State of Michigan
Department of Environmental Quality

Water Resources Division
27700 Donald Court
Warren, MI 48092-2793
586-753-3700

File Number 11-63-0127-P

Date: August 5, 2011

PUBLIC NOTICE

The Clinton River Watershed Council, Attn: Anne Vaara, 1115 West Avon Road, Rochester Hills, Michigan 48309, has applied to this office for a permit under authority of Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The applicant proposes to remove the dam on Paint Creek and dredge and fill in the creek and adjacent 100-year-floodplain for the purpose of improving aquatic and riparian habitat. The project encompasses approximately 4,250 linear feet of stream channel and is located west of Orion Road between Gallagher and Gunn Roads. A total of approximately 290 cubic yards of material will be dredged during structure removal, sediment trap and grade control installation. Approximately 150 cubic yards of gravel will be dredged from 600 linear feet of stream for future site improvements. A total of approximately 280 cubic yards of material will be used to construct the grade control structures. A pipe, 18 inches in diameter, will divert water to the dam mill race channel. Approximately 1,200 cubic yards of cut is proposed in the floodplain with the removal of the dam's earthen berm. Spoils will remain onsite. Approximately 1 acre of wetland may be partially drained due to structure removal. The project is located in T4N, R11E, Section 28, Oakland Charter Township, Oakland County, Michigan, in accordance with plans attached to this notice.

THIS NOTICE IS NOT A PERMIT

The proposed project may also be regulated by one or more additional parts of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) that are administered by the Water Resources Division (WRD). The requirements of applicable parts are considered in determining if it is in the public interest to issue a permit.

When a permit application is received requesting authorization to work in or over the inland waters of the State of Michigan, pursuant to Part 301, Inland Lakes and Streams, of the NREPA, the NREPA provides that the department submit copies for review to the department of public health, the city, village or township, and the county where the project is to be located, the local soil conservation district, any local watershed council organized under Part 311, Local River Management, and the local port commission. Additional notification is provided to certain persons as required by statute or determined by the department.

Those persons wanting to make comments on the proposed project shall furnish this office with their written comments no later than 20 days from the date of this notice. Written comments will be made part of the record and should reference the above file number. Objections must be factual, specific, and fully describe the reasons upon which any objection is founded. Unless a written request is filed with the department within the 20-day public comment period, the department may make a decision on the application without a public hearing. The determination as to whether a permit will be issued or a public hearing held will be based on evaluation of all relevant factors defined in Sections 30106 and 30311, or permit criteria defined by other appropriate parts of the NREPA. These Sections address the effect of the proposed work on the public trust or interest including navigation, fish, wildlife, and water quality among other criteria. Public comments received will also be considered.

This application will be reviewed by federal agencies in accordance with an agreement with the U.S. Environmental Protection Agency, under provisions of Section 404 of the Federal Clean Water Act Amendments of 1977.

cc: Clinton River Watershed Council, applicant
DNR, Wildlife, Southfield
Oakland County Clerk
Oakland County Drain Commission
History Division
see file for adjacent property owners
DEQ, WRD, 404 Coordinator
USEPA
DEQ, WRD, Warren, M. Foose
DNR, Fisheries, Southfield
Oakland County Health Dept.
Oakland Charter Township Clerk
Oakland Soil Conservation Dist.
Hubbell, Roth & Clark, Inc.
DNR, Wildlife, Natural Heritage
USACE
USFWS

U.S. Army Corps of Engineers www.lre.usace.army.mil Michigan Dept of Environmental Quality www.mi.gov/jointpermit DEQ

SE MI - Pat Durack

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AGENCY USE	Previous USACE File Number	Date Received	DEQ File Number
	USACE File Number	JUL 08 2011 Water Resources Div. Permit Consolidation Unit	11-63-0127-P
			Fee received 500 - cc

Validate that all parts of this checklist are submitted with the application package. Fill out application and additional pages as needed.

- ☐ All items in Sections 1 through 9 are completed.
- ☐ Project-specific Sections 10 through 20 are completed.
- ☐ Dimensions, volumes, and calculations are provided for all impact areas.
- ☐ All information contained in the headings for the appropriate Sections (1-20) are addressed, and identified attachments (➡) are included.
- ☐ Map, site plan(s), cross sections; one set must be black and white on 8 ½ by 11 inch paper; photographs.
- ☐ Application fee is attached.

1 Project Location Information *For Latitude, Longitude, and TRS info anywhere in Michigan see www.mcgi.state.mi.us/wetlands/*

Project Address (road, if no street address)	Zip Code	Municipality (Township/Village/City)	County
access drive off Orion Rd.	48306	Oakland Township	Oakland

Property Tax Identification Number(s)	Latitude	Township/Range/Section (TRS)
attached	42.738408 N	T 4 N or S; R 11 E or W;
Subdivision/Plat and Lot Number attached	Longitude - 83. 167126 W	Sec 28 OR Private Claim #

2 Applicant and Agent Information

Owner/Applicant (individual or corporate name)	Agent/Contractor (firm name and contact person)
Clinton River Watershed Council, Ms. Anne Vaara	Hubbell, Roth & Clark, Inc.
Mailing Address 1115 W. Avon Road	Mailing Address 555 Hulet Drive
City Rochester Hills State MI Zip Code 48309-3038	City Bloomfield Hills State MI Zip Code 48303
Contact Phone Number 248-601-0606 Fax 248-601-1280	Contact Phone Number 248-454-6363 Fax 248-454-6312
Email anne@crwc.org	E-mail jburton @hrc-engr.com

☒ No ☐ Yes Is the applicant the sole owner of all property on which this project is to be constructed and all property involved or impacted by this project? ➡ If no, attach letter(s) of authorization from all property owners including the owner of the disposal site.

Property Owner's Name (If different from applicant) attached	Mailing Address attached
Contact Phone Number	City State Zip Code

3 Project Description

Project Name Paint Creek Habitat Restoration Dam Removal	Preapplication File Number 11 - 63 - 0127 -P
Name of Water body Paint Creek	Date project staked/flagged wetlands flagged April, 2011

The proposed project is on, within, or involves (check all that apply)

- ☐ an inland lake (5 acres or more)
- ☐ a pond (less than 5 acres)
- ☒ a stream, river, ditch or drain
- ☐ a legally established County Drain
  Date Drain was established
- ☐ a channel/canal
- ☒ 500 feet of an existing water body
- ☐ a Great Lake or Section 10 Waters
- ☒ a wetland
- ☒ a 100-year floodplain
- ☒ a dam
- ☐ a designated high risk erosion area
- ☐ a designated critical dune area
- ☐ a designated environmental area

Project Use

- ☐ private
- ☐ commercial
- ☐ public/government
- ☐ project is receiving federal/state transportation funds
- ☐ WRP
- ☒ other restoration

Indicate the type of permit being applied for: ☒ General Permit ☐ Minor Project ☐ Individual (All other projects.) ➡ See Appendix C.

Written Summary of All Proposed Activities Attached

Construction Sequence and Methods Attached

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U.S. Army Corps of Engineers www.lre.usace.army.mil Michigan Dept of Environmental Quality www.mi.gov/jointpermit

Water Resources Div.
Permit Consolidation Unit

Permit Consolidation Unit

4 Project Purpose, Use and Alternatives *Attach additional sheets as necessary.*

Describe the purpose of the project and its intended use; include any new development or expansion of an existing land use.
Attached

Describe the alternatives considered to avoid or minimize resource impacts. Include factors such as, but to limited to, alternative locations, project layout and design, and construction technologies. For utility crossings include alternative routes and construction methods.
Attached

5 Locating Your Project Site *Attach a legible black and white map with a North arrow.*

Names of roads of closest intersection Orion and Gallagher Rds.

Directions from main intersection to the project site, with distances from the best and nearest visible landmark and water body attached

Description of buildings on the site *(color; 1 or 2 story, other)*	Description of adjacent landmarks or buildings *(address; color; etc)*
none	*west of Goodison Cider Mil; north of paint Creek Cider Mill*

How can your site be identified if there is no visible address? concrete dam at the end of gravel access drive

6 Easements and Other Permits

☒ No ☐ Yes Is there a conservation easement or other easement, deed restriction, lease, or other encumbrance upon the property?
➡ If yes, attach a copy. Provide copies of court orders and legal lake levels if applicable.

List all other federal, interstate, state, or local agency authorizations including required assurances for Critical Dune Area projects.

Agency	Type of Approval	Number	Date Applied	Date approved /denied	Reason for denial
OCWRC	Soil Erosion	N/A	pending		
RCOC	Gunn Rd. ROW	N/A	pending		

7 Compliance

If a permit is issued, when will the activity begin? (M/D/Y) 09/01/11	Proposed completion date (M/D/Y) 12/30/11

☒ No ☐ Yes Has any construction activity commenced or been completed in a regulated area?
➡ If Yes, identify the portion(s) underway or completed on drawings or attach project specifications and give completion date(s).
☐ No ☐ Yes Were the regulated activities conducted under a DEQ and/or USACE permit?
➡ If Yes, list the permit numbers
☒ No ☐ Yes Are you aware of any unresolved violations of environmental law or litigation involving the property?
➡ If Yes, attach explanation.

8 Adjacent Property Owners *Provide current mailing addresses. Attach additional sheets/labels for long lists.*

☐ Established Lake Board ☐ Lake Association	Contact Person	Mailing Address	City	State and Zip Code

List all adjacents. If you own the adjacent lot, provide the requested information for the first adjacent parcel that is not owned by you.

Property Owner's Name	Mailing Address	City	State and Zip Code
Attached			

9 Applicant's Certification *Read carefully before signing.*

I am applying for a permit(s) to authorize the activities described herein. I certify that I am familiar with the information contained in this application; that it is true and accurate; and, to the best of my knowledge, that it is in compliance with the State Coastal Zone Management Program. I understand that there are penalties for submitting false information and that any permit issued pursuant to this application may be revoked if information on this application is untrue. I certify that I have the authority to undertake the activities proposed in this application. By signing this application, I agree to allow representatives of the DEQ, USACE, and/or their agents or contractors to enter upon said property in order to inspect the proposed activity site before and during construction and after the completion of the project. I understand that I must obtain all other necessary local, county, state, or federal permits and that the granting of other permits by local, county, state, or federal agencies does not release me from the requirements of obtaining the permit requested herein before commencing the activity. I understand that the payment of the application fee does not guarantee the issuance of a permit.

☐ Property Owner ☐ Agent/Contractor ☒ Corp. or Public Agency / Title	Printed Name Anne Vaara	Signature	Date 7/12/11

10 Projects Impacting Inland Lakes, Streams, Great Lakes, Wetlands or Floodplains

- Complete only those sections A through M applicable to your project.
- If your project impacts wetlands also complete Section 12. If your project impacts regulated floodplains also complete Section 13.
- To calculate volume in cubic yards (cu yd), multiply the average length in feet (ft) times the average width (ft) times the average depth (ft) and divide by 27. Example: (25 ft long x 10 ft wide x 2 feet deep) / 27 = 18.5 cubic yards
- Some projects on the Great Lakes require an application for conveyance prior to Joint Permit Application completeness.

➡Provide a black and white overall site plan, with cross-section and profile drawings. Show existing lakes, streams, wetlands, and other water features; existing structures; and the location of all proposed structures, land change activities and soil erosion and sedimentation control measures. Review Appendix B and EZ Guides for aid in providing complete site-specific drawings.

➡Provide tables for multiple impact areas or multiple activities such as multiple fill areas or multiple culverts. Include your calculations.

Water Level Elevation

On inland waters ☐ NGVD 29 ☒ NAVD 88 ☐ other Observed water elevation (ft) 842.3 date of observation (M/D/Y) 5/5/11

On a Great Lake ☐ IGLD 85 ☐ surveyed ☐ converted from observed still water elevation.

☒ A. PROJECTS REQUIRING FILL (See All Sample Drawings)

➡Attach a site plan and cross-section views to scale showing maximum and average fill dimensions with calculations.
➡ For multiple impact areas on a site provide a table with location, dimensions and volumes for each fill area.

Purpose ☐ bioengineered shore protection ☐ boat ramp ☐ boat well ☐ bridge or culvert ☐ crib dock
☒ riprap ☐ seawall ☐ swim area ☐ other

Dimensions of fill (ft) Length Width Maximum Depth	Total volume (cubic yards) see attached	Volume below OHWM (cubic yards) 280
Maximum water depth in fill area (ft)	Area filled (sq ft)	Will filter fabric be used under proposed fill? ☐ No ☒ Yes (If Yes, type) coir netting

Fill will extend feet into the water from the shoreline and upland feet out of the water.

Type of clean fill ☐ peastone % ☐ sand % ☒ gravel 9% ☒ other field stone 82%; Logs 9%

Source of clean fill ☒ commercial ☐ on-site ➡ If on-site, show location on site plan.
☐ other ➡ If other, attach description of location.

☒ B. PROJECTS REQUIRING DREDGING OR EXCAVATION (See Sample Drawings)

- Refer to www.mi.gov/jointpermit for spoils disposal and authorization requirements.

➡Attach a site plan and cross-section views to scale showing maximum and average dredge or excavation dimensions with calculations.
➡For multiple impact areas on a site provide a table with location, dimensions and volumes for each dredge/excavation area.

Purpose ☐ boat ramp ☐ boat well ☐ bridge or culvert ☐ maintenance dredge
☐ navigation ☐ pond/basin ☒ other riffle/log vane footers

Dimensions (ft) Length 195.75 Width 20 Maximum Depth 2	Total volume (cu yds) 1,490	Volume below OHWM (cu yds) 290

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Has this same area been previously dredged?	☒ No ☐ Yes	If Yes, provide date and permit number:
Will the previously dredged area be enlarged?	☒ No ☐ Yes	If Yes, when and how much?
Is long-term maintenance dredging planned?	☒ No ☐ Yes	If Yes, how often?

Dredge or Excavation Method ☐ Hydraulic ☒ Mechanical ☐ other

Spoils Disposal

Dredged or excavated spoils will be placed ☒ on-site ☐ landfill ☐ USACE confined disposal facility ☐ other upland off-site
For disposal, provide a ➡Detailed spoils disposal area location map and site plan with property lines.
➡Letter of authorization from property owner of spoils disposal site, if disposed off-site.

For volumes less than 5,000 cu yards, has proposed dredge material been tested for contaminants within the past 10 years?
☒ No ☐ Yes ➡If Yes, provide test results with a map of sampling locations.

☒ C. PROJECTS REQUIRING RIPRAP (See Sample Drawings 2, 3, 8, 12, 14, 22, and 23)

Riprap water ward of the ordinary high water mark: dimensions (ft) length 172.125 width 20 depth 2	Volume(cu yd) 255
Riprap landward of the ordinary high water mark: dimensions (ft) length width depth	Volume(cu yd)
Type and size of riprap (inches) ☒ field stone ☒ angular rock ☒ other gravel	Will filter fabric or pea stone be used under proposed riprap? ☒ No ☐ Yes, Type

☒ **D. SHORE PROTECTION PROJECTS** (See EZ Guides and Sample Drawings 2, 3, and 17. Complete Sections 10A, B, and/or C.)
➡ For bioengineering projects include the list of native plants/seeds, if available.

Type and length (ft) ☒ bioengineering (ft) 290 ☐ revetment (ft) ☐ riprap (ft) ☐ seawall/bulkhead (ft)

Structure is ☒ new ☐ repair ☐ replacement of an existing structure | Will the existing structure be removed? ☐ No ☐ Yes

Proposed Toe Stone (linear feet) | Distance of project from adjacent property lines (ft) <100

Distance of project from an obvious fixed structure (example - 50 ft from SW corner of house) varies

For bioengineering projects indicate the structure type ☒ brush bundles ☐ coir log ☒ live stakes ☐ tree revetment ☒ other attached

☐ **E. DOCK - PIER – MOORING PILINGS** (See Sample Drawing 10)
➡ Attach a copy of the property legal description, mortgage survey, or a property boundary survey report.

