

From: Robert.Ellis@rcgov.org  
To: Centrline@aol.com  
CC: mayor@rcgov.org, Dale.Tech@rcgov.org, Ron.Kroeger@rcgov.org  
Sent: **4/19/2011 3:37:17 P.M. Mountain Daylight Time**  
Subj: Misc

Ski,

The attached map shows the location of our monitoring wells and leachate pumping wells. **As for the detention cell construction, the Landfill can construct the portion on City property.**

Robert Ellis, PE

Public Works Director

300 6th Street

Rapid City, SD 57701

(605) 394-4154



# CITY OF RAPID CITY

RAPID CITY, SOUTH DAKOTA 57701

## Public Works Department

300 Sixth Street

Telephone: (605) 394-4165 FAX: (605) 355-3083

Web: [www.rcgov.org](http://www.rcgov.org)

December 6, 2013

Kostaneski  
Lawrence ~~Konstaneski~~, PE  
Centerline  
2040 West Main Street  
Rapid City, SD 57701

RE: Detention Pond MP 203

Kostaneski  
Dear Mr. ~~Konstaneski~~:

I wanted to provide you with written confirmation on the proposed schedule for the design and construction of the MP 203 metering pond detailed in the South Truck Route Drainage Basin Plan. The City will proceed with the design of the metering pond in January of 2014. The intent would be to have the design completed and construction estimates available by the Summer of 2014. We will then program the construction of the metering pond to occur in 2015. I appreciate you and your client's patience as we work through the funding issues associated with this project. If you have any other questions or concerns please let me know.

Respectfully

Terry Wolterstorff, PE  
Public Works Director



EQUAL OPPORTUNITY EMPLOYER

Request for City Metering Pond Status  
MP203 South Truck Route Drainage Basin Plan  
3/18/2011

**DRAINAGE BASIN DESIGN PLAN**

**FOR**

**SOUTH TRUCK ROUTE DRAINAGE BASIN**

October 29, 2003

**SEE Optional Routing Addendum  
Element 13 to 102**

PREPARED FOR:

**CITY OF RAPID CITY**

**RAPID CITY, SOUTH DAKOTA**



**FMG. INC.** 3700 Sturgis Road, Rapid City, South Dakota 57702-0317 605/342-4105  
FAX 605/342-4222



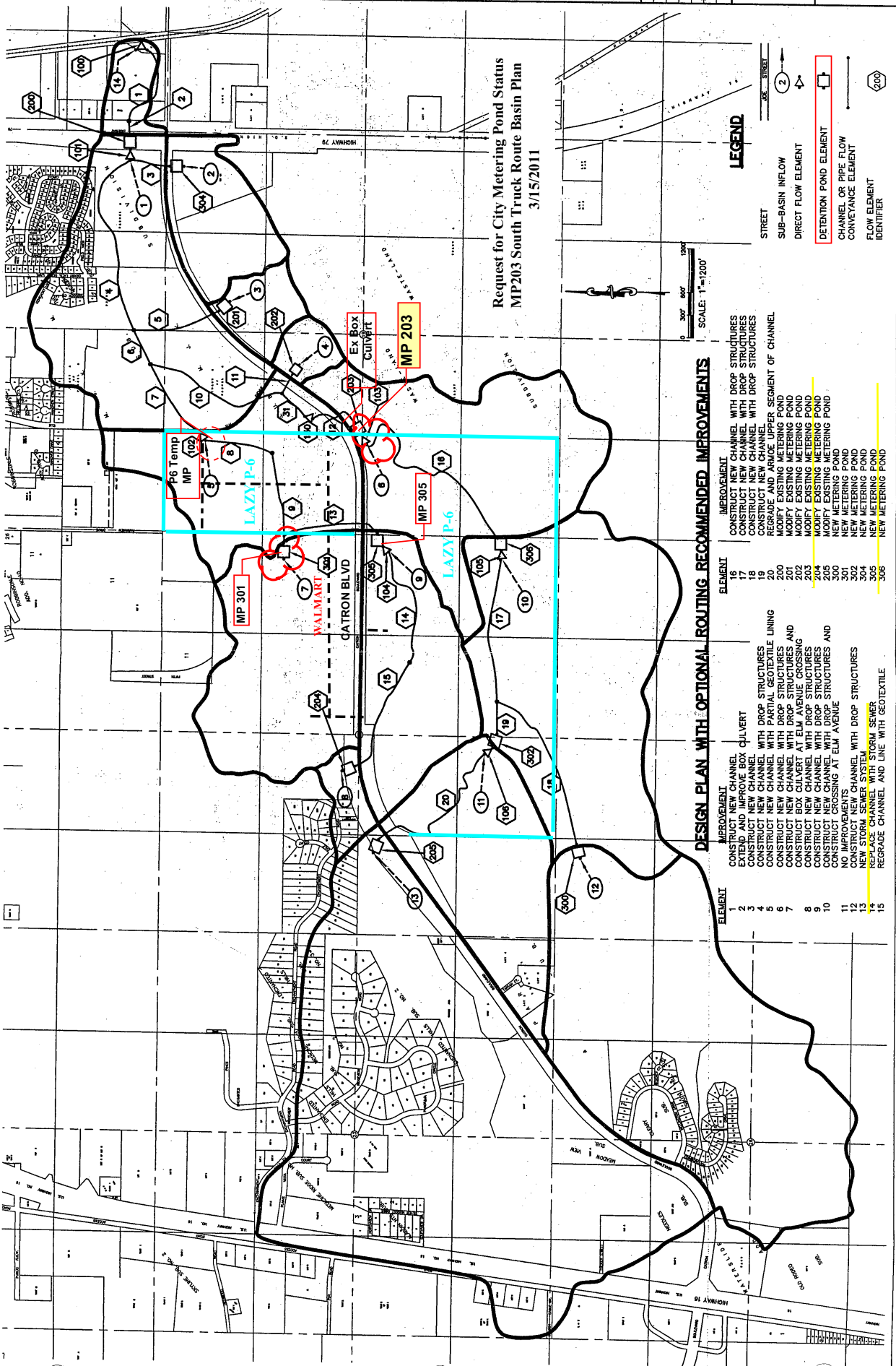
Project: SOUTH TRUCK ROUTE  
 Location: SOUTH TRUCK ROUTE  
 Design: J. M. GARDNER  
 Checked: J. M. GARDNER  
 Date: 3/15/2011

