1	C	D		LEFT						6		
IN7-IN8											50			38	1	
IN7	26+76.40		25		1	C	D	RIGHT						6		
IN10-IN8											168			126	1	
IN10	28+44.00	25		1		C	D	LEFT						6		
IN9-IN10											50			38	1	
IN9	28+44.00		25	1		C	D	RIGHT						6		
TOTAL				6	4						1516	1074	500	1	2597	
FOR ESTIMATE				6	4						1516	1074	500	1	(E)	

(1) DISTANCE IS INVERT TO INVERT.

(2) CURB TYPE KEY:

C - WITHOUT CURB OPENING.  
O - WITH CURB OPENING.

(3) GRATE TYPE KEY:

D - NEENAH R-3246-AL OR DEETER 2064 OR EQUIVALENT.  
F - FABRICATED.

(4) USE RCP WITH WATER TIGHT JOINTS. (3)

## EXHIBIT 26



**SURFACING SUMMARY (BITUMINOUS)**

**General:** The Surfacing Summary contains surfacing related items including, but not limited to, base materials, pavement, wearing course, asphalt binder, prime, tack, seal and hydrated lime.

Each line in the Surfacing Summary quantifies the amount of surfacing materials and associated haul for a particular section of roadway, with the exception that haul is not calculated when the material source is contractor furnished.

The Materials Program determines surfacing thicknesses to distribute wheel loads so that the underlying embankment materials are not overstressed. These thicknesses are given in the Surfacing Recommendations and are shown on the typical sections.

Roadway widths, including the traveled way and shoulders, are given in the Reconnaissance Report and are shown on the typical sections. These widths are based on current WYDOT and AASHTO design standards.

**Elements:** Refer to Exhibit 27.

- [1] Station limits are given for:
  - Beginning / End of Project
  - Changes in surfacing thicknesses
  - Changes in roadway width
  - Equations
  - Bridge abutments/approach slabs
- [2] The average top width for a particular section is obtained from the typical sections and represents the total roadway width including shoulders.
- [3] The distance for a particular section is computed by subtracting the stations at the beginning and end of the section and is given to the nearest 0.01 foot [0.001 m] and 0.001 mile [0.001 km]. The half distance to the center of the section is given to nearest 0.001 mile [0.001 km].
- [4] Average haul is the distance from the pit/plant site to the center of the particular roadway section, to the nearest 0.001 mile [0.001 km]. Average haul is computed using the cumulative entries in the Distance and Half Distance columns, not by subtracting stations.

- [5] The ton/ft [t/m] value for a particular surfacing material in a particular roadway section is calculated using the dimensions shown on the typical section and the unit weight given in the Materials and Rates.
- [6] Tons [t] are shown to the nearest 1 ton [1 t] and are obtained by multiplying the ton/ft [t/m] column by the distance column for a particular roadway section.
- [7] Total tons [t] to the nearest 1 ton [1 t] is the sum of the weights of all surfacing materials in that roadway section.
- [8] Haul, to the nearest 1 TMI [tkm], is obtained by multiplying the entries in the Total Ton [t] column by the Average Haul column. Haul is not measured for payment, but is shown for estimating purposes only.
- [9] Surfacing widths and thicknesses on approach slabs and bridges, if applicable, are given in the bridge plan sheets.
- [10] For tapers, the average end area is used to calculate the appropriate ton/ft [t/m] number. Haul is assumed to be to the center of a tapered section.
- [11] In this example, the surfacing additive quantities are calculated as part of the Surfacing Summary and carried to an Accumulation Summary. The designer has the option to summarize the additive quantities in their own specific summary. For examples, see the ACCUMULATION OF QUANTITIES section.
- [12] On projects with designated pits, the average haul for surfacing materials is calculated using the following equation and is included for the contractor's use in bidding:

$$\text{Average Haul} = \frac{\text{Total (or Subtotal) TMI}}{\text{Total (or Subtotal) Ton}}$$

The Subtotal TMI [tkm] and Subtotal Ton [t] should be used if the average haul for approach quantities is calculated separately on the Approach Summary.

Do not calculate or show the average haul when the material source is contractor furnished. On projects where the material source is contractor furnished and there is a designated plant site, the average haul from the plant site is calculated and shown.

- [13] The dead haul distance from the plant site to a particular station on the project is obtained from the Field.

- [14] Prime, asphalt binder, hydrated lime, tack, seal, water, etc., quantities associated with surfacing materials can be shown in a sub-summary for additives or a separate Surfacing Additives Summary.
- [15] Quantities of prime, tack and seal are obtained by multiplying the treated surface area by the application rates given in the Materials and Rates. The width to which these materials are to be applied is given in a description in the Oiling Notes.
- [16] Calculate the quantity of asphalt binder in the bituminous materials by multiplying the total tons [t] of bituminous pavement by the weight of asphalt in a cubic foot [ $\text{m}^3$ ] of pavement, then dividing by the total weight of a cubic foot [ $\text{m}^3$ ] of pavement. Show the total tons of plant mix for each binder type in a note below the summary or in a separate column in the summary.
- Calculate the lime quantity in a similar manner. Obtain the weight of asphalt binder, weight of lime, and total weight of pavement from the Materials and Rates.
- [17] The quantity of water for the crushed base is determined by multiplying the total tons [t] of crushed base by the sum of the gal/ton [ $\text{m}^3/\text{t}$ ] figures for optimum moisture and finishing given in the Materials and Rates. In the case of English units, the total gallons of water should be divided by 1,000 to obtain the MG quantity which represents thousands of gallons required.

## SURFACING SUMMARY

STATION [1]	DIRECTION OF HAUL	AVERAGE TOP WIDTH [2] FT	DISTANCE [3] FT	HALF DISTANCE [3] MILES	AVERAGE HAUL [4] MILES	CRUSHED BASE		HOT PLANT MIX		PLANT MIX WEARING COURSE		TMI	REMARKS
						TON/FT [5]	TON [6]	TON/FT [5]	TON [6]	TON/FT [5]	TON [6]		
404+98.00		32	4942.00	0.936	3.979	2.134	10546	0.859	4245	0.128	633	61372	BEGINNING OF PROJECT
454+40.00 BK =													
454+25.26 AH													
468+43.83		32	1418.57	0.289	4.582	2.134	3027	0.859	1219	0.128	182	20289	EQUATION
		34	25.00	0.005	4.719	1.668	42	0.835	21	0.136	3	311	END OF APPROACH SLAB
468+68.83													RF ABUTMENT
			162.00	0.031									[9]
470+30.83													RF ABUTMENT
		34	25.00	0.005	4.755	1.668	42	0.835	21	0.136	3	314	[9]
470+55.83													END OF APPROACH SLAB
		32	3869.37	0.733	5.124	2.134	8257	0.859	3324	0.128	495	61877	
509+25.20													BEGIN TAPER
		38	125.00	0.024	5.502	2.429	304	1.007	126	0.152	19	2470	[10]
510+50.20													END TAPER
		44	1250.00	0.237	5.633	2.723	3404	1.154	1443	0.176	220	28542	
523+00.20													BEGIN TAPER
		38	150.00	0.028	5.765	2.429	364	1.007	151	0.152	23	3102	[10]
524+50.20													END TAPER
		32	18595.80	3.522	7.54	2.134	39683	0.859	15974	0.128	2380	437599	
710+46.00													END OF PROJECT
TOTAL							65669		26524		3958	615876	
FOR ESTIMATE							66300		26800		3960		[E]