Dock Type ☐ open pile ☐ filled ☐ crib ☐ floating ☐ cantilevered ☐ spring piles ☐ piling clusters ☐ other

Is the structure within the applicant's riparian area interest area? ☐ No ☐ Yes ➡ Show parcel property lines on the site plan

Proposed structure dimensions (ft) length width | Use ☐ private ☐ public ☐ commercial

Dimensions of nearest adjacent structures (ft) length width | Distance of dock from adjacent property lines (ft)

☐ **F. BOAT WELL** (See EZ Guide. Complete Sections 10A and 10B)

Dimensions (ft) length width depth | Number of boats

Type of sidewall stabilization ☐ concrete ☐ riprap ☐ steel ☐ vinyl ☐ wood ☐ other

Volume of backfill behind sidewall stabilization (cu yd) | Distance of boat well from adjacent property lines (ft)

☐ **G. BOAT RAMP** (See EZ Guide. Complete sections 10A, 10B, and 10C for mattress and pavement fill, dredge, and riprap)

Type ☐ new ☐ existing ☐ maintenance/improvement | Use ☐ private ☐ public ☐ commercial

Existing overall boat ramp dimensions (ft)
length width depth | Type of construction material
☐ concrete ☐ wood ☐ stone ☐ other

Proposed overall ramp dimensions (ft)
length width depth | Proposed ramp dimensions (ft) below ordinary high water mark
length width depth

Number of proposed skid piers | Proposed skid pier dimensions (ft)
length width | Distance of ramp from adjacent property lines (ft)

☐ **H. BOAT HOIST – ROOFS** (See EZ Guide)

Type ☐ cradle ☐ side lifter ☐ other | Located on ☐ seawall ☐ dock ☐ bottomlands

Hoist dimensions, including catwalks (ft) length width

Area occupied, including cat walks (sq ft) | Distance of hoist from adjacent property lines (ft)

Permanent Roof ☐ No ☐ Yes
➡ If Yes, how is the roof supported? | Maximum Roof Dimensions (ft): length width height

☐ **I. BOARDWALKS and DECKS in WETLANDS or FLOODPLAINS** (See Sample Drawings 5 and 6. Complete Sections 12 and/or 13)
➡ Provide a table for multiple boardwalks and decks proposed in one project; include locations and dimensions.

Wetlands		Floodplains	
Boardwalk ☐ on pilings ☐ on fill Dimensions (ft) length width	Deck ☐ on pilings ☐ on fill Dimensions (ft) length width	Boardwalk ☐ on pilings ☐ on fill Dimensions (ft) length width	Deck ☐ on pilings ☐ on fill Dimensions (ft) length width

☐ **J. INTAKE PIPES** (See Sample Drawing 16) or **OUTLET PIPES** (See Sample Drawing 22)

If outlet pipe, discharge is to ☐ inland lake ☐ stream, drain or river ☐ overland flow ☐ Great Lake ☐ wetland ☐ other

Number of pipes | Pipe diameters and invert elevations | Does pipe discharge below the OHWM? ☐ No ☐ Yes
Is the water treated before discharge? ☐ No ☐ Yes

Type ☐ headwall ☐ end section ☐ other | Dimensions of headwall OR end section (ft)
length width height

12 ACTIVITIES THAT MAY IMPACT WETLANDS (See Sample Drawings 8 & 9). Complete other Sections as applicable.

- Locate your site and wetland information with the DEQ Wetlands Map Viewer at www.mcgi.state.mi.us/wetlands/
- For information on the DEQ's Wetland Identification Program (WIP) visit www.mi.gov/wetlands.
  - ➡ Provide a detailed site plan with labeled property lines, upland and wetland areas, and dimensions and volumes of wetland impacts.
  - ➡ Complete the wetland dredge and wetland fill dimension information below for each impacted wetland area.
  - ➡ Attach tables for multiple impact areas or activities.
  - ➡ Attach at least one cross-section for each wetland dredge and/or fill area; show wetland and upland boundaries on the cross-section.

Has the DEQ conducted a wetland assessment for this parcel?	☒ No ☐ Yes	➡ If Yes, provide a copy or WIP number:
Has a professional wetland delineation been conducted for this parcel?	☐ No ☒ Yes	➡ If Yes, provide a copy with data sheets
Is there a recorded DEQ easement on the property?	☒ No ☐ Yes	➡ If Yes, provide the easement number
Did the applicant purchase the property before October 1, 1980?	☒ No ☐ Yes	➡ If Yes, provide documentation.
Is any grading or mechanized land clearing proposed?	☒ No ☐ Yes	➡ If Yes, label the locations on the site plan.
Has any of the proposed grading or mechanized land clearing been completed?	☒ No ☐ Yes	➡ If Yes, label the locations on the site plan

Proposed Activity

☐ boardwalk or deck (Section 10I)	☐ bridges and culverts (Section 14)	☐ designated environmental area
☒ dewatering	☐ draining surface water	☐ driveway / road
☐ fences (Section 10L)	☐ fill or dredge	☐ restoration
☐ septic system	☐ stormwater discharge (Section 10J)	☒ other small dam removal

	Dimensions maximum length (ft) maximum width (ft)	Area ☐ acres ☐ sq ft	Average depth (ft)	Volume (cu yd)
FILL				
DREDGE				

Spoils Disposal

Dredged or excavated spoils will be placed ☐ on-site ☐ landfill ☐ USACE confined disposal facility ☐ other upland off-site

For disposal, provide a ➡ Detailed spoils disposal area location map and site plan with property lines.

➡ Letter of authorization from property owner of spoils disposal site, if disposed off-site.

Septic System

The proposed project will be serviced by:
☐ public sewer ☐ private septic system
➡ Show system on plans.

If a private septic system is proposed, has an application for a permit been made to the County Health Department? ☐ No ☐ Yes
If Yes, has a permit been issued? ☐ No ☐ Yes ➡ Provide a copy of the permit.

Describe the wetland impacts, the proposed use or development, and the alternatives considered:

Minor, temporary impacts may occur to wetland fringe areas due to equipment access to areas adjacent to the dam. Timber mats or other measures will be used to minimize impacts. No wetland excavation or fill is proposed. See attached wetland report.

Wetland A/B/C is a 1.9 acre scrub-shrub wetland that will be partially drained by the lowering of the Paint Creek Dam elevation by 2.5 feet.

Does the project impact more than 1/3 acre of wetland? ☒ No ☐ Yes

➡ If Yes, submit a Mitigation Plan with the type and amount of mitigation proposed. For more information go to www.mi.gov/wetlands

Describe how impacts to waters of the United States will be avoided and minimized:

Timber mats, silt fence, or other measures will be used to minimize impacts, as necessary. No wetland excavation or fill is proposed.

Invasive plant species removal (ex. buckthorn, honeysuckle) will minimize spreading of invasives to downstream wetland areas.

Describe how the impact to waters of the United States will be compensated. OR Explain why compensatory mitigation should not be required for the proposed impacts.

Impacts to wetland A/B/C due to indirect dewatering should be allowed without mitigation because the wetlands were artificially created in the backwater of the dam. The dam removal and restoration of aquatic organism passage will compensate for localized wetland impacts.

13 FLOODPLAIN ACTIVITIES (See Sample Drawing 5 and others. Complete other applicable sections.)

- For more information go to www.mi.gov/floodplainmanagement. This site also lists the projects and requirements for an expedited floodplain review under "Expedited Review Information for Minor Floodplain Projects."
- Examples of projects proposed within the non-floodway portions of the 100-year-floodplain which may qualify for an expedited review: Open pile decks and boardwalks; residences, commercial/industrial facilities, garages and accessory structures; parking lots; pavilions, gazebos, large community playground structures; residential swimming pools
- Examples of projects proposed within the floodway portions of the floodplain which may qualify for an expedited review: Open pile decks and boardwalks, (non-enclosed) that are anchored to prevent floatation and that do not extend over the bed and bank of a watercourse; parking lots constructed at grade or resurfacing that is no more than 4 inches above the existing grade; dry hydrants that do not require fill placement; scientific structure such as staff gauges, water monitoring devices, water quality testing devices, and core sampling devices which meet specific design criteria and fish structures that meet specific design criteria.
- For expedited review include:
  - ➡ Photographs of the work site labeled to identify what is being shown and with the direction of the photo clearly indicated. Include photographs of any river or stream adjacent to the project.
  - ➡ A letter or statement from the local unit of government acknowledging your proposed application. See the website for sample wording.
- A hydraulic analysis or hydrologic analysis may be required to fully assess floodplain impacts.
- The state building code requires an Elevation Certificate for any building construction or addition in a floodplain. A sample form can be found at www.fema.gov/nfip/elvinst.shtm.
  - ➡Attach additional sheets or tables for multiple proposed floodplain activities and provide hydraulic calculations.
  - ➡Show reference datum used on plans.

Proposed Activity ☐ fill ☒ excavation or cut ☒ other earth dam removal	100-year floodplain elevation (ft) (if known) 846.5 at dam Datum ☐ NGVD 29 ☒ NAVD 88 ☐ other
Site is 0-4 feet above ☒ ordinary high water mark (OHWM) OR ☐ observed water level. Date of observation (M/D/Y) 5/5/11	
Fill volume below the 100-year floodplain elevation (cu yds)	Compensating cut volume below the 100-year floodplain elevation (cu yds) 1200

Buildings and/or Additions

Type of construction is ☐ residential ☐ garage/pole barn ☐ non residential ☐ other

Construction is ☐ new ☐ addition AND Serviced by ☐ public sewer ☐ private septic ☐ other

Lowest adjacent grade (ft): existing proposed

datum ☐ NGVD 29 ☐ NAVD 88 ☐ other

Existing Structure Information	Proposed Structure Information
Foundation type ☐ basement ☐ concrete slab on grade ☐ pilings ☐ crawl space ☐ other	Foundation type ☐ basement ☐ concrete slab on grade ☐ pilings ☐ crawl space ☐ other
Foundation floor elevation (ft)	Foundation floor elevation (ft)
Height of crawl space/basement from finished foundation floor to bottom of floor joists (ft)	Height of crawl space/basement from finished foundation floor to bottom of floor joists (ft)
Elevation of 1st floor above basement floor/crawl space (ft)	Elevation of 1st floor above basement floor/crawl space (ft)

For enclosed areas below the flood elevation, such as a crawl space, garages and accessory structures:

Area of proposed foundation (sq ft)

Elevation of proposed enclosed area (ft) datum ☐ NGVD 29 ☐ NAVD 88 ☐ other

Number of flood vents net opening of each vent (sq inches) lowest elevation of flood vents (ft)

15 STREAM, RIVER, or DRAIN CONSTRUCTION, RELOCATION and ENCLOSURE ACTIVITIES

- Complete Section 10C for riprap activities.
- If side casting or other proposed activities will impact wetlands or floodplains, complete Sections 12 and 13, respectively.

➡Provide a scaled overall site plan showing existing lakes, streams, wetlands, and other water features; existing structures; and the location of all proposed structures and land change activities.

➡Provide scaled cross-section (elevation) drawings necessary to clearly show existing and proposed conditions.

➡For activities on legally established county drains, provide original design and proposed dimensions and elevations.

Stream Information

Water elevation (ft) 842.3 datum ☐ NGVD 29 ☒ NAVD 88 ☐ IGLD 85 (Great Lakes coastal areas) ☐ other

➡ Show elevation on plans with description.

Dimensions (ft) of existing stream/drain channel (ft) length 290 width 22-34 depth 3.2-5

Existing channel average water depth in a normal year (ft) 3 max. bankfull depth

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Proposed Activity ☐ enclosure ☐ improvement ☐ maintenance ☐ new drain ☐ relocation ☐ wetlands ☒ other dam removal

If an enclosed structure is proposed, check material type ☐ concrete ☐ corrugated metal ☐ plastic ☐ other

Dimensions (ft) of the structure: diameter length	Volume of fill (cu yds) 280
Will old/enclosed stream channel be backfilled to top of bank grade? ☐ No ☐ Yes	
Length of channel to be abandoned (ft)	Volume of fill (cu yds)
Dimensions (ft) of improved, maintained, new, relocated or wetland stream/drain channel. length 290 width 22-34 depth 3	Volume of dredge/excavation (cu yds) 290
How will slopes and bottom be stabilized? coir mat; fieldstone riffles	Proposed side slopes (vertical / horizontal) n/a

Spoils Disposal

Dredged or excavated spoils will be placed ☒ on-site ☐ landfill ☐ USACE confined disposal facility ☐ other upland off-site

For disposal, provide a ➡ Detailed spoils disposal area location map and site plan with property lines.

➡ Letter of authorization from property owner of spoils disposal site, if disposed off-site.

16 DRAWDOWN OF AN IMPOUNDMENT

- If wetlands will be impacted, complete Section 12.

Type of drawdown ☐ over winter ☐ temporary ☐ one-time event ☐ annual event ☐ permanent (dam removal) ☐ other

Reason for drawdown

Has there been a previous drawdown? ☐ No ☐ Yes If Yes, provide date (M/D/Y)		Previous DEQ permit number, if known
Does waterbody have established legal lake level? ☐ No ☐ Yes ☐ Not Sure		Dam ID Number, if known
Extent of vertical drawdown (ft)	Impoundment design head (ft)	Number of adjacent or impacted property owners
Date drawdown would start (M/D/Y)	Date drawdown would stop (M/D/Y)	Rate of drawdown (ft/day)
Date refilling would start (M/D/Y)	Date refill would end (M/D/Y)	Rate of refill (ft/day)
Type of outlet discharge structure to be used ☐ surface ☐ bottom ☐ mid-depth	Impoundment area at normal water level (acres)	Sediment depth behind impoundment discharge structure (ft)

17 DAM, EMBANKMENT, DIKE, SPILLWAY, or CONTROL STRUCTURE ACTIVITIES (See Sample Drawing 15)

- For more information go to www.mi.gov/damsafety. If wetlands will be impacted, complete Section 12.
- Information on removing a dam is available at www.mi.gov/damsafety and following the Related Link – DEQ Dam Removal web site.

➡Attach site-specific conceptual plans for construction of a new dam, reconstruction of a failed dam, or enlargement of an existing dam for resource impact review. Detailed engineering plans are required once the activity has been determined to be permitable.

➡Attach detailed signed and sealed engineering plans for a Part 315 dam repair, dam alteration, dam abandonment, or dam removal.

➡Part 315 Dam Safety application fees are added to all other application fees.

Proposed Activity: ☐ abandonment ☐ alteration ☐ enlargement of an existing dam ☒ removal ☐ repair ☐ reconstruction of a failed dam ☐ new dam construction ☐ other

Dam ID Number, if known unregulated	Type of outlet discharge structure ☒ surface ☐ bottom ☐ mid-depth

Will proposed activities require a drawdown of the waterbody to complete the work? ☒ No ☐ Yes ➡ If Yes, complete Section 16.

Does the structure allow complete drainage of the waterbody? ☐ No ☐ Yes	Impoundment size (acres) 0.78 (no pond impoundment)
Benchmark elevation (ft) see plans Describe the benchmark and show on the plans	Datum ☐ NGVD 29 ☒ NAVD 88 ☐ Local ☐ other

Dredging/excavation volume (cu yd) 290	Fill volume (cu yd) 280	Riprap volume (cu yd) 255

Have you engaged the services of a Licensed Professional Engineer? ☐ No ☒ Yes

Engineer's Name	Registration Number	Mailing Address
James Burton	#49137	see Section 2

Will a water diversion during construction be required? ☒ No ☐ Yes

If Yes, describe how the stream flow will be controlled through the dam construction area during the proposed project activities:

Complete the following for a new dam, reconstruction of a failed dam or enlargement of an existing dam

Describe the type of dam and how you will design the dam and embankment to control seepage through and underneath the dam.

Embankment top elevation (ft)	Streambed elevation at downstream embankment toe (ft)

Structural height (difference between embankment top elevation and streambed elevation at downstream embankment toe) (ft)

Embankment dimensions	length (ft)	top width (ft)	bottom width (ft)	slopes (vertical / horizontal)	Upstream Downstream

Proposed normal pool elevation (ft)	Impoundment flood elevation (ft)

Maximum vertical drawdown capability (ft)	Attach operational procedure of the proposed structure, if available.

Have soil borings been taken at dam location?	☐ No ☐ Yes	➡ If Yes, attach results.
Will a cold water underspill be provided?	☐ No ☐ Yes	➡ If Yes, provide the invert elevation (ft)
Do you have flowage rights to all proposed flooded property at the design flood elevation?	☐ No ☐ Yes	➡ If No, provide a letter of authorization from the property owner.