OCTOBER, 2008

**SOUTH TRUCK ROUTE**  
 DRAINAGE BASIN DESIGN PLAN  
 RAPID CITY, SOUTH DAKOTA

Revision / Date  
 Sheet Name  
**DESIGN PLAN WITH OPTIONAL ROUTING SCHEMATIC**

Figure Number:  
**F1**



Request for City Metering Pond Status  
 MP203 South Truck Route Basin Plan  
 3/15/2011

**LEGEND**

- STREET
- SUB-BASIN INFLOW
- DIRECT FLOW ELEMENT
- RETENTION POND ELEMENT
- CHANNEL OR PIPE FLOW CONVEYANCE ELEMENT
- FLOW ELEMENT IDENTIFIER

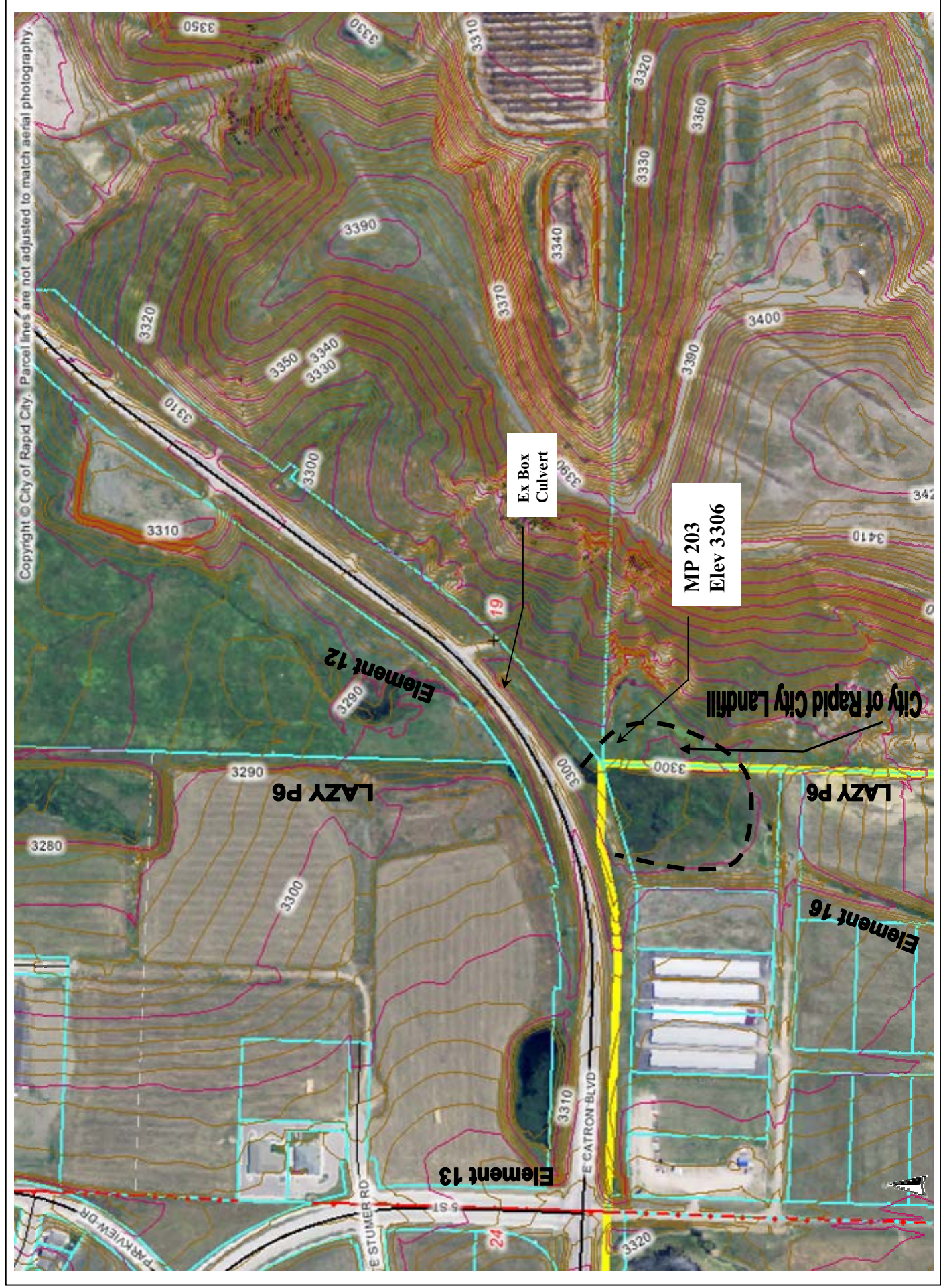
**DESIGN PLAN WITH OPTIONAL ROUTING RECOMMENDED IMPROVEMENTS**

ELEMENT	IMPROVEMENT	ELEMENT	IMPROVEMENT
1	CONSTRUCT NEW CHANNEL	16	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES
2	CONSTRUCT NEW CHANNEL	17	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES
3	CONSTRUCT NEW CHANNEL	18	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES
4	CONSTRUCT NEW CHANNEL WITH PARTIAL GEOTEXTILE LINING	19	CONSTRUCT NEW CHANNEL
5	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES	20	MODIFY EXISTING METERING POND
6	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES	21	MODIFY EXISTING METERING POND
7	CONSTRUCT BOX CULVERT WITH DRAINAGE CURB AND GUTTER	22	MODIFY EXISTING METERING POND
8	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES	23	MODIFY EXISTING METERING POND
9	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES	24	MODIFY EXISTING METERING POND