## [14] SURFACING ADDITIVES

ITEM	UNITS	TOTAL	FOR ESTIMATE
PRIME COAT [15]	TON	214.7	(A)
(2) ASPHALT BINDER (PG 58-28) [16]	TON	1459	(A)
(3) ASPHALT BINDER (PG 64-28) [16]	TON	248	248
HYDRATED LIME [16]	TON	289	(A)
TACK COAT [15]	TON	15.1	(A)
SEAL COAT [15]	TON	40.1	40
WATER [17]	MG	1162	(A)

(A) SEE ACCUMULATION SUMMARY [11] (2) FOR 26524 TONS OF HPM.  
 (3) FOR 3958 TONS OF PMWC.

## EXHIBIT 27

**SURFACING SUMMARY (CONCRETE)**

**General:** This Surfacing Summary contains surfacing related items including, but not limited to, base materials, water and concrete pavement.

Each line in the Surfacing Summary quantifies the amount of surfacing materials for a particular section of roadway. Concrete surfacing is normally contractor furnished for small or urban projects and, therefore, haul is not estimated or shown on the plans.

Surfacing thicknesses are determined by the Materials Program and are obtained from the Surfacing Recommendations and shown on the typical sections.

The roadway widths, including the traveled-lanes and shoulders are given in the Reconnaissance Report and should be shown on the typical sections. The widths and number of lanes are usually obtained from the Traffic Program for urban situations or based on current WYDOT and AASHTO design policies for interstate projects.

**Elements:** Refer to Exhibit 28.

- [1] Station limits are given for:
  - Beginning / End of Project
  - Changes in surfacing thicknesses
  - Changes in roadway width
  - Equations
  - Bridge abutments/approach slabs
  - etc.
- [2] When the pay unit is by the Ton [t] or CY [m<sup>3</sup>], show amount to the nearest whole unit.
- [3] Square yards [m<sup>2</sup>] are shown to the nearest whole unit and are obtained by multiplying the length of the section by the width shown on the typical sections.
- [4] The quantity of water for the crushed base is determined by multiplying the total tons [t] of crushed base by the sum of the gallon/ton [m<sup>3</sup>/t] figures for optimum moisture and finishing given in the Materials and Rates. In the case of English units, the total gallons of water should be divided by 1,000 to obtain the MG quantity which represents thousands of gallons required.

Water for washing the concrete aggregate or batching of the concrete is not included when the concrete is contractor furnished, since the commercial batch plant would have its own water source with no royalty payment required.

- [5] In this example, the surfacing additive quantities are calculated as part of the Surfacing Summary and carried to an Accumulation Summary. The designer has the option to summarize the additive quantities in their own specific summary. For examples, see the ACCUMULATION OF QUANTITIES section.
- [6] Exhibit 28 is an example where the material source for the crushed base is a contractor furnished source, therefore no haul was calculated. If the material source is available, then include the haul calculation in the summary and reference the haul as For Estimate Only in a note below the summary.
- [7] Portland Cement (CONC PVMT) and Fly Ash (CONC PVMT) will be measured but is considered incidental to the contract pay item Concrete Pvm (\_\_\_in). Fly Ash is only used when recommended by the Material Program.

**SURFACING SUMMARY [6]**

STATION TO STATION [1]	TON [2]	SY [3]
	CRUSHED BASE	CONCRETE PVMT (10 in)
32+80.00 - 50+30.00	4508	12639
50+30.00 - 60+60.00	2464	6867
60+60.00 - 64+00.00	813	2267
64+00.00 - 68+50.00	1027	2850
<b>TOTAL</b>	<b>8812</b>	<b>24623</b>
<b>FOR ESTIMATE</b>	<b>8910</b>	<b>24630</b>

(W) SEE WATER SUMMARY [5]

(E) FOR ESTIMATING PURPOSES ONLY

**SURFACING ADDITIVES**

ITEM	UNIT	TOTAL	FOR ESTIMATE
WATER [4]	MG	156	(W)
(1) PORTLAND CEMENT (CONC PVMT)	TON	1778	(E)
(2) FLY ASH (CONC PVMT)	TON	445	(E)

(1) 520 LB/CY PORTLAND CEMENT (CONC PVMT) HAS BEEN USED  
FOR ESTIMATING PURPOSES ONLY. [7]

(2) 130 LB/CY FLY ASH (CONC PVMT) HAS BEEN USED FOR ESTIMATING  
PURPOSES ONLY. [7]

**EXHIBIT 28**

**APPROACH SUMMARY**

**General:** Standard approach widths, radii and paving requirements should be obtained from the Standard Plans. The maximum allowable approach width is normally 40 ft [12.2 m].

The surfacing and drainage culvert quantities associated with approaches on a particular project are normally combined in the Approach Summary.

Culverts under approaches should be placed outside the clear zone or mitered ends with safety grates should be considered for larger pipe or multiple pipe installations. The AASHTO Roadside Design Guide indicates that safety grates are not normally required for single pipe installations with diameters of 24 inches [600 mm] or less. If safety grates are required, standard details are available. The Standard Plans for trash guards cannot be used in this situation.

The lengths of approach culverts located inside the clear zone should be calculated using 1V:8H or flatter approach embankment slopes.

The minimum depth of cover over approach culverts should be obtained from the Standard Plans.

**Elements:** Refer to Exhibit 29.

- [1] If possible, approach dimensions used should be in accordance with the Standard Plans. However, these dimensions may be varied to suit local conditions.
- [2] Eighteen inch [450 mm] pipe culverts are normally used for approaches unless the culvert must carry a design discharge that requires a larger pipe size.
- [3] Minor approaches such as field and other minimum use approaches are normally paved to the end of the radius. Farm, residential, and major county road approaches are normally paved to the right-of-way line.