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Clinton River Watershed Council
GLRI - Paint Creek Habitat Restoration Dam Removal Project

Attachments

3. Project Description

Background
The Clinton River is listed as a Great lakes Area of Concern (AOC) due to Beneficial Use Impairments including degradation of fish and wildlife populations and loss of fish and wildlife habitat. Two specific criteria in the Clinton River AOC's fish/wildlife delisting goals include dam removals and stream bank stabilization. The Paint Creek Habitat Restoration project will address these two criteria.

One element of the project will be the removal of the Paint Creek Dam. This dam was constructed in 1835 and is located in the middle section of Paint Creek, which is a tributary to the Clinton River. It is no longer functioning for its intended purpose; the dam's former millrace is a state-designated historic feature important to Oakland Township. Paint Creek is the highest quality coldwater stream in Southeast Michigan, and a headwater tributary to the Clinton River AOC. The overall project's objective is to remove the dam and improve aquatic and riparian habitat. A Natural Channel Design approach will be used to develop designs to restore the stream for a distance of approximately 1,500 feet. The Clinton River Watershed Council has coordinated a Technical Advisory Committee (TAC) consisting of representatives from MDNR, Trout Unlimited, Lawrence Technical University, Oakland University, and Oakland Township to review and provide guidance on the project design approach.

Existing Conditions Upstream of the Paint Creek Dam

- There is no longer a significant impoundment above the dam. Deposition has occurred over time that has created a narrow, deep channel upstream of the dam that actively conveys sediment over the dam periodically. Bank erosion is occurring in areas where the banks are mowed to the water's edge.
- Unapproved modifications to the dam in recent years, in the form of removal boards, has raised the water surface and diminished the bank height. This has altered the sediment entrainment and transport efficiencies and caused bank erosion in deposition areas.

Existing Conditions Downstream of the Paint Creek Dam

- Vertically Incised – The channel bed has eroded or was dredged by up to 3 ft downstream of the dam. The Bank Height Ratio (lowest bank height / maximum riffle depth) of 1.9 downstream of the dam indicates that the channel is deeply incised.
- Laterally Unstable – mainly based on bank erosion rates that are 6-12 times reference conditions and the increase in width-to-depth ratio.
- The channel bed material has coarsened below the dam. The riffle D84 increased from almost 2 inches at an upstream reference reach to almost 4 inches below the dam.

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Project Location

Paint Creek dam is located in Oakland Township, Oakland County, Michigan. The dam is located in Hydrologic Unit Code 04090003, just downstream of Gunn Road and west of Orion Road at approximately N42.738408/W-83.167126.

Proposed Activities

- A sediment trap will also be constructed near station 4020 (see channel profile) prior to dam removal.
- A grade control structure, consisting of a natural field stone riffle, will be constructed downstream of the Paint Creek dam prior to dam removal. The elevation of the riffle will allow a diversion pipe to bypass flows into the raceway channel at the existing mill race inlet invert elevation of 838.36.
- The capacity of the pipe at bankfull discharge will not exceed 20 cfs (10% of bankfull discharge).
- The Paint Creek dam was constructed with a head of 3.6 ft (USGS, see attachment). The concrete dam will be removed in late September, 2011. The right (north) dam wing may remain in place to insure bank stability. The earthen dam will be graded down to match the adjacent floodplain areas and the material will be placed on-site.
- Due to weather and unforeseen contingencies, the applicant would like to request an extension on in-stream work in Paint Creek until October 21, 2011 for in-stream field stone placement, minor bank grading, and bypass pipe installation. All other work after that date will consist of upland stabilization consisting of erosion control blanket installation, planting, and restoration.
- Final restoration plans are in progress and are pending review. The final plans will be submitted to PCU under a separate application by the end of 2011. Those "Phase II" restoration measures will be constructed in 2012. (See prioritization plan below)

Alternative to Dam Removal

Do Nothing – erosion has already occurred around the north headwall, scour pools have formed downstream of the dam, the boards (recently placed by residents) provided an additional foot of hydraulic load, and additional sediment accumulation upstream of the dam will cause the dam to fail eventually. The resulting channel instability will likely have a negative impact on the fishery and longitudinal connectivity may still not be provided. Aquatic organisms are not currently able to move upstream past the dam (6 ft drop below dam), habitat is generally degraded in the dam area, and the clear water discharge below the dam is exacerbating existing channel incision.

Construction Sequence and Methods

The Paint Creek Habitat Restoration Dam Removal Project will be constructed in two phases due to fisheries restrictions in the creek. Preliminary grade controls and dam removal will be completed in fall 2011. Additional restoration work will be completed in spring/summer 2012 under a separate permit.

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CUT/FILL QUANTITIES

ITEM	QTY CUT BELOW OHWL (CYDS)	QTY CUT ABOVE OHWL (CYDS)	QTY FILL BELOW OHWL (CYDS)	QTY FILL ABOVE OHWL (CYDS)
Dam Removal	20			
Earth Excavation	200			250
Earthen Dam Removal		1,200		1,200
Log Vanes	30		25	
Sediment trap	40			
Dredge Ex. Stream Gravel Phase II Use	150			150
Streambed Restoration (Boulders 12"-36")			180	
Streambed Restoration (Cobble 4"-12")			50	
Streambed Restoration (Gravel 0.5"-4")			25	
TOTAL	**290**	**1,200**	**280**	**1,450**

Restoration Prioritization Plan for Phase II Improvements

Background - Streambank erosion is now occurring upstream of the dam at low-moderate rates due to a combination of factors such as altered riparian vegetation, mowing, placement of yard wastes, upland drainage, log jams, etc. It is anticipated that some level of moderate bank erosion will continue to occur upstream of the dam following the dam removal due to the resulting increase in slope and shear stress (see attached supporting documentation). Depositional bars will begin to move, bank height ratios may increase, and channel widening may occur (the existing channel is relatively narrow, deep, and has a flat localized gradient). An estimated 100 cyds of sediment will likely move to the reach downstream of the dam based on the proposed bed slope. These impacts will be minimized with grade control measures (see plan). Excessive streambank erosion will be minimized with soil bioengineering measures at prioritized sites pending landowner permissions.

For 1,340 feet downstream of the dam, the channel is highly incised with extensive bank erosion. Therefore, although some deposition is expected, further impacts will likely be negligible.

Phasing - Due to the fisheries construction window and the nature of the GLRI funding program, the dam will be removed in 2011 with minimal grade control and restoration measures. Additional stream restoration measures will be implemented in 2012 under a separate permit.

Dam Removal - Some amount of channel adjustment is natural and desirable in natural stream systems as it moves towards a new equilibrium following the change in slope and sediment supply. A Restoration Prioritization Plan is described in this section to provide the residents confidence that problems will be addressed. Bank armoring or other structural improvements will not be an option unless infrastructure is affected and long-term erosion/sedimentation will not be completely eliminated. A menu of soil bioengineering practices will be provided to the affected homeowners along with a palate of native plant materials.

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Prioritization - Prioritized stabilization/restoration sites will be selected based on Bank Height Ratio (incision), Width-to-Depth Ratio Stability Rating, and Sediment Competence (or entrainment).

DEFINITIONS:
Bank Height Ratio (BHR) = Lowest Bank Height/Max. Bankfull Depth (at a riffle)

Width-to-Depth Ratio (W/d) = Bankfull Width (surface width at a riffle) / Mean Bankfull (riffle) Depth

Sediment Competence (SC) = Sufficient depth and slope are available to provide adequate bankfull shear stress to transport the largest particle size available (bar D_{100} = 50 mm) shear stress in lb/ft^2

		PRIORITIZATION		
Parameter	**Reference Reach**	**Low (green)**	**Moderate (yellow)**	**High (orange)**
BHR	1.0-1.05	1.05-1.1	1.1-1.3	1.3
W/d	14	~ 20% change	~ 40% change	~ 60% change
SC	τ =0.22-0.25 lb/ft^2	Slightly incised; Mod. deposition	<D35 of the bed moved; >D100 of the bed moved	<D35 of the bed moved; >D100 of the bed moved

Examples of Types of BMPs to be Used in Each Priority Area (Shown in detail sheets for reference in this permit application)

Low Priority (Green) – live stakes, seeding, silt fencing, erosion control blankets, riparian plantings, upland fascines (setback from bank), and other soil bioengineering methods that typically do not require a permit

Moderate Priority (Yellow) – natural riffle grade controls, stone toe protection, and soil bioengineering methods described above and similar BMPs described in NRCS, NEH 654 Stream Restoration.

High Priority (Orange) – natural riffle grade controls, wood/stone toe protection, log vanes, riffle/pool enhancements, and soil bioengineering methods described above

Channel Design Approaches

- The Phase I design approach involves using a threshold channel design that will promote vegetated banks and grade controls so that the streambed will not move in critical areas. "*A threshold channel is a channel in which movement of the channel boundary material is negligible during the design flow* (USDA-NRCS, NEH 654, Ch. 8)." A full Rosgen Level III geomorphic analysis has been conducted for the reach and is summarized in the attached supporting documentation (Table 1); however, this data will mainly be used for Phase II improvements because Phase I will not modify channel widths or pattern. Upstream of the dam, Paint Creek has moderate deposition. Downstream of the dam, the creek is incised (degradation).

- The Phase II stream restoration work will involve a combination of analog (reference reach), empirical (regional curve), and analytical (regime equation) methodologies. An alluvial channel will

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be preferred where feasible and the use of a threshold design approach will be minimized to the extent practicable. "*Alluvial rivers are free to adjust section, pattern, and profile in response to hydraulic changes. Alluvial streams flow through channels with bed and banks made of sediments transported by the stream under-current conditions* (USDA-NRCS, NEH 654, Ch. 9)."

- A list of morphological parameters (including pebble count data) and mini-regional curves are attached for Paint Creek. Mini-regional curves were developed by surveying 5 sites from the Lake Orion gage station downstream to the Rochester gage station to verify bankfull discharge and dimensions due to the incised nature of the existing channel. Results were compared to peak flows at the gage stations and flood flows for the site provided by MDEQ (see attached summary). The D100 of the bar material/D84 of the riffle material was compared at various sites: the reference reach site, upstream of Gunn Road above the backwater influences, depositional bar material just upstream of Gunn Road, bank stratification material, and at a riffle downstream of the project reach. Entrainment calculations showing the impact of dam lowering are attached.

- Phase I does not propose to modify the channel widths or alignments (planform). Details and a profile of the proposed grade controls are provided in the Project Plans.

Small Dam Removal General Criteria

- The height of the dam and footers is approx. 6 feet. The original head on the dam was 3.6 feet.
- There is no longer a significant impoundment above the dam. Deposition has occurred over time that has created a narrow, deep channel upstream of the dam that conveys sediment over the dam periodically.
- The dam at Yates Cider Mill is the first known dam upstream of Lake St. Clair and, therefore, the Paint Creek Dam does not act as a sea lamprey barrier.
- No known state or federally listed threatened or endangered species have been identified in the project area (see attachment). Dead shells of *Villosa iris* (rainbow mussel) were found approx., a half mile downstream of the project area, at Orion Road in 1977-78. At Orion Road, one *Alasmidonta viridis* (slippershell mussel) was found in 1936 and dead mussels were found in 1977-78. Impacts to downstream mussel populations will be minimal and short-term during construction. Reductions in streambank erosion rates will improve mussel habitat in the long-term.
- There are no known areas of contaminated sediments in the area. Based on a sample collected upstream of the dam on 4/14/09, 99.3% of the bed material is >0.075 mm in size (i.e. fine sand or a #200 sieve). Therefore, waste characterization of the sediment was not conducted.
- Oakland Township owns the Paint Creek Dam and the parcel that provides access to the dam. The Township has provided a letter of authorization for pursuing the permit. The adjacent upstream and downstream property owners have been contacted and formal easements are in progress. Other permit applications are pending.
- Wetlands upstream of the dam will be partially drained. Other wetland impacts will be short-term or limited to the greatest extent possible. Permanent wetland impacts from streambank grading, excavation, and fill will be less than 0.1 acres.
- Paint creek is not a federally designated wild and scenic river.

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Dam Removal Plan

- The opinion of the Technical Advisory Committee (TAC) is that stream instability upstream of the dam will be minimal following dam removal based on the surveyed profile and Bank Height Ratios (slightly-moderately incised). Impacts will be mitigated with grade control riffles, plantings, and soil bioengineering methods.
- Once the incised downstream channel is restored, the project will improve riparian wetlands, floodplain connectivity, fish passage, and in-stream habitat.
- Dam Removal Schedule/Methods
  - A grade control riffle will be constructed downstream of the dam to effectively draw down the water surface elevation by approx. two and a half feet (raceway invert at 838.36).
  - Log vane structures will be constructed immediately downstream of the rock riffle. Sand/gravel from behind the dam will naturally backfill the vane arms over the winter and provide floodplain connectivity.
  - The concrete dam will be removed in 3-4 stages over 1-2 weeks.
  - The right wall may be left in place to insure bank stability.
  - Most of the earthen dam will be removed and the material will be placed on-site.

M1 Backwater Estimate

In 1971, the Gazetteer of the Clinton River basin, Technical Paper No. 5, published a head of 3.6 feet. Using the Ranga Ruji (1981) equation to estimate the maximum upstream limit of the backwater effects in mildly sloping streams:

$$\mathbf{L = 0.92 *(D_o/D_n)^{1.05} *(D_n/S_o)}$$

Where: S_o is the slope without dam = 0.00246 ft/ft and with dam lowered 2.6 feet, S_o = 0.002225 ft/ft

D_n is the normal depth upstream 3.4 feet,

Do is the downstream controlling depth. The D_o values is 3.6 feet at the 1971 head and 1 foot with the elevation lowered 2.6 feet.

Using this calculation the M1 backwater effects are estimated to be:

Head	M1 Backwater impact length
3.6 feet	1,354 feet
1 feet	390 feet

The 1,354 feet corresponds to the properties (390 feet) downstream of Gunn Road. Therefore, the three properties between the Gunn Road and the dam will be impacted by the dam lowering. The two properties immediately upstream of Gunn Road have existing streambank erosion problems, partially due to mowing practices and altered riparian vegetation (turf grass), and may have continue to have some

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erosion issues. Restoration of properties upstream of Gunn Rd. may be included in Phase II permitting as budgets permit.

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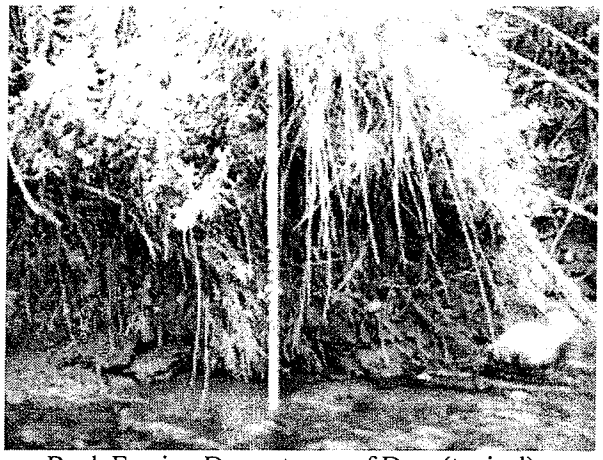
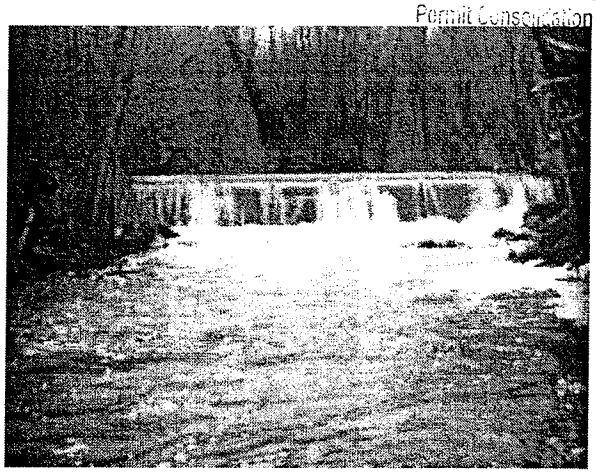
Site Photos

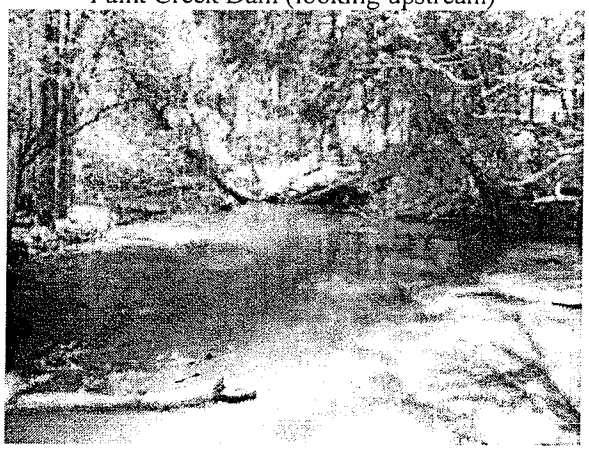


Bank Erosion Downstream of Dam (typical)

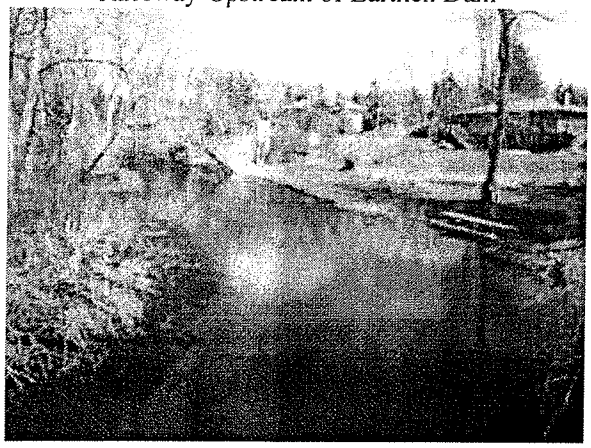


Paint Creek Dam (looking upstream)

Raceway Upstream of Earthen Dam



Reference Reach (typical)



Paint Creek Upstream of Gunn Rd.