10	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES AND IMPROVEMENTS	25	MODIFY EXISTING METERING POND
11	NO IMPROVEMENTS	26	NEW METERING POND
12	CONSTRUCT NEW CHANNEL WITH DROP STRUCTURES	301	NEW METERING POND
13	NEW STORM SEWER SYSTEM	302	NEW METERING POND
14	REPLACE CHANNEL WITH STORM SEWER	303	NEW METERING POND
15	REGRADE CHANNEL AND LINE WITH GEOTEXTILE	304	NEW METERING POND
		305	NEW METERING POND
		306	NEW METERING POND

SCALE: 1"=1200'



Request for City Metering Pond Status  
MP203 South Truck Route Drainage Basin Plan  
3/18/2011



## ELEMENTS 10, 12, and 31

Elements 10, 12, and 31 are existing open channels beginning at Element 6 and ending at the Element 203. The existing channels are steep and poorly defined for all but low flows. Flows that would exceed the capacity of the defined channel will spill into a broad floodplain area.

Improved channels are recommended. The Design Plan route generally follows the route of the primary existing channels.

Routed flow in Element 10 is 677 cfs. It is recommended that the design discharge at the lower end of element 10 be increased to about 750 cfs to account for a certain amount of inflow from sub-basin 1. The recommended Element 10 channel has a 20' bottom, 4:1 side slopes, n value of 0.045, and an invert slope of 0.007 ft/ft. Normal depth is about 3.9 feet and velocity is 5.3 fps.