The surfacing section for minimum use approaches normally consists of 2 inches [50 mm] of plant mix pavement, and 6 inches [150 mm] of base material. For ease of constructability, it is often helpful to use the same thicknesses as those used on the mainline. Wearing course or cover coat material is not normally used on approaches, unless conditions specifically dictate otherwise.

- 4] Approaches noted on the plans as major will require compaction to a minimum 92% of maximum density in accordance with the QC/QA requirements. The District determines if an approach is major or minor. Approaches are considered as minor unless otherwise noted.
- [5] The dead haul distance from the pit/plant site to a specific station on the project is normally supplied to the Designer by the Field.
- [6] The total quantity of items that occur in more than one summary are typically carried another Summary or, preferably, to an Accumulation Summary to be combined.
- [7] Average haul is equal to the total haul for the approach surfacing material divided by the total tons of approach surfacing material. The average haul distance is supplied for the contractor's use in bidding.
- [8] If available, CR numbers obtained from the Materials Program should be included in the summary. If the CR numbers are not available, CR1 can be assumed for approach pipe only and so noted beneath the summary.



## APPROACH SUMMARY

STATION	FT		PIPE 18 in [2]	EA PIPE SECT 18 in	FT	FILL HEIGHT	TON		MI	TOTAL	T MI	REMARKS [3] [4]
	WIDTH [1] "W"	RADII [1] "R"					CRUSHED BASE [3]	HOT PLANT MIX APPROACHES [3]				
216+00 LT	24	50	64	2	1.8	196	62	8,746	258	2256	MAJOR APPR, CO. RD, PAVE TO END OF TAPER	
241+00 LT	16	30	24	2	1.0	38	10	8,273	48	397	FIELD	
241+00 RT	16	30	24	2	1.0	38	10	8,273	48	397	FIELD	
272+77 RT	24	50	32	2	1.0	196	62	7,671	258	1979	MAJOR APPR, KIOSK SITE, PAVE TO END OF TAPER	
320+90 LT	16	30				38	10	6,760	48	324	FIELD	
383+50 RT	16	30	72	2	3.5	38	10	5,574	48	268	FIELD	
424+21 RT	16	30	28	2	6.5	38	10	4,803	48	231	FIELD	
469+55 RT	16	30	20	2	1.0	38	10	3,944	48	189	FIELD	
508+66 LT	16	30	24	2	1.0	38	10	3,203	48	154	FIELD	
530+41 LT	16	30	32	2	1.0	38	10	2,792	48	134	FIELD	
531+00 RT	24	50				196	62	2,780	258	717	MAJOR APPR, BOAT RAMP, PAVE TO END OF TAPER	
598+85 LT	16	30	32	2	1.0	38	10	1,495	48	72	FIELD	
625+00 RT	24	50	40	2	1.5	82	26	1,000	108	108	FIELD	
TOTAL			392	22		1012	302		1314	7226		
FOR ESTIMATE			(C) [6]	(C) [6]		(A) [6]	303			(E) [6]		

(1) AVERAGE HAUL = 5.499 MILES [7]

(E) FOR ESTIMATING PURPOSES ONLY

(A) SEE ACCUMULATION SUMMARY.

(C) SEE CULVERT SUMMARY.

PAVE APPROACHES TO THE END OF RADIUS, UNLESS OTHERWISE NOTED.

MEET THE REQUIREMENTS OF A CR1 INSTALLATION FOR ALL APPROACH CULVERTS. [8]

## EXHIBIT 29

DEAD HAUL = 1.000 MILES  
FROM PIT/PLANT SITE TO  
STA 625+00.00 [5]

## CATTLE GUARD SUMMARY

**General:** The purpose of the Cattle Guard Summary is to specify the size and location of cattle guards on a particular project.

Cattle guards are usually installed at locations recommended by the Resident Engineer and/or the Right-of-Way Program based on agreements with the adjacent landowner.

WYDOT specifies standard cattle guard widths in 6 ft [1.8 m] increments. Therefore, a 16 ft [4.9 m] approach would receive a cattle guard that is 18 ft [5.4 m] wide, while a 22 ft [6.7 m] approach would have a 24 ft [7.2 m] cattle guard.

Medium duty and heavy duty cattle guards are designed to carry HS 20-44 (MS18) loads. Larger members are used in the heavy duty cattle guard to provide a longer service life under conditions of constant truck traffic. Thus, medium duty cattle guards are normally used on approaches, while heavy duty cattle guards are installed in locations where the cattle guard crosses the mainline, interstate ramps, etc.

**Elements:** Refer to Exhibit 30.

- [1] The disposition of the removed cattle guard should be specified in the summary notes or it will become the property of the contractor by default in accordance with the Standard Specifications.

CATTLE GUARD SUMMARY					
STATION	EA			REMOVAL OF CATTLE GUARDS	REMARKS
	CATTLE GUARD (MEDIUM DUTY)		CATTLE GUARD (HEAVY DUTY)		
	18 ft	42 ft	24 ft		
205+00			1		MAINLINE
216+01 LT		1			APPROACH
272+77 RT		1			APPROACH
274+28 RT		1			APPROACH
424+21 RT	1				APPROACH
531+00 RT		1			APPROACH
573+20				1	MAINLINE; 24 ft CATTLE GUARD (1)
<b>TOTAL AND FOR ESTIMATE</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	

(1) HAUL CATTLE GUARD GRILLS TO THE COUNTY YARD IN RAWLINS. HAUL DISTANCE = 12.4 MILES.  
DISPOSE OF FOUNDATIONS IN THE WASTE AREA LOCATED AT STA 269+75. [1]

**EXHIBIT 30**

**UNDERDRAIN SUMMARY**

**General:** The need for and location of underdrains is determined by the Geology Program and/or the Materials Program. Underdrains are normally installed at the surfacing edge of highways with high traffic volumes, usually interstates, to improve the subgrade conditions and thereby extend the life of the surfacing section.

Although several types of underdrains have been used in the past, WYDOT is currently installing trench underdrains consisting of perforated drain pipe wrapped with a geotextile filter fabric embedded in drain gravel.

The decision whether to locate the underdrains on one side or both sides of the roadway is made by the Geology Program and/or Materials Program. Normally, underdrains are placed on the low side of the roadway cross section; i.e., on the side of the roadway away from the median on tangent sections, or on the median side if the roadway superelevation drains toward the median.

It is standard practice to place underdrain outlets at a maximum spacing of 500 feet [150 m]. Outlets must be placed at all of the low points in the roadway gradeline. A splash block or stilling basin is placed at each edge drain outlet to minimize erosion. A rodent screen is placed in each outlet pipe to prevent damage or blockage to the drain by small animals.

Standard details needed for the plans are available for underdrains, pipe connections, outlets, splash blocks, etc.

