Memorandum

To: Programs, Projects, and Operations Subcommittee

Re: Urban Conservation Assistance Program – Eastern Nebraska Veterans Home

Date: August 2, 2010

From: Lori Ann Laster, Stormwater Management Engineer

The City of Bellevue has submitted an application for the Urban Conservation Assistance Program to address erosion issues at the Eastern Nebraska Veterans’ Home. The site was constructed in 2007 without stormwater best management practices (BMPs). As a result, stormwater is allowed to run off approximately seven acres of impervious area into Quail Creek.

While planning for a Veterans’ Memorial Garden, erosion issues were identified. Before the memorial can be constructed, the drainage issues must be resolved. The City is proposing to install ten bioretention gardens and two bioswales to allow water to infiltrate rather than drain overland to Quail Creek.

At this time, only seven of the proposed twelve BMPs will be constructed. The cost estimate for the BMPs is $58,354. The City is requesting a cost share of $29,177.

- Management recommends that the Subcommittee recommend to the Board that the District approve the City of Bellevue application for the Eastern Nebraska Veterans’ Home in the amount of $29,177 for District Program 17.0 Urban Conservation Assistance Program, subject to inclusion in the Fiscal Year 2011 budget.
URBAN CONSERVATION ASSISTANCE PROGRAM

SPECIAL PROJECT REQUEST APPLICATION

1. DATE: __07-27-2010______________

2. PROJECT NAME ______Eastern Nebraska Veteran’s Home BMP’s___________

3. PROJECT SPONSOR: ______City of Bellevue, Nebraska____________________
   ADDRESS: ______210 West Mission Ave.______________________________
   ______Bellevue, NE 68005_______________________________

4. CONTACT PERSON: ______Phil Davidson______________________________
   TITLE: ______Special Projects________________________

5. TELEPHONE: ______(402)293-3052______________________________

6. PROJECT LOCATION: The Eastern Nebraska Veterans Home is located on 20 acres off of 40th Street and Capehart Road in Bellevue, Nebraska.

7. DESCRIPTION OF PROBLEM: The City of Bellevue and Sarpy County are very excited to have the veteran’s home in the military community of Bellevue. It has always been the intent to make this Home a beautiful place to live and visit. A Veteran’s Memorial Garden was always envisioned for our new Eastern Nebraska Veterans Home in Bellevue.

State and federal money are not available for this project so a coalition of volunteer Veteran’s and Leadership Sarpy participants began the process of fund raising and designing the memorial. Joining them are the City of Bellevue, Green Bellevue, Master Gardeners, CM’s Custom Landscape and Big Muddy Workshop. During the planning phase, landscape drainage problems were identified. In order to create the memorial, remedial drainage engineering is necessary. Such work presents both an additional financial challenge and an opportunity for a retrofit demonstration project along Quail Creek.

8. PROPOSED SOLUTION:
   See attachment “A”
Eastern Nebraska Veterans’ Home

BMP Concept Design Summary

Multiple community interests have proposed a number of site improvements for the Veterans’ Home including a courtyard plaza and other landscape improvements. Best management practices (BMPs), namely bioretention gardens, were suggested by interested community and Veteran’s Home administration members to correct some drainage problems and manage stormwater on the site. The following is a summary of Big Muddy Workshop’s preliminary analysis for retrofitting the site with BMPs.

The current site includes approximately 7.30 acres of impervious surfaces. The building roof accounts for 2.80 acres of imperviousness. These impervious surfaces prevent rain falling on this area from infiltrating into the soil to replenish local groundwater. The soil on the site consists of clay which has been severely compacted from the construction of the building. Poor soil quality also reduces the ability for rain to infiltrate. Both impervious surfaces and poor soil quality have lead to increased surface runoff and significant erosion problems within the site.

The site would benefit from BMP retrofits that would reduce the volume of surface runoff, increase rainfall infiltration, and beautify the site. The city owns much of the adjacent property and has a vested interest in the beautification and stabilization of the site. The receiving stream, Quail Creek, has been impacted by the increased volume of stormwater as can be observed from visual assessment.