Routed flow in Element 12 is 672 cfs. This is the flow used for channel design since only insignificant flows from the adjacent sub-basins would enter the channel. The recommended Element 12 channel has a 20' bottom, 4:1 side slopes, n value of 0.045, and an invert slope of 0.007 ft/ft. Normal depth is about 3.7 feet and velocity is 5.2 fps.

Routed flow in Element 31 is 672 cfs. This is the flow used for channel design since only insignificant flows from the adjacent sub-basins would enter the channel. The recommended Element 31 channel has a 20' bottom, 4:1 side slopes, n value of 0.045, and an invert slope of 0.007 ft/ft. Normal depth is about 3.7 feet and velocity is 5.2 fps.

It is recommended that the existing stock dam at the upstream end of Element 31 be removed. Under existing conditions the stock dam will overflow to the west and east creating a split flow situation as shown on the Existing Routing Schematic. It was judged appropriate to eliminate this split flow as part of the overall improvement recommendations in the area. Portions of the split flow would spread over wide areas and would also split over a ridge and enter the Element 8 and 13 areas. Based on discussions with City staff it is recommended that the flow split be eliminated and all flows confined to a single defined channel system when the area is developed. Elimination of the flow split results in Elements 10 and 31, including the Elm Avenue crossing, being larger than would be required with the flow split.

Drop structures will be required to flatten the channel grades. The drop structures can be at various locations such as the inlet to the Elm Avenue crossing, at the outlet of the box culvert under South Truck Route, or along the channel as required.

Elements 10, 12, and 31 were UDSWM95 modeled with the above data. The n value was increased by 25% for modeling as suggested in the User manual.

The existing channel system crosses through the future intersection of Elm Avenue and the Rearage Road. Elm Avenue is currently defined as an Arterial Street; therefore, the crossing needs to pass the 100 year flow with no overtopping. The crossing is near the upstream end of Element 10 thus 677 cfs was used for the 100 year flow at the crossing. Twin 78" RCP culverts are proposed for this crossing. Final design of the crossing will depend upon final road and channel grades.

Other channel locations may be possible depending upon future development plans for the area. It was beyond the scope of this report to determine revised locations for the channel.

#### ELEMENT 11

Element 11 is an existing 24" RCP under the South Truck Bypass. No improvements are necessary except for entrance modifications discussed under Element 202.

Element 11 was UDSWM95 modeled as a 36" RCP because of the increased n value required for UDSWM95. Peak routed flow is 8 cfs.

#### ELEMENT 12

Element 12 is described under ELEMENTS 10, 12 AND 31.

#### ELEMENT 13

Element 13 is an existing open channel beginning at Element 8 and ending at Element 305. The existing channel is "steep" and will likely be subject to erosion. An improved channel is recommended to flatten grades and to better allow for development in the area. The Design Plan route generally follows the route of the existing channels.

Routed flow in the channel is 207 cfs. A certain amount of additional localized flow will also enter the channel from sub-basin 5. It will be necessary to determine the added flows when final development is proposed. A design discharge of 250 cfs was assumed for the purpose of preliminary channel size recommendations.

The recommended channel has an 8' bottom, 4:1 side slopes, n value of 0.045, and an invert slope of 0.0075 ft/ft. Normal depth using 250 cfs is about 3.0 feet and velocity is 4.2 fps.

Elements 13 was UDSWM95 modeled with the above data. The n value was increased by 25% for modeling as suggested in the User manual.

Drop structures will be required to flatten grade. The drop structures can be at various locations such as the outlet from the existing pipe system under South Truck Route, at the Rearage Road, or along the channel as required.

## ELEMENT 15

Element 15 is an existing open channel beginning at Element 14 and ending at metering pond Element 204. Improvements to the existing channel are recommended.

Discharge to the channel from Element 204 is 13 cfs. Based on a review of existing topography it is assumed additional flows will enter the channel from the upper reaches of sub-basin 9. These flows are not expected to be significant in size and a design discharge of 75 cfs was assumed for the purpose of preliminary channel size recommendations. It will be necessary to determine final design flow when development is proposed.

The existing channel is "steep" and varies in cross section. It is recommended the channel be reshaped to a trapezoidal section and lined with a permanent geotextile. The recommended channel has an 8' bottom, 4:1 side slopes, n value of 0.035. The invert slope will vary and has been averaged at 0.044 ft/ft for modeling. Normal depth is about 0.9 feet and velocity is 7 fps. Velocity is within allowable parameters; however, lining is recommended because of the "steep" grade and Froude Number of 1.5.

Element 15 was UDSWM95 modeled with the above data. The n value was increased by 25% for modeling as suggested in the User manual.