**Elements:** Refer to Exhibit 31.

- [1] The geotextile filter fabric wrapping that encases the perforated pipe is bid as a Special Item FT-A (special provision required). The bid item Underdrain Pipe (Perf)\_\_\_in includes trench excavation.
- [2] The bid item Underdrain Pipe (Non-Perf)\_\_\_in used for outlet pipe includes the trench excavation required for its placement, rodent screens, splash blocks, concrete headwalls, location posts, etc.

## UNDERDRAIN SUMMARY

STATION	FT						CY	EA	REMARKS
	UNDERDRAIN PIPE (PERF) 4 in		SPECIAL ITEM FT - A (1) [1]		UNDERDRAIN PIPE (NON-PERF) 4 in [2]		GRAVEL FOR DRAINS	DRAIN OUTLETS (2)	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT			
0+00									HIGH POINT
	100		100				5		
1+00					20			1	LOW POINT
	400		400				20		
5+00					20			1	
	400		400				20		
9+00									HIGH POINT
	475		475				24		
13+75					20			1	
	500		500				25		
18+75					20			1	
	460		460				23		
23+35					20			1	END OF APPROACH SLAB
									BRIDGE
38+10					20			1	LOW POINT AND END OF APPROACH SLAB
	415		415				21		
42+25					20			1	
	500		500				25		
47+25					20			1	
	500		500				25		
52+25					20			1	
	500		500				25		
57+25					20			1	
	285		285				14		
60+10					20			1	BEGIN SUPERELEVATION
		415		415			21		
64+25						20		1	
		500		500			25		
69+25								1	
SUBTOTAL	4535	915	4535	915	220	20	273	13	
TOTAL	5450		5450		240		273	13	
FOR ESTIMATE	5450		5450		240		273		

(1) SPECIAL ITEM FT - A, IS A CIRCULAR-KNIT GEOTEXTILE COVERING (SOCK) THAT IS PLACED OVER THE UNDERDRAIN PIPE (PERF) 4 in.

(2) FOR ESTIMATING ONLY.

## EXHIBIT 31

**CURB AND GUTTER, DOUBLE GUTTER AND SIDEWALK SUMMARY**

**General:** The purpose of this summary is to give the quantities and locations of the bid items associated with the construction of curb and gutter, double gutter and sidewalk. Since the type of curb and gutter, double gutter, and sidewalk varies from town to town, provide plan details which clearly show the pay limits, thicknesses, widths, etc., of each of these items if they deviate from the Standard Plans.

**Elements:** Refer to Exhibit 32.

- [1] The station to station limits given in the summary should be in accordance with the details for the specific project. In this example, the station limits are measured between the front faces of the curb and gutter sections.
- [2] Always show the approach width “W” and radius “R.”
- [3] Different types of available curb and gutter are shown in the Standard Plans. Normally, Curb and Gutter Type A is used unless local conditions dictate otherwise. The width of the curb and gutter section must be shown on the typical sections or otherwise stated in the plans if it deviates from the Standard Plans.
- [4] Double gutter is often used to carry drainage across driveways, approaches, street intersections and to provide a thicker concrete section with greater load carrying capacity than sidewalk at driveways. See the Standard Plans for pay limits, gutter thickness and slope requirement for pedestrians.
- [5] Normally, concrete sidewalk is 4 inches [100 mm] thick. The widths, thicknesses, and slope of sidewalk installations must be shown on the typical sections or otherwise stated in the plans. On all projects with curb and gutter and sidewalk, Americans with Disabilities Act (ADA ) requirements should be met. Various ADA requirements are shown in the Standard Plans and their construction is considered to be incidental to the sidewalk and curb and gutter bid items. The locations and types of ADA requirements should be specified in the plans.
- [6] Base material is normally used beneath curb and gutter, sidewalk, and double gutter installations to provide a stable foundation. The normal base material thickness is 4 inches [100 mm]. However, the mainline earth grade is often extended beneath adjacent curb and gutter for ease of construction, thus establishing the thickness of the base material beneath the curb and gutter.
- [7] The dead haul distance from the material source or plant site to a particular point on the project is supplied by the Field.

- [8] Carry the crushed base total quantity to an accumulation summary to be combined with like quantities for the entire project.

## CURB AND GUTTER, DOUBLE GUTTER AND SIDEWALK SUMMARY

STATION-STATION [1]	FT		MI	FT [3]		SY (1) [4]		SY [5]		TON [6]		TMI	REMARKS
	APPROACH [2]	RADIUS		CURB AND GUTTER TYPE A		DOUBLE GUTTER		SIDEWALK (CONC)		CRUSHED BASE			
				LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT		
	42	50	4.034	79	79	95	95	44	44	36	36	72	290
			4.056	118	138			66	77	22	25	47	191
	22	20	4.076	63	22	18		35	12	16	4	20	82
			4.089	79	119			44	66	15	22	37	151
	22	20	4.102	63	22	18		35	12	16	4	20	82
			4.122	148	188			82	104	27	34	61	251
	22	20	4.142	63	22	18		35	12	16	4	20	83
			4.153	20	90			11	50	4	17	21	87
	42	50	4.166	157	42	154		87	23	63	8	71	296
			4.186	72	122			40	68	13	22	35	147
	36	50	4.205	157	157	149	149	87	87	62	62	124	521
			4.224	115	115			64	64	21	21	42	177
				1134	1116	452	244	630	619	311	259	2358	
TOTAL				2250		696		1249		570		2358	
FOR ESTIMATE				2250		696		1250		(A) [8]		(E)	

AVERAGE HAUL = 4.137 MILES

DEAD HAUL = 4.03 MILES FROM THE PLANT SITE TO STA 416+04. [7]

(A) SEE ACCUMULATION SUMMARY

(1) DOUBLE GUTTER IS 7 ft - 6 in WIDE AND 6 in THICK.

(E) FOR ESTIMATING PURPOSES ONLY

## EXHIBIT 32

## RESET MAILBOX SUMMARY

**General:** Moving and maintaining mailboxes to ensure accessibility during construction is incidental to the bid item Reset Mailbox (\_\_\_\_). The purpose of the Reset Mailbox Summary is to note the location and number of mailboxes on a particular project.

The number and location of mailboxes are usually supplied to Design by the Field, taking into account the following factors:

- The primary consideration should be safety
- Direction of the mail route
- Landowner convenience
- Approach and turning movements
- Whenever possible, mailboxes should be located at the same turnout rather than at individual locations

The Standard Plans include details for mailbox supports and turnouts. Widening for construction of mailbox turnouts must be included in the Grading and Surfacing summaries.

Refer to Exhibit 33.