Paint Creek Downstream of Gunn Rd.

LUCIANO ZANOTTI
3981 ORION RD
OAKLAND MI 48363

KIM M NIEBEL
3980 ORION ROAD
OAKLAND MI 48363

DONALD BUXAR
1540 W GUNN RD
ROCHESTER MI 48306

A-1 BAIL BOND AGENCY INC
1181 N MILFORD RD STE 201
MILFORD MI 48381

DAVID H PURDY
SUSAN W POWNER-PURDY
1560 W GUNN RD
ROCHESTER MI 48306

MILDRED M BRABEAU
3800 HELMS RD
GRANTS PASS OR 97527

CHARTER TOWNSHIP OF OAKLAND
4393 COLLINS
ROCHESTER MI 48306

ANGELO IAFRATE
1719 W GUNN RD
ROCHESTER MI 48306

CHAD NIGHTINGALE
EMILY NIGHTINGALE
4110 ORION RD
ROCHESTER MI 48306

SUE C BROWN
4310 ORION RD
ROCHESTER MI 48306

GREGORY OLSON
4190 ORION RD
ROCHESTER MI 48306

ROBERT SPITZ
6215 SEDGEWOCK DR SW
ROANOKE VA 24018

ANGELO IAFRATE
1719 W GUNN RD
ROCHESTER MI 48306

ANGELO IAFRATE
1719 W GUNN RD
ROCHESTER MI 48306

ANGELO IAFRATE
1719 W GUNN RD
ROCHESTER MI 48306

NANCY MIKESCH
4014 ORION RD
ROCHESTER MI 48306

BRIAN EVANS
RUBY EVANS
1669 W GUNN RD
ROCHESTER MI 48306

NANCY L STRAMAGLIA
4125 ORION RD
ROCHESTER MI 48306

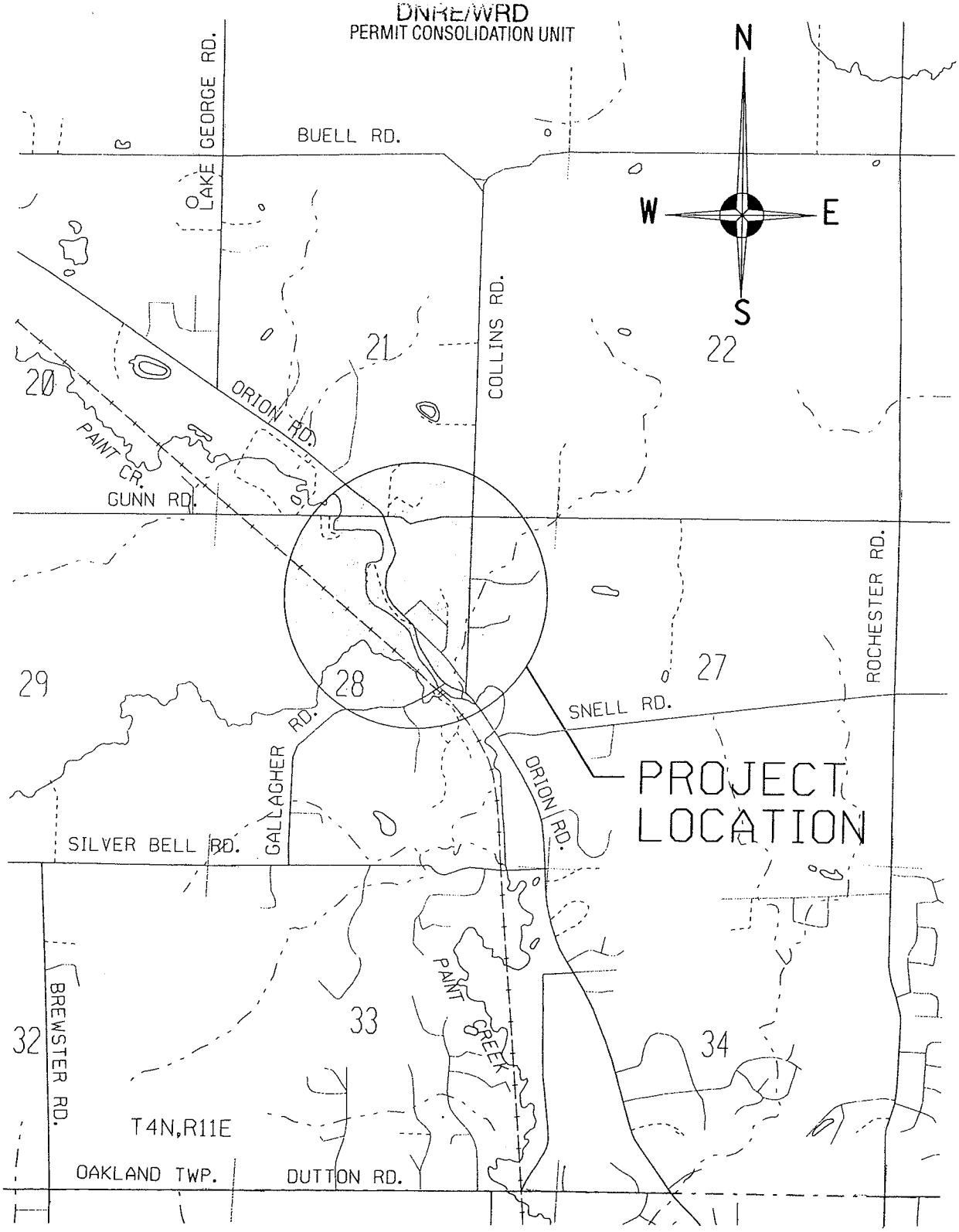
R P S DEVELOPMENT CO
4295 ORION RD
ROCHESTER MI 48306

R P S DEVELOPMENT CO
4295 ORION RD
ROCHESTER MI 48306

STATE OF MICHIGAN
530 W ALLEGAN ST
LANSING MI 48933

Road Commission for Oakland County
31001 Lahser Road
Beverly Hills, MI 48025
Attention: Mr. Brad Knight

Charter Township of Oakland
4393 Collins Road
Rochester, MI 48306
Attention: Mr. James Creech



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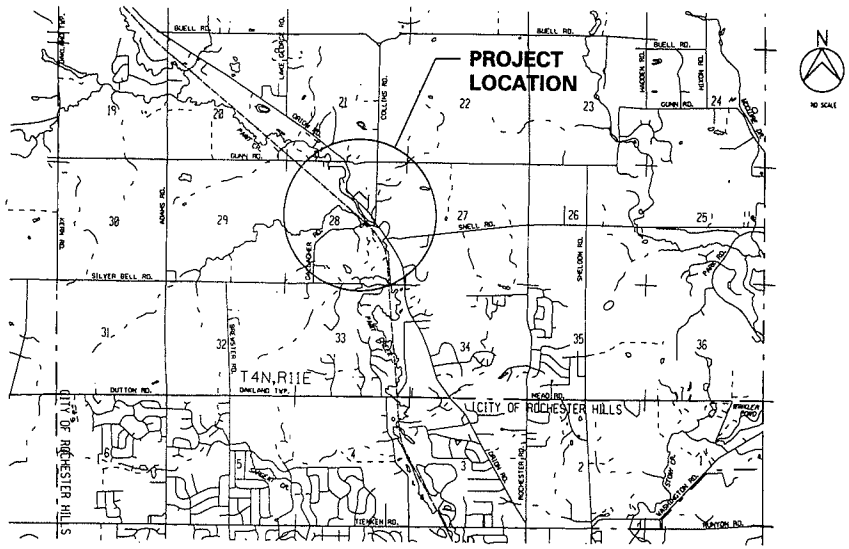
PAINT CREEK HABITAT RESTORATION DAM REMOVAL PROJECT

HRC JOB No. 20110115

GLRI PROJECT No. EPA GL-00E00544-0



CLINTON RIVER WATERSHED COUNCIL

ELE.	ELEV.	DESCRIPTION
301	812.93	MAG NAIL IN WEST FACE OF 22" POPLAR, 300' +/- WEST OF ORION ROAD @ EAST SIDE OF WEIR.
302	812.23	TOP OF TRAVERSE POINT #3008 @ NORTHWEST CORNER OF ORION AND GALLAGHER ROADS.
303	810.53	MAG NAIL IN TOP OF WOOTWESTERLY GUARD RAIL POST, 100' +/- WEST OF ORION ROAD, NORTH SIDE OF GALLAGHER ROAD.
304	810.47	MAG NAIL IN WEST FACE OF 18" ELM, EAST SIDE OF PAINT CREEK TRAIL, 75' +/- SOUTH OF TRAVERSE POINT #3012.
305	810.06	VERTICAL MAG NAIL IN WEST ROOT OF 14", 18" AND 2-12" ELMS, 10' +/- SOUTHEAST OF WEIR, 270' +/- WEST OF ORION ROAD.
306	808.53	VERTICAL MAG NAIL IN EAST ROOT OF 18" ELM, 6' +/- EAST OF FENCE, 75' +/- SOUTH OF TRAVERSE POINT #3002.
308	811.26	SOUTHWEST CORNER OF CONCRETE CURB ON NORTH SIDE OF BRIDGE OVER PAINT CREEK ON GUNN ROAD, 30' +/- WEST OF DRIVE TO HOUSE #1500.
309	816.46	CONCRETE NAIL IN WEST FACE OF UTILITY POLE, SOUTH SIDE OF GUNN ROAD @ HOUSE #1500.
312	816.03	VERTICAL MAG NAIL IN 36" STUMP, 15' +/- SOUTHEAST OF TRAVERSE POINT #3016, 15' +/- NORTHEAST OF PAINT CREEK.

DATUM NAVD 88

NOTICE:
ALL EXISTING UTILITIES SHOWN ON THIS TOPOGRAPHIC SURVEY HAVE BEEN TAKEN FROM VISUAL OBSERVATION, AND RECORD MAPPING WHERE AVAILABLE. NO GUARANTEE IS MADE, OR SHOULD BE ASSUMED, AS TO THE COMPLETENESS OR ACCURACY OF THE UTILITIES SHOWN ON THIS DRAWING. PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS PRIOR TO CONSTRUCTION ACTIVITIES.

2 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 800-482-7171 STOP, LOOK, PROTECT

LIST OF DRAWINGS

CONSULTANT TEAM

HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers

NIEWANDER ENVIRONMENTAL, LLC
Finding Solutions In a Complex World

Somat Engineering, INCORPORATED

LimnoTech
Water | Environment | Scientists | Engineers

HopkinsBurns

ECT
Environmental Consulting & Technology, Inc.

STATE OF MICHIGAN JAMES F. BURTON ENGINEER No. 48337 PROFESSIONAL ENGINEER

DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-PCU PRE APP. COMMENTS
7-8-11	ISSUED FOR MDEQ PERMIT No. 1

PAINT CREEK HABITAT RESTORATION DAM REMOVAL PROJECT - HRC JOB No. 20110115

DESIGN FILE - VA20110120011105COV1.dwg dgn
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PCS TBL - \\hrc\dfs\pitts\plotting\plotting\hrc.pcs
DATE - 15-JUL-2011 10:51

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GENERAL

THE PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MDOT 2003 STANDARD SPECIFICATIONS FOR CONSTRUCTION UNLESS OTHERWISE SPECIFIED IN THE STANDARD SPECIFICATIONS. DETAILS OR SPECIAL PROVISIONS AND THE SPECIFICATIONS CONTAINED HEREIN.

COOPERATION BY THE CONTRACTOR: NO ADDITIONAL COMPENSATION WILL BE PAID TO THE CONTRACTOR FOR ANY DELAY OR INCONVENIENCE DUE TO MATERIAL SHORTAGES OR REASONABLE DELAYS DUE TO THE OPERATIONS OF SUCH OTHER PARTIES DOING WORK INDICATED OR SHOWN ON THE PLANS OR IN THE PROPOSAL OR FOR ANY REASONABLE DELAYS IN CONSTRUCTION DUE TO THE ENCOUNTERING OF EXISTING UTILITIES THAT MAY OR MAY NOT BE SHOWN ON THE PLANS.

LIMITATIONS ON PRIVATE WORK: DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL NOT PERFORM WORK BY PRIVATE AGREEMENT WITH PROPERTY OWNERS ADJACENT TO THE PROJECT WITHOUT PRIOR OWNER CONSENT. WORK MAY BE ALLOWED WHEN REQUESTED BY THE CITY, BUT ONLY WITH WRITTEN CONSENT.

THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL CODES FOR NOISE LEVELS, VIBRATIONS, OR ANY OTHER RESTRICTIONS WHILE PERFORMING ANY CONSTRUCTION OPERATIONS WITHIN THIS CONTRACT. COSTS TO BE INCLUDED IN THE RESPECTIVE ITEM OF WORK.

THE CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE LOCAL FIRE & POLICE DEPARTMENTS, POST OFFICE, AND THE TOWNSHIP 24 HOURS IN ADVANCE OF PROPOSED ROAD CLOSURES, OR TEMPORARY TRAFFIC CONTROL MEASURES.

THE CONTRACTOR SHALL, BEFORE EACH DAYS WORK, OR WHEN MOVING TO A NEW AREA OF WORK, DETERMINE AND EVALUATE THE LOCATION OF ALL UNDERGROUND FACILITIES IN THE AREA. IF LOCATION STAKES HAVE BEEN MOVED OR DO NOT APPEAR CORRECT, THE CONTRACTOR SHALL NOT EXCAVATE UNTIL ALL UTILITIES HAVE HAD AN OPPORTUNITY TO CHECK OR RESTAKE THEIR LOCATIONS. ANY DELAYS INCURRED, DUE TO THE CHECKING OR RESTAKING OF UTILITIES SHALL NOT BE A BASIS FOR ADDITIONAL COMPENSATION.

THERE WILL BE NO ADJUSTMENT IN THE CONTRACT UNIT PRICE REGARDLESS OF THE PERCENTAGE OF INCREASE OR DECREASE ABOVE OR BELOW THE CONTRACT QUANTITY FOR ANY ITEM OF WORK.

IT IS THE INTENT THAT ALL GOVERNMENT CORNERS ON THIS PROJECT BE PRESERVED AND THAT, WHERE NECESSARY, MONUMENT BOXES BE PLACED OR ADJUSTED, AT THE CONTRACTORS EXPENSE WHETHER SHOWN OR NOT.