A total of twelve BMP retrofits have been proposed to mitigate the stormwater issues, ten bioretention gardens and two bioswales. The retrofits are numbered on the accompanying drawing in order of importance relative to the benefits received as a result of their construction. They should be implemented in this order if the project requires phasing.

The design and makeup of each bioretention area is slightly different due to varying size of incoming drainage areas and type of outgoing drainage relief. The design variables include the amended soil depth, the ponding depth and outlet type. The amended soil depth was determined by the outgoing drainage relief. Bioretention gardens that utilize infiltration as a sole means of discharging water will have a 30 inch amended soil depth. All other bioretention gardens are equipped with a subdrain pipe and outlet that daylight. These gardens have an 18 inch amended soil depth. The ponding depths are also slightly different depending on the condition of the surface water overflow. Bioretention gardens that only include a surface overflow outlet have a 6 inch ponding depth while all other bioretention gardens equipped with an underdrain system have a deeper ponding depth of 9 inches.

Due to the low soil infiltration rates, additional precautions have to be made to insure that the gardens won’t hold water over 36 hours. Five bioretention gardens have a subdrain pipe system. Five bioretention gardens use a gravel sump system that is five feet deep to penetrate the compacted soil layers, allow vertical and lateral water movement of water for infiltration.
and to provide temporary storage of water. An inspection port will be provided in each sump to allow the owner to monitor the infiltration rate of each sump and to allow water to be pumped out of the sump during times of extremely wet weather. Bioretention gardens utilizing a subdrain pipe system are referred to in associated documents as ‘Type A’ and gardens utilizing a sump system are referred to as ‘Type B’.

The bioswales direct stormwater to the bioretention gardens at their terminus while both cleaning and slowing the water within the swale. As the stormwater slows, silt and other pollutants are taken up or broken down by the plant material and other microbiota in the amended soil. The swales include six inches of amended soil roto-tilled into the natural soil to create a more favorable soil environment for the plantings and provide a small level of water storage and infiltration.

The amended soils are an even mix of sand and compost which provides a rich and nurturing media for perennials to thrive. Native perennials which include native grasses and wildflowers provide deep root penetration which after time increases the percolation rate of the soil. When the bioretention gardens are saturated, the plantings also provide transpiration. A two-inch layer of mulch on top of the amended soil enables the amended soil to retain moisture between rain events.

Although retrofits are less effective as if they were implemented in the original design, the proposed bioretention and bioswales offer effective mitigation to the surface runoff from 15% of the impervious surfaces on the site. The retrofits are sized to hold the first 1.5 inches of rainfall volume created in their respective drainage areas. This volume is the estimated depth required to contain approximately 95% of all storms that occur at the site. The proposed retrofits would greatly enhance the site aesthetically while helping to decreased stormwater runoff and prevent erosion problems.
LEGEND

--- DRAINAGE AREA

Bioretention Garden

Enhanced Swale

Brick Pavers

Eastern Nebraska Veterans' Home

BMP Concept Design Plan
Bellevue, Nebraska

SCALE: 1" = 150'-0"
Legend

- DRAINAGE AREA
- BIORETENTION GARDEN
- ENHANCED SWALE
- BRICK PAVERS

Eastern Nebraska Veterans' Home

BMP Concept Design Plan
Bellevue, Nebraska
### Opinion of Probable Construction Costs
Prepared by Big Muddy Workshop and CM's Custom Lawn and Landscape

#### Eastern Nebraska Veteran's Home – BMP Concept Design
Bellevue, Nebraska

<table>
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<tr>
<th>Description</th>
<th>Cost</th>
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<td>Bioretention Garden and Bioswale #3</td>
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<td>Bioretention Garden #10</td>
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**TOTAL** $58,354
# Opinion of Probable Construction Costs

Eastern Nebraska Veterans' Home - BMP Concept Design
Bellvue, Nebraska
Design Firm: Big Mudly Workshop, Inc
June 29, 2016
Project Number: 40591
File name: Cost_Opinion_6-29-10.xls