RESET MAILBOX SUMMARY				
STATION		EA		
		RESET MAILBOX		
		(SINGLE)	(DOUBLE)	(MULTIPLE)
27+68	RT	1		
39+23	RT		1	
58+90	RT		1	
67+72	RT	1		
86+28	RT	1		
96+98	RT		1	
120+12	RT		1	
173+48	RT	1		
184+10	RT		1	
227+10	RT			1
261+00	RT	1		
278+02	RT			1
304+48	RT	1		
330+98	RT	1		
356+88	RT	1		
367+30	RT	1		
383+88	RT		1	
458+30	RT	1		
498+30	RT	1		
<b>TOTAL AND FOR ESTIMATE</b>		<b>11</b>	<b>6</b>	<b>2</b>

**EXHIBIT 33**

**TOPSOIL AND SEEDING SUMMARY**

**General:** The purpose of this summary is to give the pay quantities for bid items associated with the revegetation of a particular project. The rates at which the items are to be applied are given in the Materials and Rates.

**Elements:** Refer to Exhibit 34.

[1] Station breaks used for the mainline quantities normally correspond to the balance points shown in the Grading Summary and are obtained from the earthwork for the project.

[2] The total acres of seeding for a project typically includes the area bound by the slope stakes and roadway edge plus an estimated additional area that the contractor is likely to disturb beyond slope boundary. The area bound by the slope stakes and roadway edge can be calculated by dividing the Topsoil Storing quantity (obtained from the earthwork) by the thickness of the topsoil shown in the Materials and Rates. The estimated areas of seeding for contractor disturbance can range from including the remaining area within the right-of-way and construction permit areas, to just including the remaining area within construction permit boundary. Consult the District for input on estimating the acres of additional seeding needed beyond the slope stake limits.

The total acres of seeding will have to be separated by slope steepness to accommodate the seeding requirements. Typically, areas with slopes 1V:3H or flatter are planted using a seed drill. Slopes steeper than 1V:3H are broadcast or hydraulic seeded. GEOPAK can generate a seeding report that is capable of separating specific slopes (i.e., greater than 1V:3H).

[3] Topsoil Storing is the volume of topsoil that is excavated and stored prior to the construction of the roadway, for future revegetation of disturbed areas. After construction is complete, the stored topsoil is placed on disturbed areas and seeded. Topsoil Placing is the volume of topsoil that is replaced. Therefore, Topsoil Storing and Topsoil Placing quantities are normally equal.

[4] Seeding, Fertilizer and Dry Mulch are separate bid items associated with the dry seeding of disturbed areas.

[5] Hydraulic Seeding is the single bid item associated with the hydraulic seeding process. The ton measurement of this item includes fertilizer, seed, mulch tack, and water. Water for hydraulic Seeding is incidental to the bid item Hydraulic Seeding. Include incidental water when calculating the state paid royalty cost on the Contract Documents estimate sheet.

[6] Generally, the area to be seeded in a pit is based on the area of the pit that must be stripped to remove the required amount of material, plus some allowance for additional areas that may be disturbed by construction operations.



**Chapter 4****Section 4-03 - Summaries**

- [7] Contact the District for the number of acres required for seeding of plant sites. Typically the revegetation area for plant sites will range from 5 to 10 acres [2 to 4 hectares].
- [8] Water for Topsoil Placing is the amount of water required for handling and/or dust control during topsoil placement operations.

**TOPSOIL AND SEEDING SUMMARY**

STATION - STATION [1]	ACRES [2]		CY		LB		TON	
	SLOPES ≤ 1V:3H	SLOPES > 1V:3H	TOPSOIL STORING [3]	TOPSOIL PLACING [3]	SEEDING (PLS) [4]	FERTILIZER TYPE I [4]	DRY MULCH [4]	HYDRAULIC SEEDING [5]
STA 422+40 - STA 557+74	31.6		16992	16992	442	948	47	
STA 557+74 - STA 656+17	25.8	6.9	17584	17584	361	774	39	6.9
STA 656+17 - STA 714+40	11.2		6023	6023	157	336	17	
MILLER PIT [6]	4.2				59	126	6	
PLANT SITE [7]	5				70	150	8	
<b>TOTAL</b>	<b>77.8</b>	<b>6.9</b>	<b>40599</b>	<b>40599</b>	<b>1089</b>	<b>2334</b>	<b>117</b>	<b>6.9</b>
<b>FOR ESTIMATE</b>			<b>40600</b>	<b>40600</b>	<b>1100</b>	<b>2340</b>	<b>120</b>	<b>7</b>

(E) SEE WATER SUMMARY.

ITEM	UNIT	TOTAL	FOR ESTIMATE
FOR TOPSOIL PLACING			
WATER [8]	MG	203	(E)

**EXHIBIT 34**

## EROSION CONTROL BLANKET SUMMARY

**General:** Erosion control blankets are used to minimize erosion in ditch sections, on steep slopes, in disturbed areas, etc. and to give the ground cover a better chance to re-establish. Either the Agronomist from the Environmental Services Section or the Resident Engineer can provide Design with suggested locations for erosion control blanket installations. Generally blankets are placed on cut and fill slopes steeper than 1V:3H and along roadside ditches steeper than 3%.

**Elements:** Refer to Exhibit 35.

- [1] Erosion control materials come in various width rolls. For current available widths contact the Environmental Services agronomist. The overall dimensions of the installation should be based on the roll width and the standard overlap dimensions identified in the Standard Specifications. Required overlaps are not measured twice and the payment will be based on the completed exposed surface area.

EROSION CONTROL BLANKET SUMMARY		
STATION - STATION	SY [1]	
	EROSION CONTROL BLANKET	
	LEFT	RIGHT
12+04 - 12+07	400	400
12+70 - 12+83	1625	1625
<b>SUBTOTAL</b>	<b>2025</b>	<b>2025</b>
<b>TOTAL AND FOR ESTIMATE</b>	<b>4050</b>	

**EXHIBIT 35**

## RIPRAP SUMMARY

**General:** Riprap is used to control erosion and scour at pipe inlets and outlets, along drainage channels, etc. The standard types of riprap typically used are Machine-Placed Riprap, Hand-Placed Riprap and Wire-Encl Riprap. Aggregate size and weight is given in the Standard Specifications. In special cases, where the design requires a larger size aggregate than given in the Standard Specifications, list the aggregate specification in a note under the Riprap Summary. The purpose of the Riprap Summary is to note the locations and quantities of riprap on a particular project.