THE LOCATION OF ALL PUBLIC UTILITIES SHOWN ON THESE PLANS IS TAKEN FROM THE BEST AVAILABLE DATA. THE OWNER & HUBBELL, ROTH AND CLARK, INC. WILL NOT BE HELD RESPONSIBLE FOR ANY OMMISION OR VARIATIONS FROM THE LOCATIONS SHOWN. PURSUANT TO ACT 53 OF THE PA OF 1974 AS A CONDITION OF THIS CONTRACT NOTICE SHALL BE GIVEN TO MISS DIG PRIOR TO UNDERGROUND WORK TO BE PERFORMED IN ACCORDANCE WITH THIS CONTRACT. PHONE (800)-482-7171 OR 647-7344.

CONTRACTOR TO SUBMIT DETAILED CONSTRUCTION SEQUENCE AT THE PRECONSTRUCTION MEETING NOTING ALL CHANGES TO PROPOSED SCHEDULE OF WORK PROPOSED OR WORK PROPOSED TO OCCUR CONCURRENTLY WITH OTHER ITEMS OF WORK.

TRAFFIC MAINTENANCE & CONTROL

TRAFFIC WILL BE MAINTAINED DURING THE CONSTRUCTION IN ACCORDANCE WITH THE CONSTRUCTION PLANS, MMUTCD (LATEST EDITION), SPECIFICATION 2550 AND ANY TRAFFIC TYPICAL PLANS INCLUDED IN SPECIFICATIONS. IN ADDITION TO THE BARRICADES AND SIGNS SPECIFIED ON THE CONSTRUCTION PLANS, THE CONTRACTOR SHALL ALSO PROVIDE NECESSARY SIGNS, FLAG CONTROL, BARRICADES AND LIGHTS TO PROTECT THE TRAFFIC AND THE WORK AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE PLASTIC DRUMS WITH BATTERY OPERATED AMBER FLASHERS (ONE PER) AS INDICATED ON PLANS.

THE CONSTRUCTION INFLUENCE AREA (C.I.A.) SHALL CONSIST OF THE WIDTH OF THE PROPOSED RIGHT-OF-WAY FROM THE PROJECT POINT OF BEGINNING TO THE POINT OF ENDING OR AS OTHERWISE INDICATED ON THE PLANS AND A SUFFICIENT DISTANCE BEFORE & AFTER THE PROJECT TO WARN MOTORISTS OF THE CONSTRUCTION AHEAD OR AS OTHERWISE DESCRIBED.

TRAFFIC MAINTENANCE AND CONTROL FOR THIS PROJECT WILL BE CONSIDERED INCIDENTAL TO THE PROJECT COSTS. THE COSTS OF ALL TRAFFIC CONTROL DEVICES NECESSARY TO CONSTRUCT THE PROJECT AS DETERMINED BY THE CONTRACTOR OR AS DIRECTED BY PROJECT ENGINEER WILL BE CONSIDERED INCIDENTAL TO PROJECT COSTS. ALL DEVICES TO HAVE LIGHTS OR FLASHERS MOUNTED ON THE ROADS TO BE OPEN TO LOCAL TRAFFIC UNLESS SPECIFICALLY WORKING IN THE RIGHT OF WAY. THE OWNER HAS PROJECT SIGNAGE TO BE PLACED DURING CONSTRUCTION. CONTRACTOR TO COORDINATE WITH THE OWNER INCIDENTAL TO PROJECT COSTS.

MISCELLANEOUS

PROTECTION AND RESTORATION OF PROPERTY: EXISTING ITEMS DISTURBED BY CONSTRUCTION ON THE PROJECT SHALL BE TEMPORARILY RESET BEYOND THE LIMITS OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER. ITEMS SHALL BE RESET OR REPLACED IN KIND BY THE CONTRACTOR IF ANY DAMAGE OCCURS WITHIN SEVEN (7) DAYS OF COMPLETION OF WORK WITHIN THE AFFECTED AREA. THE TEMPORARY RESETTING AND FINAL PLACEMENT OF THE ITEMS WILL BE CONSIDERED INCLUDED IN THE COST OF THE PROJECT.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE PROPERTY BEYOND THE LIMITS OF CONSTRUCTION, INCLUDING EXISTING FENCING, LAWN, TREES AND SHRUBBERY.

WHEN HMA BOND COAT IS SPECIFIED ON THE PLANS OR REQUIRED BY THE ENGINEER IN THE CONSTRUCTION OF THE PROJECT, IT WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE UNIT BID PRICE FOR HMA PAVING.

UNLESS INDICATED ON THE PLANS NO STORAGE OF MATERIALS, EQUIPMENT, ETC SHALL OCCUR IN THE FLOOD PLAIN LIMITS. FLOW IN THE FLOOD PLAIN TO BE MAINTAINED AT ALL TIMES.

FOR PROPOSED WORK IN AREAS CLOSE TO UTILITY POLES, NO EXCAVATIONS WITHIN TEN (10) FEET AND NO BORES WITHIN (5) FEET FROM THE UTILITY POLES ARE ALLOWED.

ALL TREES AND SHRUBS REQUIRED TO BE TRIMMED/PRUNED SHALL BE DONE IN A MANNER TO MAINTAIN NATURAL APPEARANCE. ALL TREES INDICATED TO BE PROTECTED ON THE PLANS OR AS DIRECTED BY THE PROJECT ENGINEER SHALL HAVE TEMP. PROTECTIVE MEASURES INSTALLED PER STANDARD SPECIFICATIONS.

CONTRACTOR RESPONSIBLE TO REPAIR OR REPLACE ANY EXISTING TRAFFIC SIGNS DAMAGED BY HIS OPERATION DURING CONSTRUCTION. SIGNS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MMUTCD.

ACCESS TO AREAS OUTSIDE OF PROJECT LIMITS TO BE APPROVED BY THE ENGINEER PRIOR TO START OF CONSTRUCTION.

CONTRACTOR TO COORDINATE CONSTRUCTION ACTIVITIES WITH OTHER CONTRACTORS WORKING IN AREA.

CONTRACTOR IS TO REVIEW SOIL BORING DATA & RECOMMENDATIONS AS PREPARED BY THE GEOTECHNICAL FIRM IF AVAILABLE.

ANY DEWATERING NECESSARY TO CONSTRUCT THIS PROJECT SHALL BE CONSIDERED INCIDENTAL AND ALL COSTS ASSOCIATED SHALL BE INCLUDED IN THE UNIT BID PRICE FOR THE AFFECTED UTILITY INSTALLATION.

ALL UTILITY CROSSINGS TO HAVE A MINIMUM OF 18" VERTICAL CLEARANCE TYPICAL.

ALL GRAVEL ACCESS DRIVES TO BE 1x3 PER OCWRC DETAIL.

UTILITIES

THE FOLLOWING UTILITY COMPANIES MAY HAVE FACILITIES WITHIN THE PROJECT LIMITS:

CENTURYTEL MICHIGAN NETWORK
MICHAEL BERGERON
100 SECOND STREET
PINCONNING, MICHIGAN 48650
(989) 879-8798

CONSUMER ENERGY CO.
JOHN HILL
ROYAL OAK OFFICE
4600 COOLIDGE HWY.
ROYAL OAK, MICHIGAN 48073
(248) 435-5618
EMER:

DETROIT EDISON UNDERGROUND
MARK COLLINS
1970 ORCHARD LAKE ROAD
SYLVAN LAKE, MICHIGAN 48320
(586) 457-3256
EMER: (800) 477-4747

DETROIT EDISON
JIM HAMMOND
37849 INTERCHANGE DRIVE
FARMINGTON HILLS, MICHIGAN 48335
(248) 427-2982

McLEOD USA
GREG SERICH
1295 S. LINDEN ROAD
FLINT, MICHIGAN 48532
(810) 244-3500

NORLIGHT TELECOMMUNICATIONS
CHRIS LENTINE
612 WEST LAKE LANSING ROAD
SUITE 400
EAST LANSING, MICHIGAN 48823
(517) 304-2946

AT&T
JEFF HEATH
54 N. MILL ST., BOX 33
PONTIAC, MICHIGAN 48342
(248) 456-0820
EMER: (800) 515-7272

ALL UTILITIES WITHIN ZONE OF INFLUENCE OF PROPOSED WORK ARE TO BE FIELD LOCATED AND HAND DUG INCLUDED IN THE UNIT BID PRICES FOR APPROPRIATE ITEMS.

ALL GAS FACILITIES SHALL BE PROTECTED AND SUPPORTED PER MICHCON OR CONSUMER ENERGY STANDARDS AS APPLICABLE.

PRIOR TO WORK ON FACILITIES BELONGING TO THE ABOVE AGENCIES, A MINIMUM OF 72 HOURS NOTICE MUST BE GIVEN IN ORDER TO INSURE PROPER INSPECTION BY THE RESPECTIVE AGENCIES.

CONCRETE, GRADE S3, SHALL BE USED TO ENCASE UTILITIES THAT ARE IN CLOSE PROXIMITY TO THE PROPOSED CONSTRUCTION ONLY AS DIRECTED BY THE ENGINEER.

ALL EXPLORATORY WORK REQUIRED FOR LOCATING EXISTING UTILITIES SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE CONSTRUCTION OF THE PROJECT.

THE EXISTING UTILITIES LISTED HEREIN AND SHOWN ON THESE PLANS REPRESENT THE BEST INFORMATION AVAILABLE AS OBTAINED FROM SURVEYS AND FROM UTILITY RECORD MAPS. THIS INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO SATISFY HIMSELF AS TO THEIR ACCURACY OR OF HIS RESPONSIBILITY IN CASE UTILITIES HAVE BEEN CONSTRUCTED, RELOCATED OR REMOVED.

OWNERS OF PUBLIC UTILITIES WILL NOT BE REQUIRED TO MOVE ADDITIONAL POLES AND STRUCTURES THAT ARE NOT SPECIFICALLY INDICATED AS SUCH ON THE PLANS.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK, AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO INSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

FOR PROTECTION OF UNDERGROUND UTILITIES, THE CONTRACTOR SHALL DIAL 800-482-7171 A MINIMUM OF 3 WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS, PRIOR TO EXCAVATING IN THE VICINITY OF UTILITY LINES. ALL "MISS DIG" PARTICIPATING WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

REMOVAL NOTES

THE PAY ITEM "EARTH EXCAVATION" SHALL INCLUDE THE PROPER REMOVAL OF EXISTING NATIVE MATERIAL TO PLAN GRADE FOR THE PROPOSED STREAM CROSS SECTION LILNE AND GRADE. SEPARATION OF SUITABLE FILL MATERIAL FOR USE ELSEWHERE. UNUSABLE MATERIALS SHALL BE TAKEN OFFSITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR.

MISC ITEMS OF WORK

SEVERAL PAY ITEMS INCLUDED IN THE PROPOSAL ARE NOT SPECIFICALLY SHOWN ON THE PLANS. THESE ITEMS SHALL BE CONSTRUCTED AS DIRECTED BY THE PROJECT ENGINEER OR USED AS NEEDED. THEY ARE:

MOBILIZATION_ .LSUM

RESTORATION

RESTORATION OF THE SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING AND SHALL BE PAID FOR AS INDICATED BELOW:

1. ANY DAMAGE TO THE TRAIL SHALL BE RESTORED PER DETAILS, INCIDENTAL TO THEPROJECT COSTS.
2. ALL DISTURBED AREAS IN THE FLOOD PLAIN SHALL BE RESTORED WITH SEED MIX 'A' AND WOOD CHIP MULCH. THE UNIT PRICE FOR "TREE REMOVAL" SHALL INCLUDE ALL LABOR, MATERIALS, AND EQUIPMENT TO CHIP EXISTING ON-SITE MATERIALS FOR MULCH AND PLACE AS NOTED ON THE PLANS.
3. RESTORATION IN OTHER AREAS TO BE PER PLAN NOTES AND DETAILS.

REMOVE ALL CONSTRUCTION EQUIPMENT, EXCESS MATERIALS, DEBRIS, ETC., ESTABLISH FINE GRADE, AND RESTORE (PER PLANS AND SPECIFICATIONS). ALL COSTS FOR THE LABOR, EQUIPMENT AND MATERIALS SHALL BE INCLUDED IN UNIT PRICE BID FOR GRADING.

REMOVE ANY HAUL ROADS OR ACCESS ROADS, MATERIAL STOCKPILES, AND CONSTRUCTION FENCING. THIS SHALL BE CONSIDERED INCIDENTAL TO PROJECT ITEM. CONTRACTOR TO COORDINATE WITH CITY DURING HAUL ROAD REMOVAL.

ALL PAVEMENT DAMAGED DURING CONTRACTOR OPERATIONS SHALL BE REPLACED AT THE EXPENSE OF THE CONTRACTOR TO CITY OR RCOC SPECIFICATIONS.

WATER REQUIRED FOR SOD AND SEEDING SHALL BE INCLUDED IN THE CONTRACT COST FOR THESE ITEMS. WATER REQUIRED FOR COMPACTION SHALL BE INCLUDED IN THE COST OF CONSTRUCTION FOR THIS PROJECT. CONTRACTOR SHALL WATER THE PLANTINGS AND SEEDED AREAS DAILY FOR A MINIMUM OF 14 DAYS WITH AN ADDITIONAL FOUR (4) WATERING EVENTS IN THE FOLLOWING TWO WEEKS AFTER THE DAILY WATERING. WATERING SHALL NOT OCCUR ON SATURDAYS, SUNDAYS, OR IMMEDIATELY AFTER RAIN EVENTS. ALL EXCEPTIONS SHALL BE APPROVED BY THE PROJECT ENGINEER. WATER CAN BE TAKEN FROM THE RIVER FOR THE PLANTINGS.

ALL AREAS DISTURBED BY THE CONTRACTOR AND/OR HIS SUBCONTRACTOR BEYOND THE NORMAL CONSTRUCTION LIMITS OF THIS PROJECT SHALL BE RESTORED AS SPECIFIED OR DIRECTED BY THE ENGINEER. NO ADDITIONAL PAYMENT OR COMPENSATION WILL BE ALLOWED FOR THIS ACTIVITY.

SPRINKLER SYSTEMS SHALL NOT BE COVERED WHEN PLACING TOPSOIL AND SOD.

ALL DISTURBED AREAS TO BE RESTORED WITHIN SEVEN (7) DAYS OF COMPLETION.

CONTRACTOR TO CHECK ON SEED AND SOD GROWTH & SUPPLEMENT AS NEEDED. COSTS FOR RESEEDING AND RESODDING TO BE INCLUDED IN THE UNIT PRICE FOR SITE RESTORATION.

ALL LABOR, EQUIPMENT AND MATERIALS NEEDED TO RESTORE ANY DAMAGE TO THE GRAVEL PATH, PER DETAIL, SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT COSTS.

GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES:

1. CHANNEL WORK WILL NOT BE ALLOWED BETWEEN APRIL 1 AND JULY 1 DUE TO FISHERIES CONCERNS.
2. THE CONTRACTOR SHALL MINIMIZE THE AREA AND DURATION OF DISTURBANCE BY ANY EQUIPMENT WHILE PERFORMING THE WORK. APPLY WOOD CHIPS TO DISTURBED FLOODPLAIN AREAS (LIMITS OF DISRUPTION) AT A RATE OF 10 TONS (50 CYD) PER ACRE. PAYMENT FOR WOOD CHIPS INCLUDED UNDER PAY ITEM-TREE REMOVAL AND EXISTING TREES REMOVED ON-SITE SHALL BE CHIPPED AND USED.
3. EQUIPMENT ACCESS TO THE CHANNEL SHALL BE LIMITED TO THOSE AREAS SHOWN ON THE PLAN OR AS DIRECTED BY THE OWNER OR ENGINEER. ACCESS ROAD TO BE PAID UNDER PAY ITEM - GRAVEL ACCESS WITH GEOTEXTILE UNDERLAY.
4. SILT FENCE SHALL BE INSTALLED ALONG STOCK PILE AREAS AND AS DIRECTED BY THE ENGINEER.
5. PERMANENT EROSION CONTROL MEASURES SHALL BE INSTALLED AS SOON AS POSSIBLE FOLLOWING FINAL GRADING.