## Bioretention Garden #1 - Type 'B' - 250 SqFt

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<th>Item Description</th>
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## Bioretention Garden and Bioswale #2 - Type 'A' - 1450 SqFt

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<td>Intake riser</td>
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<td>$720</td>
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<td>4&quot; outlet</td>
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<td>$150.00</td>
<td>$150</td>
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<tr>
<td>4&quot; rainguard</td>
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<tr>
<td>Intake riser</td>
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## Subtotal Construction Costs

20% Project Contingency: $1,281
12% Design Fee: $629
**Total: $13,130**
Opinion of Probable Construction Costs

Eastern Nebraska Veterans' Home - BMP Concept Design
Bellevue, Nebraska

Design Firm: Big Muddy Workshop, Inc
June 29, 2010
Project Number: 10590
Filename: Cost Opinion_6-29-10.xls

Bioretention Garden #8 - Type "A" - 135 SF

Grading/Excavation
8 CY $10.00 $80
Load, haul excess soil offsite
8 CY $15.00 $120
4" underdrain pipe w/ aggregate
80 LF $0.80 $64
4" outlet
1 EA $150.00 $150
4" retrofit
1 EA $25.00 $25
Intake riser
1 EA $450.00 $450
Import and place amended soil mix and finish grade
8 CY $60.00 $480
Metal edging
25 LF $7.00 $175
Native grasses and wildflowers - quart size
60 EA $5.00 $300
Shredded wood mulch
2 CY $35.00 $70
$2,490

20% Project Contingency $498
12% Design Fee $299

Subtotal Construction Costs $3,387

Bioretention Garden #9 - Type "A" - 120 SF

Grading/Excavation
8 CY $10.00 $80
Load, haul excess soil offsite
8 CY $15.00 $120
4" underdrain pipe w/ aggregate
80 LF $6.00 $640
4" outlet
1 EA $150.00 $150
4" retrofit
1 EA $25.00 $25
Intake riser
1 EA $450.00 $450
Import and amend topsoil
8 CY $45.00 $360
Place amended soil mix & finish grade
8 CY $20.00 $160
Metal edging
25 LF $7.00 $175
Native grasses and wildflowers - quart size
60 EA $4.50 $270
Shredded wood mulch
2 CY $35.00 $70
$2,500

20% Project Contingency $500
12% Design Fee $300

Subtotal Construction Costs $3,300

Bioretention Garden #10 - Type "B" - 160 SF

Grading/Excavation
10 CY $10.00 $100
Load, haul excess soil offsite
10 CY $15.00 $150
Gravel sump - 16" dia. - 5' depth
1 EA $150.00 $150
Inspection port in sump
1 EA $75.00 $75
Import and amend topsoil
10 CY $45.00 $450
Place amended soil mix & finish grade
10 CY $20.00 $200
Metal edging
50 LF $7.00 $350
Native grasses and wildflowers - quart size
200 EA $4.50 $900
Shredded wood mulch
4 CY $35.00 $140
$2,565

20% Project Contingency $513
12% Design Fee $310

Subtotal Construction Costs $3,412

ITEM DESCRIPTION
Drainage improvements near Garage

Remove vegetation
1 Allow $100.00 $100
Fine grading - create swale & drain grade
3 CY $30.00 $90
Load, haul excess soil offsite
3 CY $15.00 $45
Geotextile fabric under pea gravel and river rock
45 SF $2.00 $90
Pea gravel - 275 sf
5 CY $125.00 $625
River rock - 59 linear feet
3 CY $20.00 $60
Trench drain - 5' length
1 EA $375.00 $375
$1,506

20% Project Contingency $301
12% Design Fee $181

Subtotal Construction Costs $1,988

Total Costs $100,342.50
9. TOTAL ESTIMATED COST: $58,354

10. COST SHARE REQUESTED: $29,177

11. SIGNATURE/TITLE: [Signature] Special Projects Cord