Hand-Placed Riprap works well because the larger voids are filled with smaller stones that provide a very stable interlocking blanket to resist water action. Labor for manual placing can be quite costly, especially for large quantities; however, Hand-Placed Riprap is more aesthetically pleasing than Machine-Placed Riprap. When riprap is placed with cranes, backhoes, or other mechanical devices, the stones will shift over time because of wave action and there is greater potential to erode the underlying soil. Typically, Machine-Placed Riprap requires a greater thickness to remain stable. Both types of riprap provide good resistance to scour. Due to higher labor costs, Hand-Placed Riprap is typically only used when smaller quantities are needed or for erosion control in landscape areas where aesthetics may be a concern.

**Elements:** Refer to Exhibit 36.

- [1] Machine-Placed Riprap - Contains mainly large size aggregate with at least 60% of the stones weighing more than 77 pounds [35 kg] and may not be available in a normal surfacing pit. This type of riprap is easily placed by dumping and spreading with power equipment.
- [2] Hand-Placed Riprap - Consists of large primary stones at least 3in [75 mm] thick and weighing at least 55 pounds [25 kg] with choke stone placed between the primary stones. The large stones may not be available in a normal surfacing pit.
- [3] Wire-Encl Riprap - Consists of 4'-10" x 4'-10" x 1'-4" [1450 mm x 1450 mm x 400 mm] wire enclosed baskets, filled with mostly 2" [50 mm] plus aggregate. This type of aggregate is normally available in a typical surfacing pit. Installation is relatively easy, but this type of riprap has a less natural appearance than either Machine or Hand-Placed Riprap. The overall dimensions of the riprap installation are based on the 4'-10" (1450 mm) width and length of the wire baskets.
- [4] Geotextile Erosion Control is normally used beneath riprap installations to prevent wave action, stream flow, etc., from removing fines through the riprap face.

- [5] The available source for riprap aggregates and dead haul distance is shown in the Materials and Rates. If the source is contractor furnished, then the dead haul distance is not required.

## RIPRAP SUMMARY [5]

LOCATION	CY		SY		REMARKS
	MACHINE-PLACED RIPRAP [1]	HAND-PLACED RIPRAP [2]	WIRE-ENCL RIPRAP [3]	GEOTEXTILE EROSION CONTROL [4]	
846+60 - 849+70 LT	400			600	BANK PROTECTION
847+75 - 848+50 RT		25		38	INLET
848+20 - 849+50 LT			7	7	OUTLET
TOTAL AND FOR ESTIMATE	400	25	7	645	

## EXHIBIT 36

## GUARDRAIL SUMMARY

**General:** The purpose of this summary is to indicate the location, length, type of guardrail and end anchorages on a particular project. Provide corresponding detail sheets in the plans that show layouts, including tangent lengths, flare lengths, starting location of flares, offsets from roadway and end anchorage types. For guardrail grading requirements, refer to Chapter 3, Section 3-03, Widening for Guardrail.

Guardrail may be used on a roadway project for a number of different reasons, including bridge end protection, median and shoulder hazards or fill slope protection. The best source of information regarding the location, type and amount of guardrail needed for a roadway design is the AASHTO Roadside Design Guide.

Include in the project Guardrail Summary all new guardrail/end anchorages and any guardrail to be removed, reset or upgraded.

Removal, resetting, or upgrading of guardrail should be considered as separate bid items. A note should be included in the plans indicating what type of barrier is to be removed to aid the contractor in bidding.

**Elements:** Refer to Exhibit 37.

- [1] Indicate the location of the guardrail by using station ranges.
- [2] Show the type of guardrail (bid item name) to be used on the project and the length needed for each station range to the nearest foot [0.3 m]. Guardrail lengths should be determined by increments compatible with post spacings (i.e., Box Beam Guardrail at 6ft [1.83 m] increments, Corr Beam Guardrail at 12ft- 6in [3.81m] increments) and end anchorage or bridge connection length as shown in the Standard Plans.
- [3] List the type of end anchorages to be used, such as Type I or WYBET.
- [4] List areas where existing guardrail is to be removed to the nearest foot [0.3 m]. The length of guardrail to be removed includes the length of the associated end anchorage.
- [5] If any of the removed barrier is to be reset, show in the summary. This should be measured to the nearest foot [0.3 m] and include the lengths of any end anchorages that are to be reset. If a new end anchorage is installed, it should be paid for separately as an end anchorage.
- [6] If any of the removed barrier is to be reset and also needs modification to bring it up to current standards, identify it as upgrading of the guardrail instead of resetting the guardrail. Measure to the nearest foot [0.3 m]. End anchorages generally cannot be upgraded and would be replaced with new

end anchorages.

[7] Show For Estimate quantities of Guardrail to the nearest whole foot [m].

GUARDRAIL SUMMARY										
STATION - STATION [1]	FT		EA		EA		FT		FT	
	BOX BEAM GUARDRAIL [2]	EBL	BOX BEAM GUARDRAIL END ANCH TYPE [3]	BOX BEAM END TERM (WYBET) [3]	REMOVAL OF GUARDRAIL AND BARRIER [4]	EBL	WBL	RESET BOX BEAM GUARDRAIL [5]	EBL	WBL
625+95 - 626+64		69		1						
626+01 - 626+64		63		1						
628+31 - 627+59	72			1						
628+25 - 627+59	86			1						
632+41 - 635+23	282		2							
639+51 - 660+04				1			53			
639+51 - 660+04				1			53			
TOTAL AND FOR ESTIMATE [7]	552		2	6			106 (1)	29		29
(1) REMOVE BOX BEAM GUARDRAIL AND HAUL TO THE WYDOT MAINTENANCE YARD IN RAWLINS (HAUL DISTANCE = 10.7 MILES).										

EXHIBIT 37

**FENCE SUMMARY**

**General:** The purpose of the Fence Summary is to detail the locations, types and quantities of fencing related items associated with a particular project.

The standard types of fence, brace panels, end panels, etc. and details of their construction are given in the Standard Plans. Type B fence is the standard fence used on interstate projects, unless an existing fence is being replaced in-kind. Normally, Type B fence is not used on two-lane roadways.

Wood fence posts should be used for permanent fencing on all projects unless the use of metal posts is justified in a letter from the District Engineer to the Highway Development Engineer or in the Engineer's Recommendations approved by the District Engineer.

The Resident Engineer may request wood stays in lieu of standard wire stays. If so, a specific note must be included in the plans.

The following procedures are generally used in determining quantities related to fencing:

- Fence lengths should be estimated, measured and paid for by surface measurement, including jogs, wire gates, end panels and brace panels, as stated in the Standard Specifications.
- Right-of-way jogs are normally fenced on a 45° diagonal. The effects of right-of-way jogs on the fence length are generally included in the estimate.
- End panels and brace panels should be installed in accordance with the Standard Plans.
- Wing fence should be utilized in accordance with the Standard Plans.