HEAVY EQUIPMENT ACCESS AND OPERATION

1. THE CONTRACTOR SHALL STAY WITHIN THE LIMITS OF DISTURBANCE AND MINIMIZE THE AREA AND DURATION OF DISTURBANCE AT ALL TIMES. THE LIMITS OF TREE CLEARING AS SHOWN TO BE INCLUDED UNDER PAY ITEM - "TREE REMOVAL" ALL OTHER TREE CLEARING NECESSARY FOR SITE ACCESS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE, APPROVED BY THE ENGINEER, AND SHAL BE INCIDENTAL TO THE PROJECT.
2. THE CONTRACTOR SHALL USE REASONABLE MEASURES TO AVOID SOIL COMPACTION BY HEAVY EQUIPMENT.
3. EQUIPMENT LOCATION SHOULD BE LIMITED TO: AGGREGATE INGRESS/EGRESS, EXISTING STONE RIFFLES, POINT BARS, AND BANKFULL BENCH AREAS TO THE MAXIMUM EXTENT POSSIBLE.
4. ALL HEAVY EQUIPMENT THAT WILL CROSS OR WORK IN THE RIVER SHALL BE EQUIPPED WITH BIODEGRADABLE HYDRAULIC FLUID WITH CERTIFICATIONS TO BE PROVIDED TO THE ENGINEER.
5. CONTRACTOR SHALL USE EQUIPMENT SUITABLE FOR WORK IN THE STREAM. THE INSPECTOR RESERVES THE RIGHT TO EXCLUDE ANY EQUIPMENT HE DEEMS UNACCEPTABLE TO ENTER THE RIVER DUE TO LEAKING FLUIDS, ACCUMULATED SEDIMENT, OR OTHER POTENTIAL HAZARDS TO WATER QUALITY. TEMPORARY RIP RAP OR OTHER MEANS AS NECESSARY SHALL BE USED TO PROTECT THE EDGE OF THE STREAMBANK WHEN ENTERING OR EXITING THE STREAM. THE ACCESS PATH WILL BE GRADED AND STABILIZED BY THE CONTRACTOR TO SUPPORT HIS OPERATIONS WHILE MINIMIZING DISRUPTION AND RESTORATION. THE CONTRACTOR SHALL PROVIDE ACCESS PLANS AND DETAILS FOR CITY REVIEW AT THE PRE-CONSTRUCTION MEETING. ALL COSTS ASSOCIATED WITH THE CONTRACTOR'S CHOSEN MEANS OF ACCESS SHALL BE INCIDENTAL TO THE PROJECT AND INCLUDED IN OTHER LINE ITEMS AS NECESSARY. THE CITY WILL NOT COMPENSATE THE CONTRACTOR FOR EXCESS CLEARING, GRADING, OR RESTORATION DUE TO THE CONTRACTOR'S OPERATIONS SELECTED.

PERMANENT EROSION CONTROL MEASURES

INSTALL PERMANENT EROSION CONTROL MEASURES AT THE FOLLOWING LOCATIONS OR AS INDICATED IN THE FIELD BY THE OWNER OR ENGINEER.

STONE REVETMENT FILL RIVERBANK DETAIL ALONG THE RIGHT BANK (FACING DOWNSTREAM) AT STATION 317+70 to 315+40 and 315+10 to 315+60.

ROUGHENED TOE PROTECTION FILL RIVERBANK DETAIL ALONG THE RIGHT BANK AT STA.320+20-319+70 and 315+80-315+00. INSTALL THIS DETAIL ALONG THE LEFT BANK AT STA.320+40-319+70

HABITAT BOULDERS WITHIN THE CENTRAL THALWEG CHANNEL FROM STATION 320+65 TO 320+30, 318+60 TO 318+35, AND 316+10 TO 315+75.

EROSION CONTROL BLANKETS ALONG ALL DISTURBED RIVER BANKS, ALONG THE LEFT BANK FROM STA. 320+75 TO 319+40 AND FROM STA. 318+10 TO 315+60, ALONG THE RIGHT BANK FROM STA. 320+40 TO 319+60, STA. 317+60 TO 315+00, THE NORTH AND SOUTH SIDES OF THE SANDY LOAM EXCAVATION AREA, AROUND THE VERNAL POOL, AND ALL FLOODPLAIN AREAS DISTURBED BY HEAVY EQUIPMENT. ALSO INSTALL 4-6" COMPOST BLANKET, SEED, STRAW WATTLES, AND EROSION CONTROL BLANKET OVER THE UPPER TERRACE SLOPE FAILURE OF THE RIGHT BANK AT STA. 317+00 TO 316+90 OR AS DIRECTED IN THE FIELD (SEE C/S 317+00). RESTORE ALL GRASSED AREAS WITH: 3" TOPSOIL, CLASS 'A' SOD, AND FERTILIZER.

SEE PLAN AND PROFILE SHEET FOR LOCATION OF FLOW RE-DIRECTIVE STRUCTURES.

SEQUENCE OF CONSTRUCTION - SOIL EROSION CONTROL

1. CONTRACTOR TO PLACE APPROVED SOIL EROSION BARRIERS AND CONSTRUCTION FENCING. WHILE SILT FENCE IS NOT SHOWN ON THE PLANS AS THE PROPOSED WORK IS WITHIN THE STREAM AND FLOODPLAIN, IT SHALL BE PLACED AROUND ALL MATERIAL STOCKPILE AREAS PER OCWRC DETAILS.
2. REMOVE VEGETATION AND TOPSOIL FROM CONSTRUCTION AREA.
3. BEGIN CONSTRUCTION.
4. CHECK AND MAINTAIN SOIL EROSION CONTROL MEASURES.
5. COMPLETE CONSTRUCTION.
6. RESTORE ALL DISTURBED AREAS AS SPECIFIED HERIN UNDER HEADING OF RESTORATION.
7. CONTRACTOR TO MAINTAIN SOIL EROSION MEASURES THROUGHOUT THE DURATION OF THE PROJECT UNTIL GRASS IS ESTABLISHED, THEN THE CONTRACTOR IS TO REMOVE THEM.

ALL SOIL EROSION CONTROL MEASURES AS SHOWN ON THESE PLANS OR AS NEEDED TO COMPLETE THIS PROJECT PAID FOR AT THE UNIT PRICES AS INCLUDED IN THE PROPOSAL. ADDITIONAL SILT FENCE AND/OR OTHER SOIL EROSION CONTROL MEASURES MAY BE REQUIRED.

PERMITS

MDEQ PART 31 PERMIT NO. (PENDING)

OCWRC SOIL EROSION CONTROL PERMIT NO.: (PENDING)

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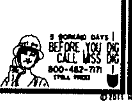
JUL 12 2011
DNRE/WRD
PERMIT CONSOLIDATION UNIT



CLINTON RIVER
WATERSHED COUNCIL

HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers

555 HULET DRIVE
BLOOMFIELD HILLS, MICH.
P.O. BOX 824
48303 - 0824
PHONE: (248) 454-6300
FAX (1st Floor): (248) 454-6312
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WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-PCU PRE APP. COMMENTS
7-6-11	ISSUED FOR MDEQ PERMIT No.1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.M.

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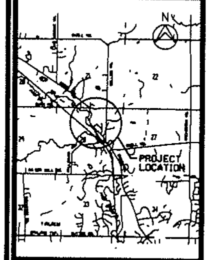

PAINT CREEK
HABITAT RESTORATION
DAM REMOVAL

OAKLAND COUNTY MICHIGAN

NOTES

HRC JOB NO.	SCALE
20110115	NO SCALE
DATE	SHEET NO.
MARCH 2011	02 of

Revised

RECEIVED
JUL 12 2011
DNRE/WRD
PERMIT CONSOLIDATION UNIT

NOTICE!
ALL EXISTING UTILITIES SHOWN ON THIS TOPOGRAPHIC SURVEY HAVE BEEN TAKEN FROM VISUAL OBSERVATION, AND RECORD MAPPING WHERE AVAILABLE. NO GUARANTEE IS MADE - OR IMPLIED OR ASSUMED, AS TO THE COMPLETENESS OR ACCURACY OF THE UTILITIES SHOWN ON THIS DRAWING. PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS PRIOR TO CONSTRUCTION ACTIVITIES.

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 800-482-7171 (TOLL FREE)

CLINTON RIVER WATERSHED COUNCIL

HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers
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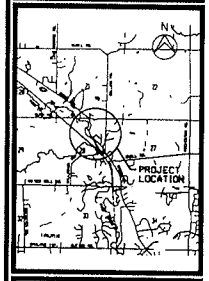
DATE	ADDITIONS AND/OR REVISIONS
7-13-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-6-11	ISSUED FOR MDEQ PERMIT (pm)

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.M.



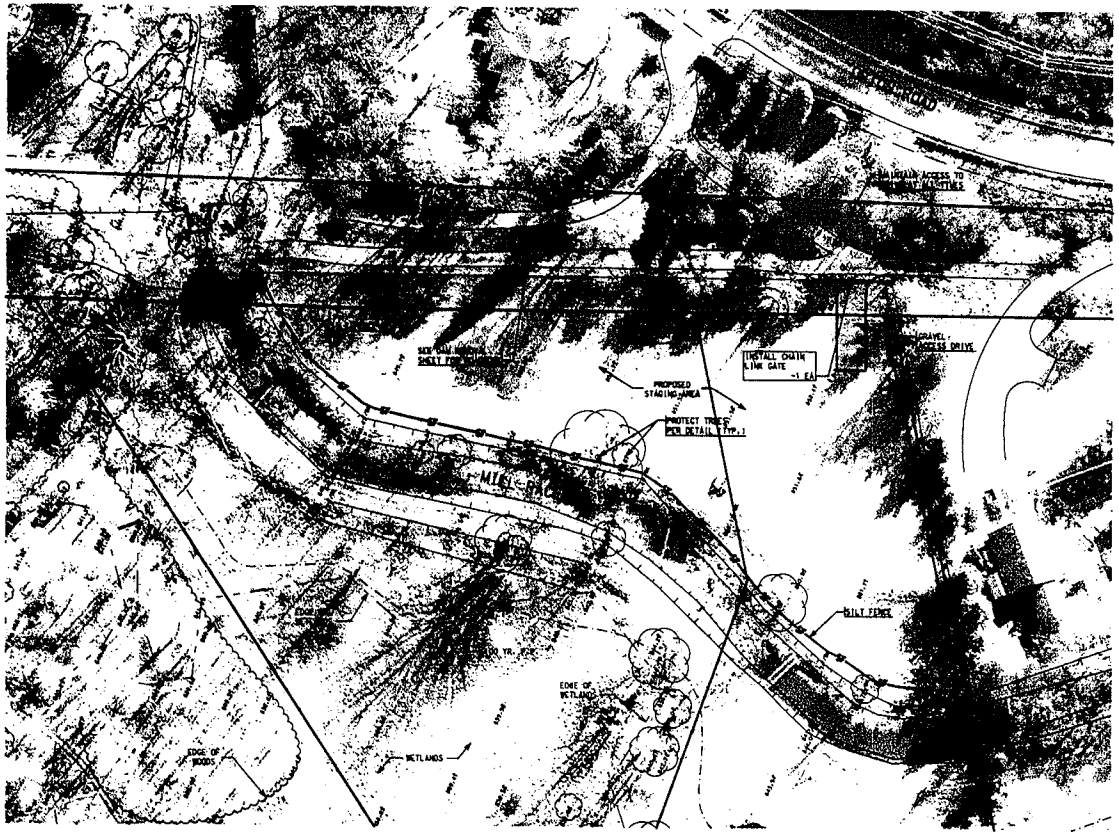
PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

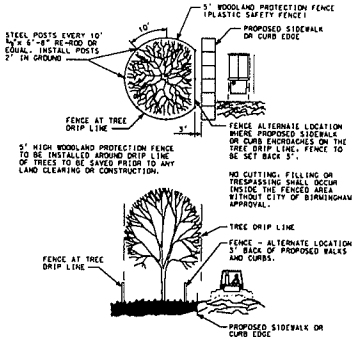
ACCESS PLAN

HRC JOB NO. 20110115	SCALE 1" = 80'
DATE MARCH 2011	SHEET NO. 03 OF

Revised



SCALE: 1" = 50'



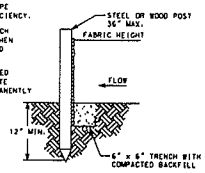
ALL SPRINKLER HEADS OR SPRINKLER SYSTEMS DAMAGED OR DISTURBED BY THE CONTRACTOR SHALL BE REPLACED AND REPAIRED TO THE SATISFACTION OF THE ENGINEER. REPLACEMENT, RELOCATION OR REPAIRS TO SPRINKLER SYSTEMS WILL BE INCIDENTAL TO THE PROJECT.

TREE PROTECTION DETAILS

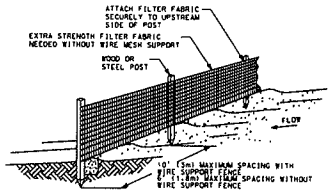
NO SCALE

NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" MAXIMUM RECOMMENDED STORAGE HEIGHT.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.



TRENCH DETAIL



SC-2 SILT FENCE

NO SCALE

RESTORATION NOTES:

1. REMOVE ALL EQUIPMENT, MATERIALS, STOCK PILES ETC.
2. REMOVE GRAVEL ACCESS DRIVE.
3. GRADE DISTURBED AREAS. MATCH EXISTING GRADES.
4. PLACE 2" TOPSOIL ON ALL BARE OR DISTURBED AREAS.
5. OVERSEED ALL AREAS WITH SEED MIX SPECIFIED. THIS SHEET.
6. PLACE STRAW MULCH ON ALL DISRUPTED AREAS.
7. WATER AREA FOR 14 DAYS. RIVER WATER MAY BE USED.
8. REMOVE SILT FENCE.
9. LOCK GATE WITH CHAIN AND PADLOCK.
10. PROVIDE 2 KEYS TO PROJECT ENGINEER.

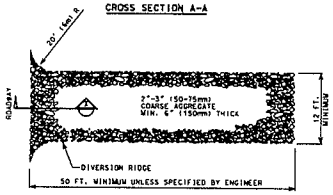
NOTES:

1. LOCATION OF NEW GATE TO BE FIELD LOCATED BY THE PROJECT ENGINEER PER EASEMENT CONDITIONS.
2. CONTRACTOR TO PROTECT REMAINING FENCE.
3. CONTRACTOR TO PROTECT ALL EXISTING TREES IN STAGING AREA. PER TREE PROTECTION DETAIL THIS SHEET. (INCIDENTAL)
4. CONTRACTOR TO MOW/BRUSH SITE BUT NOT GRADE OR EXCAVATE TO PRESERVE VEGETATION.
5. RESTORE ALL DISTURBED AREAS PER NOTES THIS SHEET.
6. NO WORK OR STORAGE OF MATERIALS EXCEPT SILT FENCING SHALL BE WITHIN 20' OF TOP OF MILL RACE BANKS.

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

CROSS SECTION A-A



SC-3 TEMPORARY GRAVEL ACCESS

NO SCALE

QUANTITIES THIS SHEET			
NO.	DESCRIPTION	UNIT	QTY.
1	REMOVE FENCE	LFT	20
2	CHAIN LINK GATE (20 FT WIDE)	EA	1
3	SESC MEASURES	LS	1
4	STAGING AREA PREP	LS	1
5	STAGING AREA RESTORATION	LS	1

NOTICE:

ALL EXISTING UTILITIES SHOWN ON THIS TOPOGRAPHIC SURVEY WERE BEEN TAKEN FROM VISUAL OBSERVATION, AND RECORD MAPPING WHERE AVAILABLE. NO GUARANTEE IS MADE, OR SHOULD BE ASSUMED, AS TO THE COMPLETENESS OR ACCURACY OF THE UTILITIES SHOWN ON THIS DRAWING. PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS PRIOR TO CONSTRUCTION ACTIVITIES.

