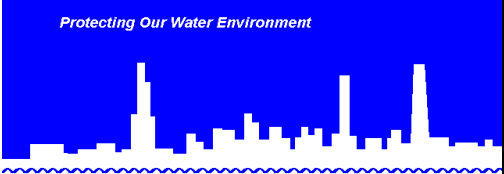


Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago
Calumet Union Drainage Ditch Alternatives
Markham, IL

November 7, 2011



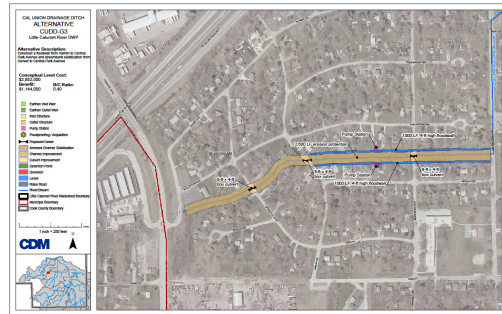
- LITTLE CALUMET RIVER DETAILED WATERSHED PLAN**
- *Project CUDD G-3 identified in the watershed plan at a conceptual level*
 - *Watershed Plan Conceptual Alternatives:*
 - *Created with information available during watershed plan development*
 - *Limited survey and data collected*
 - *No geotechnical information*

- PRELIMINARY ENGINEERING**
- *Thorough investigation of the problem area, the conceptual alternative, and identification of other alternatives*
 - *Extensive survey and data collection*
 - *In depth analysis of hydrologic and hydraulic modeling; updating the models where necessary*
 - *Geotechnical investigation*
 - *Alternative analysis*

KEY FEASIBILITY CONSIDERATIONS

- **Project's cost relative to its benefits**
- **Permitability:**
 - **Army Corps of Engineers**
 - » **Strong preference for natural channel design**
 - » **Requires alternative analysis to allow for structural measures**

CONCEPTUAL FLOODWALL ALTERNATIVE



CONCEPTUAL FLOODWALL ALTERNATIVE

- **Proposed 4 ft high floodwall along both banks from Hamlin Ave to Central Park Ave**
- **DWP Cost = \$2.9M (did not include Central Park Avenue culvert replacement)**
- **DWP Benefits = \$1.144M**
- **DWP B/C Ratio = 0.40**
- **Preliminary engineering concluded:**
 - **4 ft floodwall not high enough**
 - **Central Park Avenue culvert not large enough to convey flow (true for all alternatives)**

REVISED CONCEPTUAL FLOODWALL ALTERNATIVE

- **Increase floodwall height to 11 Ft**
 - **Safety issues**
 - **Aesthetics**
- **Construction Cost Estimate = \$7M**
- **B/C Ratio = 0.16**
- **If allowed by Army Corps, mitigation fees likely required**

CONCRETE LINED CHANNEL ALTERNATIVE

- **Estimated Construction Cost = \$4.32M**
- **Streambank Stabilization from Sunset to Hamlin**
 - **Bio-engineered stabilization**
 - **Rock vanes to redirect flow away from the banks to the waterway center**
 - **Geolifts to stabilize eroded banks in steep areas**
 - **Reuse of existing riprap for additional protection**

CONCRETE LINED CHANNEL ALTERNATIVE

- **Flood Control east of Hamlin**
 - **800 LF concrete lined channel terminating at Central Park Ave.**
 - **Includes Central Park Ave culvert expansion**
- **Potential permitting difficulty for concrete lined portion. If approved, mitigation fees likely required.**

OTHER ALTERNATIVES

- **Encapsulation:**
 - Enclose CUDD in underground pipes, increase size of Central Park Ave culvert
 - Cost = \$8.35M
 - Permitting agencies discourage encapsulation in most cases; if approved, mitigation fees likely required.
- **Buy Out:**
 - Buy out properties affected by flooding,
 - 2011 Market Value = \$3.6M
 - Additional costs incurred for demolition and regrading of property

NATURAL CHANNEL DESIGN

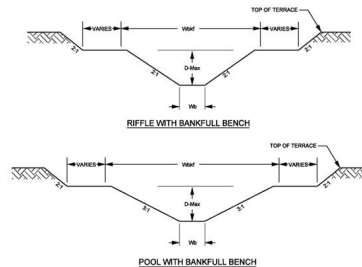


BIOENGINEERED ALTERNATIVES

- **Bioengineered Stormwater Alternatives:**
 - Utilizing sustainable measures and practices to address identified stormwater problems.
 - Bioengineering can be used to address streambank erosion and flood control issues:
 - Use vegetation, geolifts and gradual slopes to stabilize streambanks.
 - Implement natural in-stream features to redirect flow away from banks toward ditch center.
 - Add flood benching for additional storage during high flow events.