**Elements:** Refer to Exhibit 38.

- [1] For non-standard fence types, the bid items Fence Type T, U, V, W, X, Y and Z are used. Details must be provided showing any differences (wire type, wire spacing, post spacing, etc.) between the non-standard fence and the Standard Plans.
- [2] Use the Removal of Fence bid item to remove old fencing that is to be replaced with new fence and for all other fences that require removal.
- [3] The number of wire gates are not paid for separately but should be shown in the plans for informational purposes only.

- [4] If fencing material is to be removed and salvaged it must be specified in the summary notes or it will become the property of the contractor by default in accordance with the Standard Specifications. Include in summary note that the fence is to be salvaged, who the owner is, where stockpile site is and haul distance.

## FENCE SUMMARY

STATION - STATION	FT						EA				FT		EA	
	FENCE TYPE C (WOOD POSTS)		FENCE TYPE X [1]		FENCE-WING (WOOD POSTS)		END PANELS		BRACE PANELS		REMOVAL OF FENCE (1) [2]		WIRE GATES [3]	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
205+00 - 255+00		5000						3		4		5000		1
255+00 - 267+00				1200						1		1200		
267+00 - 353+00		8600				140		11		6		8600		2
353+00 - 367+00				1400						2		1400		
367+00 - 426+00		5900						3		5		5900		
426+00 - 431+00				500		140		6		1		500		
431+00 - 435+00		400								1		400		
435+00 - 438+00				300						1		300		
438+00 - 445+00		700						3				700		
445+00 - 450+00				500						1		500		
450+00 - 454+00		400								1		400		
454+00 - 457+00				300						1		300		
457+00 - 507+00	5000						1		4		5000		2	
507+00 - 519+00			1200						1		1200			
519+00 - 605+00	8600				140		7		6		8600		3	
605+00 - 619+00			1400						1		1400			
619+00 - 678+00	5900						1		5		5900			
678+00 - 681+75				375				1		1		375		
681+75 - 692+75		1100						2		1		1100		1
692+75 - 696+50			375		140		8				375			
696+50 - 707+50	1100						1				1100		1	
<b>SUBTOTAL</b>	<b>20600</b>	<b>22100</b>	<b>2975</b>	<b>4575</b>	<b>280</b>	<b>280</b>	<b>18</b>	<b>29</b>	<b>17</b>	<b>26</b>	<b>23575</b>	<b>26675</b>	<b>6</b>	<b>4</b>
<b>TOTAL</b>	<b>42700</b>		<b>7550</b>		<b>560</b>		<b>47</b>		<b>43</b>		<b>50250</b>		<b>10</b>	
<b>FOR ESTIMATE</b>	<b>42700</b>		<b>7550</b>		<b>560</b>		<b>47</b>		<b>43</b>		<b>50300</b>		<b>(E)</b>	

(E) FOR ESTIMATING PURPOSES ONLY.

AT ROCK CUTS, TIE FENCE TO THE BACKSLOPES TO CONTAIN LIVESTOCK.

(1) EXISTING FENCE BECOMES THE PROPERTY OF THE COUNTY, SALVAGE AND DELIVER FENCE  
AND TO THE COUNTY YARD IN RAWLINS. HAUL DISTANCE = 12.4 MILES FROM STA. 707=50.

## EXHIBIT 38



## TEMPORARY FENCE SUMMARY

**General:** Temporary fence is normally used to fence construction permit areas where construction disturbs the terrain outside the project right-of-way boundary. The main purpose of temporary fence is to prevent animals from grazing in these areas until revegetation has been established, to prevent livestock from entering the highway during construction and/or to delineate the work area limits for the contractor.

Metal posts are normally used for temporary fence, but wood posts may be specified. Temporary fence should normally be constructed with three barbed wires for cattle or horses and five barbed wires or woven wire for sheep.

See the Standard Plans for further information and a typical detail for temporary fence. Any deviation from the temporary fence specified in the Standard Plans should be identified with a note in the plans.

**Elements:** Refer to Exhibit 39.

- [1] Non-standard features of the temporary fence (wire spacing, post type, disposition, etc.), should be specified in the plans.

Normally, temporary fence is removed by and becomes the property of the adjacent landowner. If this is not the case, the disposition of temporary fence should be explicitly stated in the plans and should comply with any written agreements that were signed with the adjacent property owners.

### TEMPORARY FENCE SUMMARY

STATION-STATION	FT		REMARKS
	FENCE TEMPORARY		
	LEFT	RIGHT	
534+50 - 536+50	230		15 FT. CONSTRUCTION PERMIT
542+20 - 546+60		470	15 FT. CONSTRUCTION PERMIT
557+60 - 560+90	390		30 FT. CONSTRUCTION PERMIT
561+40 - 563+60		250	15 FT. CONSTRUCTION PERMIT
SUBTOTAL	620	720	
TOTAL AND FOR ESTIMATE	1340		

CONSTRUCT THE TEMPORARY FENCE WITH FENCE TYPE G.[1]

### EXHIBIT 39

## STRUCTURE SUMMARY

**General:** Each title sheet in the bridge plans gives the quantities associated with the construction of that particular structure. The purpose of the Structure Summary is to combine all of the structure quantities into a single summary that is located with the rest of the project summaries.

The reiteration of the structure quantities is also necessary for archiving purposes, since the bridge drawings are archived separately from the rest of the plans.

Many of the structure bid items, such as concrete, reinforcing steel, etc., are paid for on a lump sum basis. In these cases, the total calculated quantities which are the basis for the lump sum payment are provided for the contractor's information.

**Elements:** Refer to Exhibit 40.

[1] A "For Estimate" column should be included for each bridge code that is shown under a separate column in the TEQ.