8 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 800-482-7171

CLINTON RIVER WATERSHED COUNCIL

HRC
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555 HULET DRIVE
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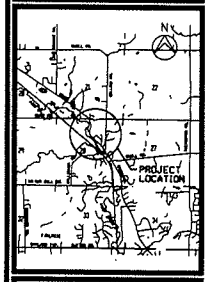
PHONE: (248) 454-6300
FAX (Tel. Phone): (248) 454-6312
FAX (Dwl. Phone): (248) 338-2000
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
7-13-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-6-11	REVISED PER MDEQ PERMIT Rev 1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	E.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

STAGING AREA PLAN

HRC JOB NO. 20110115	SCALE 1" = 50'
DATE JUNE 2011	SHEET NO. 04 OF

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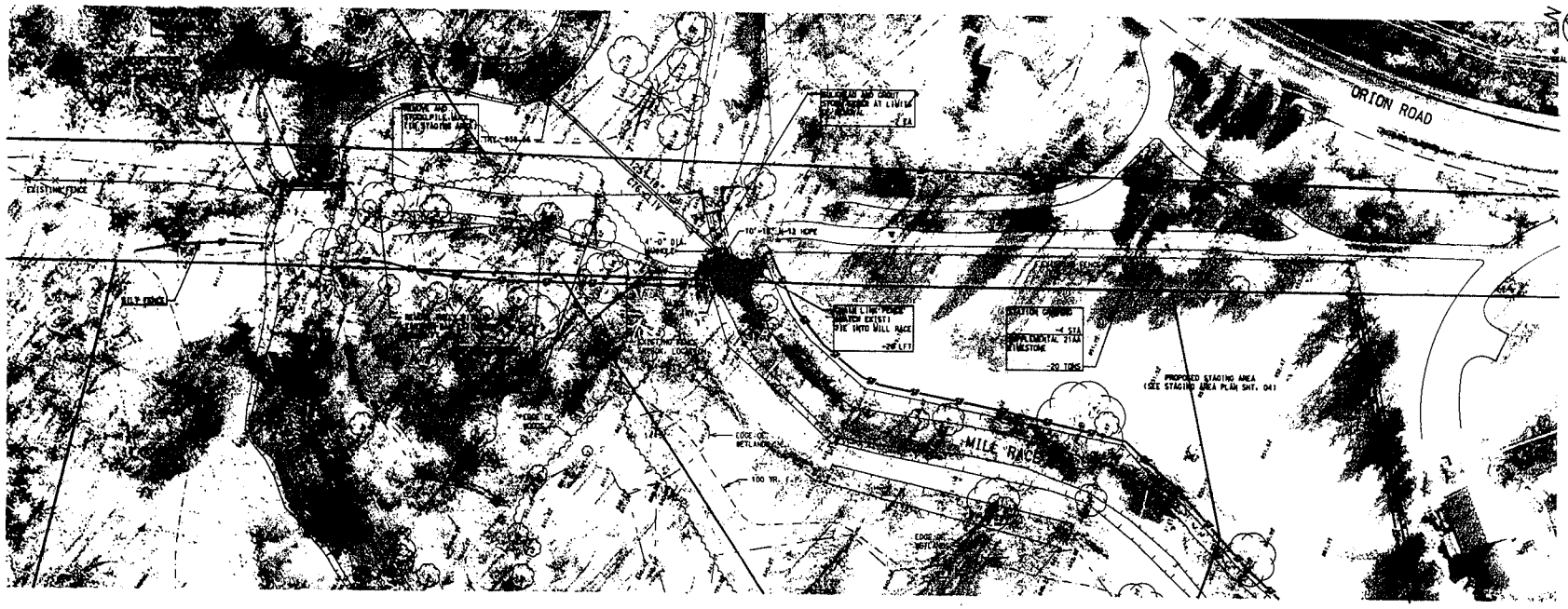
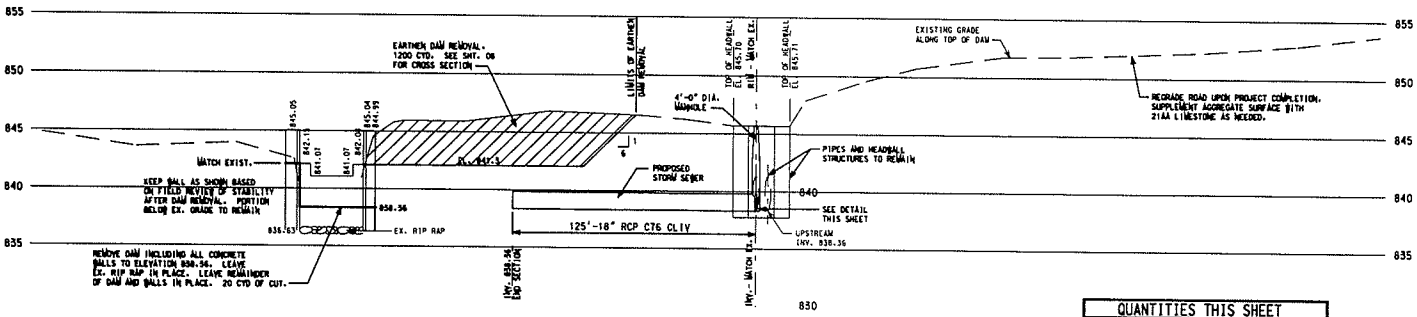
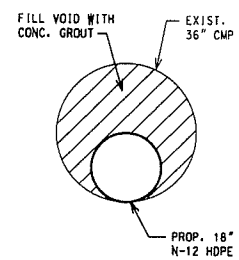
RECEIVED
JUL 12 2011
DNRE/WRD
PERMIT CONSOLIDATION UNIT

Revised





SCALE: 1" = 30' HOR.
1" = 5' VERT.



PIPE DETAIL BULKHEAD
NO SCALE

RESTORATION:

UNLESS OTHERWISE SPECIFIED ALL DISTURBED AREAS SHALL BE RESTORED BY GRADING OUT DISRUPTED AREAS, PLACING 2" TOPSOIL, SEEDING MIX 'A' AND STRAW MULCH.

DAM REMOVAL NOTES:

1. REMOVE ALL CONCRETE STRUCTURES RELATED TO DAM TO ELEVATION SHOWN.
2. REMOVE TIMBER DECK/SITTING AREA.
3. ACCESS TO NORTHERN SIDE OF DAM TO BE THRU RIVER.
4. CONTRACTOR TO MAINTAIN CONTINUOUS FLOW FROM UPSTREAM TO DOWNSTREAM OF DAM THROUGHOUT CONSTRUCTION.
5. DAM SHALL BE REMOVED IN 3, 9"-12" SECTIONS AND ALLOW FOR RIVER FLOW TO STABILIZE.
6. DAM REMOVAL TO OCCUR "IN THE DRY".

EARTHEN DAM REMOVAL:

1. CLEAR ALL TREES ON OR WITHIN 15-20 FT EACH SIDE (50'-40' TOTAL WIDTH) OF EARTHEN DAM.
2. TREES MAY BE USED FOR OTHER STRUCTURES AS CALLED FOR ON-SITE OR CHIPPED FOR MULCH USED FOR ON-SITE RESTORATION.
3. ALL OTHER TREES TO BE PROTECTED.
4. EXCAVATE EARTHEN DAM TO ELEVATIONS SHOWN.
5. EXCAVATED MATERIAL MAY BE USED ELSEWHERE ON SITE AS SPECIFIED.
6. RESTORE WITH 2" TOPSOIL, SEED MIX 'A' AND STRAW BLANKETS.

QUANTITIES THIS SHEET

NO.	DESCRIPTION	UNIT	QTY.
1	STATION GRADING	STA	4
2	21AA LIMESTONE	TONS	20
3	REMOVE FENCE	LFT	250
4	CHAIN LINK FENCE	LFT	20
5	BULKHEAD AND GROUT STORM SEWER	EA	2
6	REMOVE CONCRETE DAM	EA	1
7	REMOVE EARTHEN DAM	LS	1
8	CLEARING	LS	1
9	SESC MEASURES	LS	1
10	EARTHEN DAM RESTORATION	LS	1
11	RESTORATION	LS	1
12	18" DIA. CT6 CLIV RCP	LFT	125
13	18" DIA. N-12 HDPE	LFT	10
14	4'-0" DIA. MANHOLE	EA	1
15	18" CONC. END SECTION	EA	1
16	REMOVE MUCK	LS	1

SOIL BORING LOCATION OF SAMPLE TAKEN FOR SIEVE ANALYSIS

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3 WORKING DAYS! BEFORE YOU DIG CALL MISS DIG 800-482-7171 (TOLL FREE)

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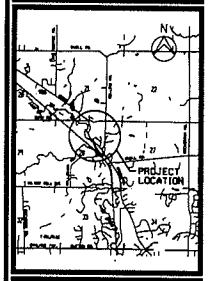
FAX (Tel. Phone): (248) 454-6312
FAX (2nd Phone): (248) 338-3882
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-6-11	ISSUED FOR MDEQ PERMIT App.

DESIGNED J.F.B.
DRAWN J.A.R.
CHECKED J.F.B.
APPROVED S.D.W.



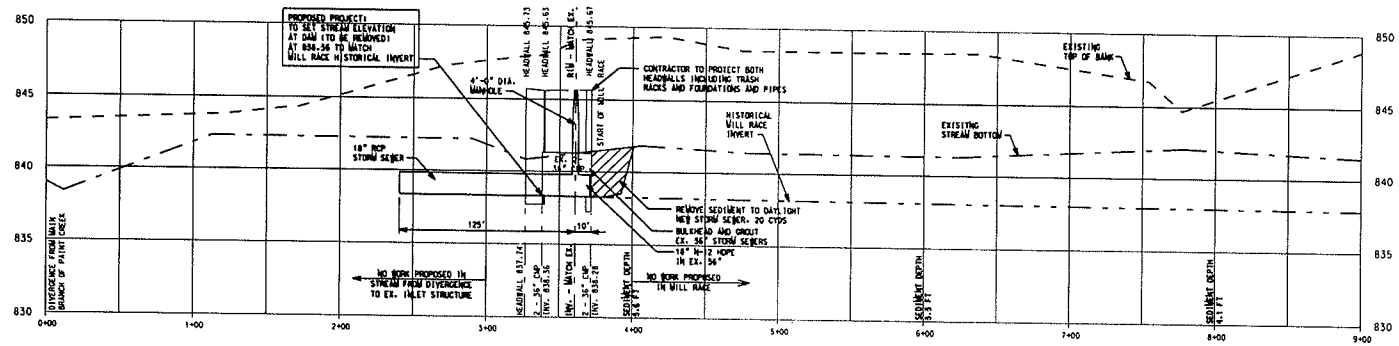
PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY — MICHIGAN

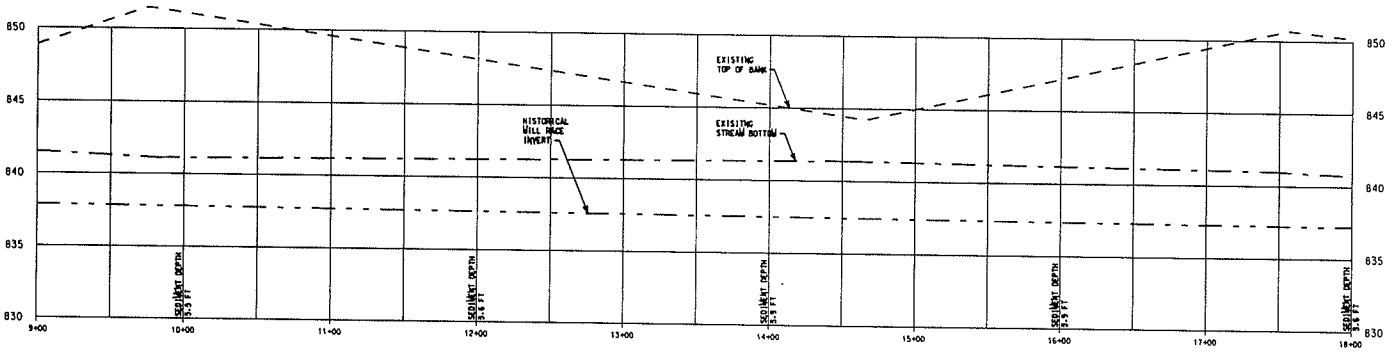
DAM REMOVAL PLAN AND PROFILE

HRC JOB NO. 20110115
SCALE 1" = 50' HOR. 1" = 5' VERT.
DATE MARCH 2011
SHEET NO. 05 OF

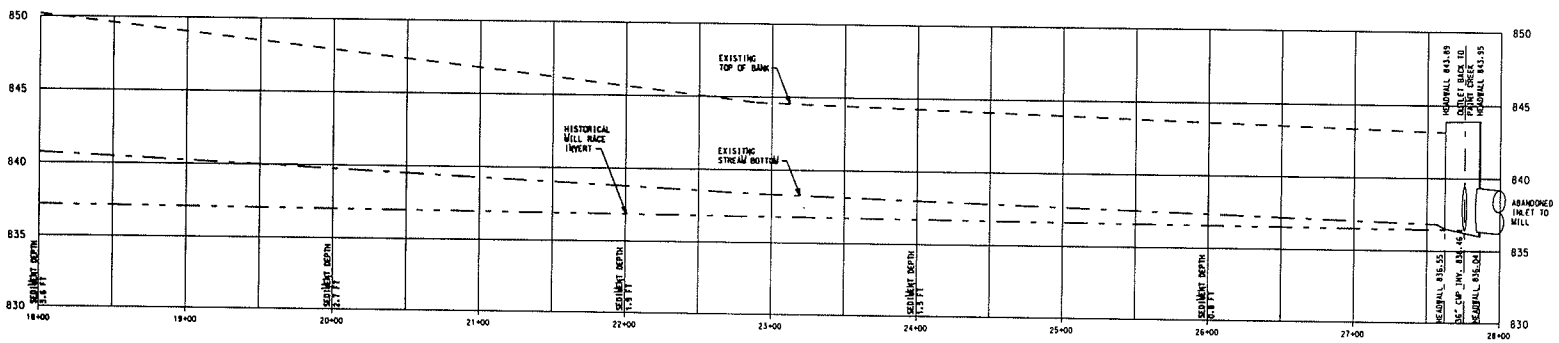
Revised



SCALE: 1" = 40' HOR.
1" = 4' VERT.



SCALE: 1" = 40' HOR.
1" = 4' VERT.



SCALE: 1" = 40' HOR.
1" = 4' VERT.

NOTES:

1. NO WORK IS PROPOSED IN THE MILL RACE FROM STA. 4+00 TO STA. 28+00
2. HEADWALLS AND PIPES AS SHOWN TO REMAIN.

NOTE:

SEE SHEET 03 (ACCESS PLAN) FOR PLAN VIEW OF MILL RACE

NOTICE:

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FAX (Dwg. Phone): (248) 258-2822
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DATE	ADDITIONS AND/OR REVISIONS
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7-6-11	REVISED PER WRD PERMIT No. 1

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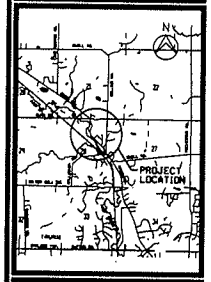
CHECKED J.F.B.
APPROVED K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