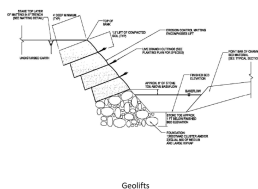
NATURAL CHANNEL DESIGN

TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS

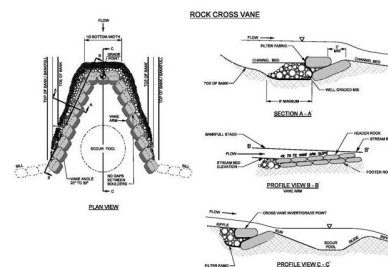


NATURAL CHANNEL DESIGN

Bio-engineering Approaches



NATURAL CHANNEL DESIGN



NATURAL CHANNEL DESIGN EXAMPLES



A streambank erosion site prior to project.



After project implementation during vegetation establishment period.

NATURAL CHANNEL DESIGN EXAMPLES



Steep streambank slopes eroding back toward residential structures.



Gentle slopes with vegetation protect streambanks from further erosion.

NATURAL CHANNEL DESIGN EXAMPLES



Erosion causing unstable banks.



Natural Channel Design creates stable slopes and stream conditions.

NATURAL CHANNEL DESIGN EXAMPLES



Rock cross vane installation on Muddy Creek.

NATURAL CHANNEL ALTERNATIVE

- **Cost is \$2.97 Million**
- **Enlargement of Central Park Ave culvert.**
- **Stabilizes banks & increases channel width to keep flow within banks.**

NATURAL CHANNEL ALTERNATIVE

- **Use bioengineering methods from Sunset Ave. to Central Park Ave.**
 - **Gentle slopes, woody plants and other vegetation to stabilize banks.**
 - **Geolifts where steeper slopes are necessary.**
 - **Rock/cross vanes reduce energy and erosion.**
 - **Flood benching to provide storage.**

NATURAL CHANNEL ALTERNATIVE

■ **Pros:**

- *Most favorable alternative from permitting perspective*
- *Stabilizes banks threatened by erosion*
- *Elimination of overbank flooding for the 100-year event along the reach*
- *Minimal maintenance after establishment period (3-5 years)*
- *Minimal to no mitigation fees required.*

NATURAL CHANNEL ALTERNATIVE

■ **Cons:**

- *Gentle slopes require layback on to private property.*
 - » *Property lines go to centerline of CUDD*
- *Existing CUDD easement approximately 15 FT in both directions from ditch centerline.*
- *MWRD permanent easements would vary up to 75 LF in either direction from CUDD easement.*
- *2-3 year establishment period for vegetation*

NATURAL CHANNEL DESIGN

Proposed Alternative: Sunset Ave to Springfield Ave



Legend
 - - - - - CUDD MWRD Permanent Easement
 - - - - - Existing CUDD Easement
 - - - - - CUDD Metcalf

NATURAL CHANNEL DESIGN

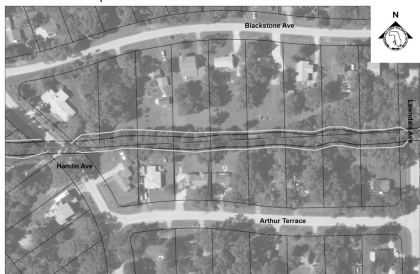
Proposed Alternative: Springfield Ave to Hamlin Ave



Legend
 - - - - - CUDD MWRD Permanent Easement
 - - - - - Existing CUDD Easement
 - - - - - CUDD Metcalf

NATURAL CHANNEL DESIGN

Proposed Alternative: Hamlin Ave to Lawndale Ave



Legend
 - - - - - CUDD MWRD Permanent Easement
 - - - - - Existing CUDD Easement
 - - - - - CUDD Metcalf

NATURAL CHANNEL DESIGN

Proposed Alternative: Lawndale Ave to Central Park Ave



Legend
 - - - - - CUDD MWRD Permanent Easement
 - - - - - Existing CUDD Easement
 - - - - - CUDD Metcalf

ALTERNATIVES CONSIDERED

ALTERNATIVE	COST*
11 FT Floodwall	\$7.0M
Concrete Lined Channel	\$4.32M
Encapsulation	\$8.35M
Buyout	\$3.6M+
Natural Channel Design	\$2.97M

*Note: Costs do not include mitigation fees.