### STRUCTURE SUMMARY

ITEM	UNITS	STA 469+00, DRWG. NO. 6183, CODE 10 - EEF				STA 508+50, DRWG. NO. 6184, CODE 11 - EGH			
		QUANTITIES			FOR ESTIMATE [1]	QUANTITIES			FOR ESTIMATE [1]
		EBL	WBL	TOTAL		EBL	WBL	TOTAL	
REMOVAL OF BRIDGE RAIL	FT	126	126	252	252	232	232	464	464
REMOVAL OF SURFACING	SY	390	390	780	780				
REMOVAL OF CONCRETE	LS	9.4 CY	9.4 CY	18.8 CY	LUMP SUM	2 CY	2 CY	4 CY	LUMP SUM
DRY EXCAVATION	CY	420	420	840	840	424	424	848	848
WET EXCAVATION	CY					110	110	220	220
STRUCTURAL STEEL	LS					329570 LB	329570 LB	659140 LB	LUMP SUM
PAINT REPAIR-STRUCTURAL STEEL	LS					414937 SY	414937 SY	829874 SY	LUMP SUM
BRIDGE RAILING	FT	220	220	440	440	326	326	652	652
TEMPORARY TRAFFIC RAILING MODIFICATION	LS	62.5 LF	62.5 LF	125 LF	LUMP SUM	62.5 LF	62.5 LF	125 LF	LUMP SUM
STEEL SHEET PILING (SM 16.0)	SF					812	812	1624	1630
REINFORCED CONC APPROACH SLABS	SY	226	226	452	452	226	226	452	452
BRIDGE APPROACH BACKFILL	CY	310	310	620	620	330	330	660	660
BEARING DEVICE MODIFICATION	LS					2 EA	2 EA	4 EA	LUMP SUM
COMPRESSED JOINT MATERIAL	FT	85	85	170	170	85	85	170	170
BRIDGE DECK MEMBRANE	SY	234	234	468	468	464	464	928	928
BRIDGE DECK REPAIR CLASS I-A	SY					777	777	1554	1560
BRIDGE DECK REPAIR CLASS I-B	SY					91	91	182	182
BRIDGE DECK REPAIR CLASS II-B	SY					5	5	10	10
CLASS A CONCRETE	LS	62 CY	62 CY	124 CY	LUMP SUM				
CLASS B CONCRETE	LS	8.2 CY	8.2 CY	16.4 CY	LUMP SUM				
REINFORCING STEEL	LS	1013 LB	1013 LB	2026 LB	LUMP SUM				
REINFORCING STEEL (COATED)	LS	4186 LB	4186 LB	8372 LB	LUMP SUM				
UNDERDRAIN PIPE (PERF) 6 in	FT	84	84	168	168	84	84	168	168
UNDERDRAIN PIPE (NON-PERF) 6 in	FT	24	24	48	48	24	24	48	48
GEOTEXTILE, MATERIAL SEPARATION (WOVEN)	SY	1160	1160	2320	2320	1190	1190	2380	2380

### EXHIBIT 40

## **TRAFFIC PROGRAM SUMMARIES**

**General:** The purpose of these summaries is to identify the highway signs, traffic control items, and electrical items needed on the project. These summaries are provided to Project Development by the Traffic Program and the Designer's sole responsibility is to incorporate the sheets provided into the plans and transfer the For Estimate quantities to the TEQ. An example is not provided since Project Development does not develop this summary.

The Designer should coordinate the appropriate sheet numbers to be used with the responsible individual(s) in the Traffic Program.

An exception to the above would be if a road design consultant is contracted to provide the traffic design for a project as well. In this case, the consultant should contact the Traffic Program for example summaries and guidance.

## **HIGHWAY MONUMENT SUMMARY**

**General:** The purpose of this summary is to identify the locations (station, offset and coordinates) of all highway monuments on a particular project. In accordance with Operating Policy 18-13, the Right-of-Way Program will determine the need for the Highway Monument Summary and, if needed, provide the summary to Project Development. The Designer's sole responsibility is to incorporate the sheets provided into the plans. An example is not provided since Project Development does not develop this summary.

The Designer should coordinate the appropriate sheet numbers to be used with the responsible individuals in the Right-of-Way Program.

Proposed highway monuments may be "For Reference Only" or as a quantified bid item for placement under the construction contract. This determination should be made at the Right-of-Way and Engineering Plan inspection. If the highway monuments are included as a contract bid item, the Designer must remember to transfer the For Estimate quantity to the TEQ.

## FLOOD HAZARD SUMMARY

**General:** The Flood Hazard Summary documents the hydraulic design parameters for all culverts on a particular project. It provides readily available design information for reviewing the culvert capacity at existing sites where flood damage occurs. If a hydraulic analysis is done for a new pipe or pipe extension, include the design parameters in the Flood Hazard Summary. If a hydraulic analysis is not done, a note should be included in the plans listing which locations were not analyzed and stating the reason why.

Once Project Development has furnished their portion of the hydraulic design data, the summary is sent to the Hydraulics Section, if necessary, to be completed. The Hydraulics Section then returns the completed Flood Hazard Summary to Project Development for inclusion in the final project plans.

**Elements:** Refer to Exhibit 41.

- [1] Design culvert size to provide the hydraulic capacity necessary to carry the design flood in accordance with Chapter 3, Section 3-04 Culvert Design.

When equivalent CMP and RCP designs have been developed for a particular culvert, it is standard practice to include only the maximum headwater (HW) and tailwater (TW) depths in the summary.

- [2] The basic flood has a recurrence interval of 100 years and each culvert should be reviewed for this event.

### FLOOD HAZARD SUMMARY

STATION	STRUCTURE			DESIGN FLOOD DATA [1]				BASIC FLOOD DESIGN [2]				DRAINAGE DATA	
	SIZE (INCHES)	TYPE (1)	INLET (2)	FREQUENCY (YRS)	Q (CFS)	HW (FT)	TW (FT)	FREQUENCY (YRS)	Q (CFS)	HW (FT)	TW (FT)	TYPE (3)	AREA (SQ. MILES)
220+57	30	CMP OR RCP	FE	10	19.4	2.2	0.7	100	65	3.7	1.1	IRR	0.04
347+80	30	CMP OR RCP	FE	10	60.0	2.1	0.4	100	187.2	3.6	0.5	IRR	0.05
438+22	60	CMP OR RCP	FE	10	93.9	0.4	1.9	100	283.9	9.8	2.8	NAT	0.14
441+70	24	CMP OR RCP	FE	10	12.0	1.9	0.3	100	43.1	5.8	0.1	NAT	0.04
446+92	30	CMP OR RCP	FE	10	30.0	3.1	0.7	100	99.9	12.7	1.0	NAT	0.06
454+82	30	CMP OR RCP	FE	10	30.4	3.1	0.8	100	99.2	12.6	1.2	IRR	0.06
600+36	60	CMP OR RCP	FE	10	140.9	5.3	1.8	100	412.1	16.6	2.8	NAT	0.09

(1) STRUCTURE TYPE KEY

RCB - REINFORCED CONCRETE BOX  
 CMP - CORRUGATED METAL PIPE  
 CMPA - CORRUGATED METAL PIPE ARCH  
 RCPA - REINFORCED CONCRETE PIPE ARCH  
 ECP - ELLIPTICAL CONCRETE PIPE  
 RCP - REINFORCED CONCRETE PIPE

(2) INLET TYPE KEY

FE - FLARED END  
 BEV - BEVELED END  
 IM - IMPROVED END

(3) DRAINAGE TYPE KEY

IRR - IRRIGATION  
 NAT - NATURAL  
 UR - URBAN

### EXHIBIT 41