## ELEMENT 16

Element 16 is an existing open channel beginning at Element 103 and ending at Element 306. The existing defined channel system has capacity for low flows only and high flows will spread out over large areas. The channel is steep and will be subject to erosion. An improved channel is recommended to flatten grades and to better allow for development in the area.

Discharge into the channel from Element 306 is 635 cfs. The channel will also intercept a significant amount of flow from sub-basin 6. The preliminary design discharge for the channel is 882 cfs as determined at Element 103 under the assumption that all of sub-basin 6 is drained to the channel.

The recommended channel has a 25' bottom, 4:1 side slopes, n value of 0.045, and an invert slope of 0.008 ft/ft. Normal depth is about 3.8 feet and velocity is 5.8 fps.

Drop structures will be required to adjust grade. Potential locations for drop structures are at the outlet from the metering pond at Element 306, in the channel as required, or by using a rundown chute in the metering dam at Element 203.



Pond flow line is at elevation 3296.4. The existing overflow into the South Truck Route ditch is at about elevation 3303.5.

Peak inflow is 49 cfs and peak outflow is 8 cfs. The 100 year water elevation is calculated at about elevation 3301.5 with 1.9 acre feet of storage.

Stage/storage/discharge data for Element 202 is given below. The discharge curve assumes no overflow below elevation 3304.

STAGE/STORAGE/DISCHARGE DATA – ELEMENT 202

ELEVATION	STORAGE (AC-FT)	DISCHARGE (CFS)
3296.4	0	0
3298	0.2	4
3300	0.7	7
3302	2.7	9
3304	4.2	10

### ELEMENT 203

Element 203 is an existing metering pond area created by the South Truck Route. Improvements are recommended.

The existing metering dam area is limited in capacity due to freeboard requirements at the existing roadway. Overtopping characteristics are poor and development is expected in areas where overflow would occur. Consequently it was judged reasonable to assume that a minimum of 2 to 3 feet of freeboard should be provided at the highway. Two feet of freeboard resulted in only about 24 acre-feet of storage being available. It was not possible to grade for measurable extra storage since existing storage at roadway overflow is about 45 acre-feet which approaches South Dakota limits for Small Dams.

Due to the above limitations it is recommended that a new embankment be constructed about 300 feet upstream of the existing roadway crossing. This will create a new metering dam with more volume. The dam embankment will be between the South Truck Route embankment and natural high ground to the south. A certain amount of pool excavation is also required.

Top of dam is proposed at elevation 3306.0, a spillway is proposed at elevation 3302.0, and pond flow line is at elevation 3294.0.

The outlet system is staged. The proposed outlet is a 78" RCP with riser box for low flow control. The riser will have a 48" diameter orifice for low flow control at flow line elevation 3294.0. Top of riser box is proposed at elevation 3330.0. The riser needs to be of adequate size such that the 78" RCP acts as control for higher flows rather than the riser overflow weir. A 20' overflow spillway through the embankment is also required at elevation 3302.0 for control of 100 year flows.

Peak inflow is 882 cfs and peak outflow is 672 cfs. The 100 year water elevation is calculated at about elevation 3305.0 with 34.1 acre feet of storage. The South Truck Route is at about elevation 3308 at this location.

Approximately one foot of freeboard has been provided between the calculated highwater elevation and top of embankment. About 13 acre feet of additional storage is available in the freeboard area. The dam could be raised for additional freeboard but this would create a Small Dam as regulated by the State of South Dakota.

Stage/storage/discharge data for Element 203 is given below.

STAGE/STORAGE/DISCHARGE DATA – ELEMENT 203

ELEVATION	STORAGE (AC-FT)	DISCHARGE (CFS)
3294	0	0
3296	1.0	18
3298	4.0	65
3299	7.0	92
3300	10.0	115
3302	18.0	305
3303	23.0	420
3304	30.0	570
3305	37.0	745
3306	47.0	950

It is necessary to improve the existing 8' x 8' box culvert under the South Truck Route in order to provide freeboard against roadway overtopping and so backwater from the box culvert does not influence discharge from new Pond 203. The box culvert should be improved by constructing a side tapered entrance. Preliminary calculations indicate a water elevation of about 3301.0 for 672 cfs with an improved side tapered box culvert inlet. This is about 3 feet below top of roadway, about 2 foot below the roadway ditch overflow elevation, and is below the Pond 203 overflow weir elevation. A minor amount of unaccounted for detention storage will be created by the area between the South Truck Route box culvert and the Element 203 embankment.