MILL RACE PROFILE

HRC JOB NO. 20110115
SCALE 1" = 40' HOR. 1" = 4' VERT.
DATE JUNE 2011
SHEET NO. 06 OF

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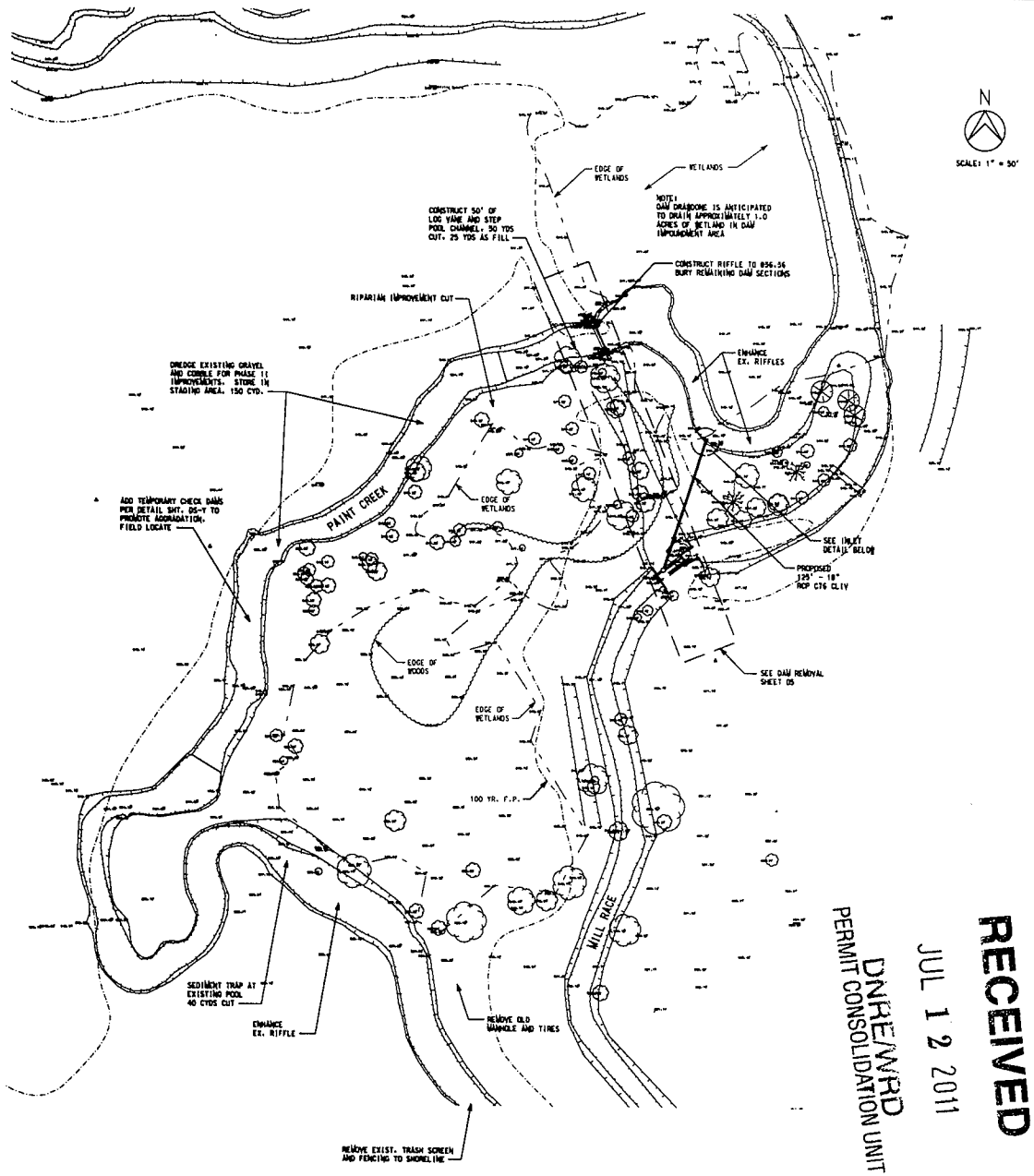
Revised



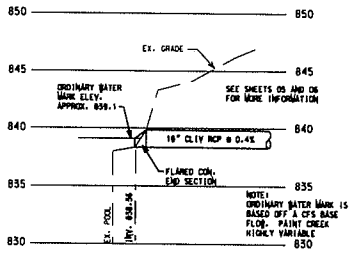
N

SCALE: 1" = 50'

NOTES:

1. ALL WORK SHOWN ON THIS SHEET INCLUDED IN PHASE I IMPROVEMENTS AND ARE INCLUDED IN NDEQ PERMIT APPLICATION No. 1.
2. SEE PROFILE (SHEET 08) FOR MORE INFORMATION.
3. ENHANCEMENT OF RIFFLES TO BE WITH 12"-18" DIA. FIELD STONE CHOKED OFF WITH PROGRESSIVELY SMALLER STONES.
4. SEE DETAIL SHEETS DS-A AND DS-B FOR TYPICAL DETAILS.
5. RIFFLE ENHANCEMENT AT GUMM ROAD SHOWN ON SHEET 09 INCLUDED IN PHASE I IMPROVEMENTS AND NDEQ PERMIT APPLICATION No. 1.
6. RIPARIAN IMPROVEMENT CUT IS INVASIVE SPECIE REMOVAL. NO EARTH DISRUPTION.

QUANTITIES THIS SHEET				CUT/FILL QUANTITIES			
				BELOW ORD. CUT		BELOW ORD. FILL	
NO.	DESCRIPTION	UNIT	QTY.	UNIT	QTY.	UNIT	QTY.
1	REMOVE TRASH SCREEN	LS	1				
2	REMOVE MANHOLE AND TIRES	LS	1				
3	CONSTRUCT AND MAINTAIN INSTREAM SEDIMENT TRAPS	LS	1	CYD	40		
4	RIPARIAN IMPROVEMENT CUT	AC	2				
5	LOG VANE AND STEP POOL	LFT	50	CYD	50	CYD	25
6	12" - 36" DIA. FIELD STONE	CYD	180	CYD	200	CYD	255
7	4" - 12" DIA. FIELD STONE	CYD	50				
8	1/2" - 4" DIA. RIVER RUN GRAVEL	CYD	25				
9	HABITAT BOULDERS	EA	50				
10	DREDGE EXIST. GRAVEL	CYD	150	CYD	150		



INLET DETAIL

1" = 50' HOR.
1" = 5' VERT.

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NOTICE:

ALL EXISTING UTILITIES SHOWN ON THIS TOPOGRAPHIC SURVEY MAP, WERE TAKEN FROM VISUAL OBSERVATION AND RECORD MAPPING WHEN AVAILABLE. NO GUARANTEE IS MADE, OR SHOULD BE ASSUMED, AS TO THE COMPLETENESS OR ACCURACY OF THE UTILITIES SHOWN ON THIS DRAWING. PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS PRIOR TO CONSTRUCTION ACTIVITIES.

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48303 - 0824
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FAX (2nd. Floor): (248) 338-8087
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER NDEQ PHS INV. COMMENTS
7-6-11	ISSUED FOR NDEQ PERMIT No. 1

DESIGNED J.F.B.
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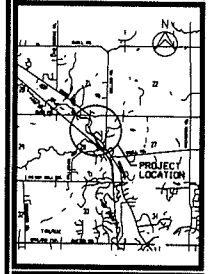
APPROVED K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

PHASE I IMPROVEMENTS

HRC JOB NO. 20110115
SCALE 1" = 50'
DATE MARCH 2011
SHEET NO. 07 OF

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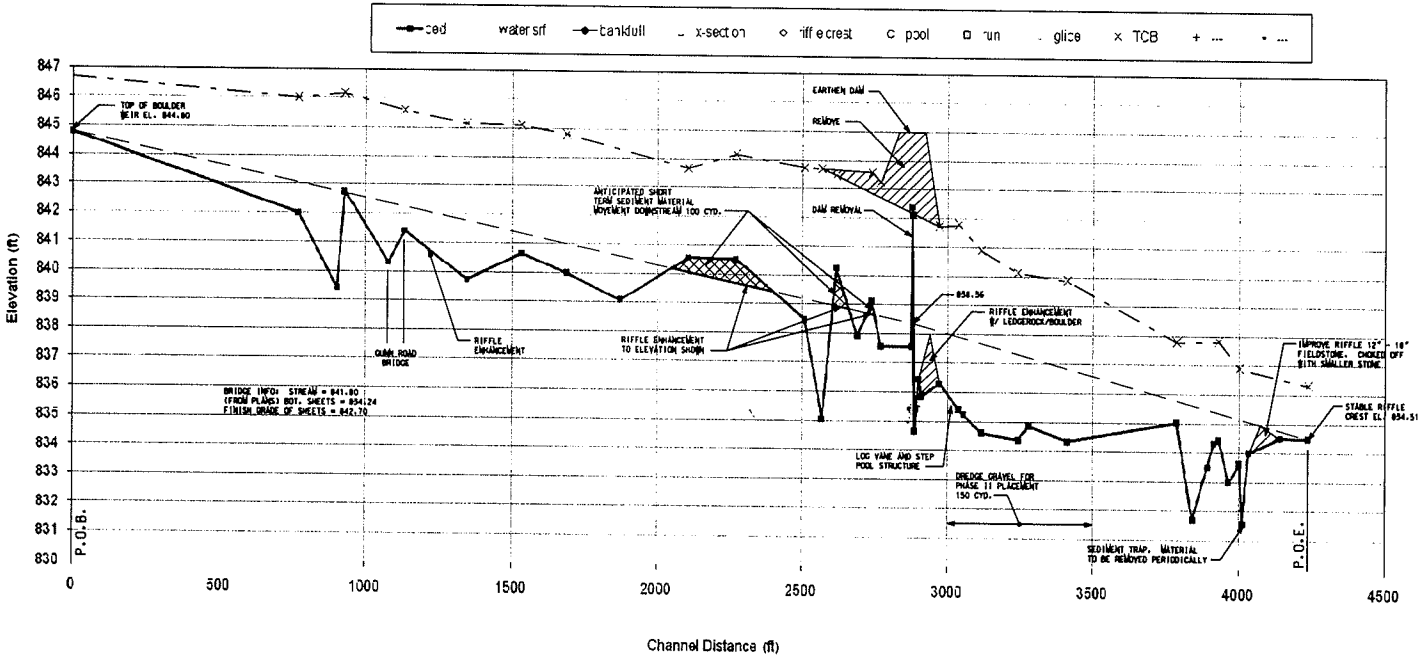
Revised



CHANNEL PROFILE

APPROX. SCALE: 1" = 200' HOR.
1" = 2' VERT.

RECEIVED
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DNRE/WRD
PERMIT CONSOLIDATION UNIT

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DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-8-11	REVISED PER MDEQ PERMIT Rev-1

DESIGNED J.F.B.
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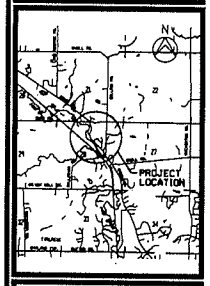

PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

CHANNEL PROFILE

HRC JOB NO. 20110115
SCALE AS NOTED
DATE MARCH 2011
SHEET NO. 08 OF

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Revised

N

SCALE: 1" = 100'

NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL IMPROVEMENTS ON THIS SHEET ARE PART OF THE PHASE II IMPROVEMENTS AND FUTURE MDEQ PERMIT APPLICATION No. 2.
2. PROPOSED PROJECT IS A PASSIVE RESTORATION APPROACH. INFORMATION CONTAINED ON THIS SHEET AND ASSOCIATED DETAILS WILL BE CONFIRMED IN THE FIELD AFTER PHASE I AND ADJUSTED ACCORDINGLY. MDEQ PERMIT APPLICATION No. 2 WILL BE MADE BASED ON FIELD CONDITIONS, ACCESS AUTHORIZATION AND AVAILABLE BUDGET.
3. SEE PROFILE (SHEET 08) FOR MORE INFORMATION.
4. AREAS ARE SHADED TO REPRESENT PRIORITIZATION OF LIKELY WORK BASED ON ANTICIPATED BANK HEIGHT RATIOS.
5. SHADED AREAS CORRESPOND TO DETAIL SHEETS AS SHOWN IN CHART THIS SHEET.
6. LIKELY WORK IS CUMULATIVE WITH EACH PRIORITY. FOR INSTANCE, DS-B SHOWS LANDSCAPE DETAILS WHICH WILL BE USED IN ALL SUBSEQUENT PRIORITIES.

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		PRIORITIZATION		
Parameter	Reference Reach	Low	Moderate	High
BHR	1.0-1.05	1.05-1.1	1.1-1.3	1.3
W/d	14	~20% change	~40% change	~60% change
SC	τ= 0.22-0.25 lb/ft^2	Slightly incised: Mod. deposition	<035 of the bed moved: >D100 of the bed moved	<035 of the bed moved: >D100 of the bed moved
Detail Sht.		DS-G	DS-Y	DS-O 1-3

Examples of Types of BMP's to be Used in Each Priority Area (Shown in detail sheets for reference in this permit application)

Low Priority - live stakes, seeding, silt fencing, erosion control blankets, riparian plantings, upland fascines (setback from bank), and other soil bioengineering methods that typically do not require a permit.

Moderate Priority - natural riffle grade controls, stone toe protections, and soil bioengineering methods described above and similar BMP's described in NRCS, NEH 654 Stream Restoration.

High Priority - natural riffle grade controls, wood/stone toe protection, log vanes, riffle/pool enhancements, and soil bioengineering methods described above.

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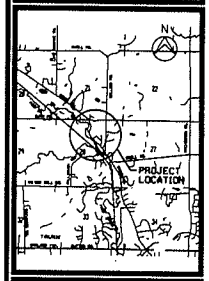
DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-8-11	ISSUED PER MDEQ PERMIT No.1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	E.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

PHASE II IMPROVEMENTS

HRC JOB NO.	SCALE
20110115	1" = 100'
DATE: MARCH 2011	SHEET NO. 09 OF

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Revised

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JUL 12 2011
DNRE/WRD
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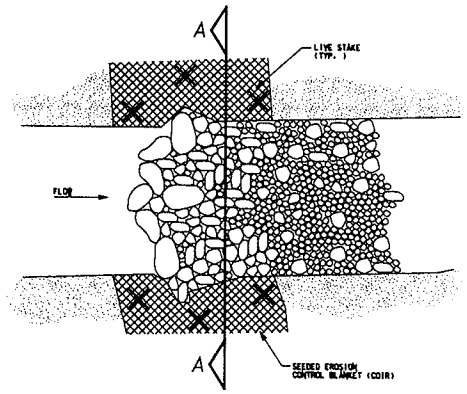
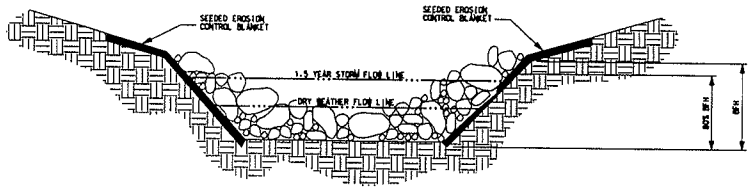


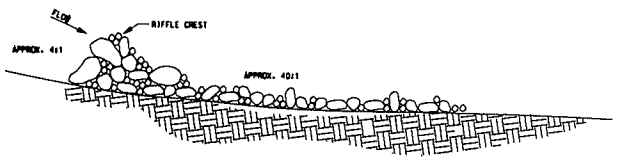
PLAN VIEW



CROSS SECTION VIEW A-A

BKFH = BANK FULL HEIGHT

- EXISTING STONE



PROFILE VIEW

NOTES:

1. EXCAVATE A 12" TRENCH ALONG THE UPSTREAM EDGE OF THE RIFFLE.
2. USE 12" - 36" NATURAL OR EXISTING FIELD STONE ON THE UPSTREAM EDGE OF THE RIFFLE AT A 4:1 SLOPE TO DIRECT FLOW TO THE CENTER OF THE CHANNEL.
3. POSITION STONES IN A V-SHAPE TOWARD AT THE CREST OF THE CHANNEL. AND ARMOR THE BANKS WITH SMALLER COBBLE RANGING FROM 4"-18" IN DIAMETER TO PREVENT SUBSEQUENT BANK EROSION.
3. BE SURE TO ALLOW WATER TO SPILL OVER THE RIFFLE STRUCTURE DURING HIGH FLOW PERIODS.
4. TAPER OFF THE RIFFLE DOWNSTREAM AT A 40:1 SLOPE.
5. DIMENSIONS WILL VARY FOR EACH RIFFLE.

RIFFLE DETAILS

NO SCALE

LOG STEP POOL

NO SCALE

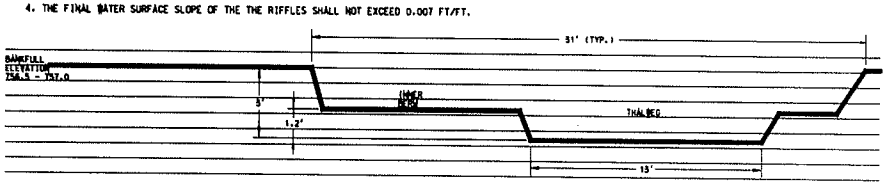
ALLUVIAL RIFFLE ENHANCEMENTS

1. WHERE GRAVEL FILL IS NECESSARY TO CONSTRUCT RIFFLES, RIVER GRAVEL FILL MATERIAL SHALL BE PROVIDED FROM OFF-SITE AND SHALL CONSIST OF THE FOLLOWING SIZE DISTRIBUTION OF WASHED RIVER RUN GRAVEL:
   - 25% FINER THAN 0.5-1"
   - 75% FINER THAN 2.5"
   - 100% FINER THAN 4"

2. EXCAVATE THE CENTRAL LOW FLOW CHANNEL AT THE RIFFLES (SEE CROSS SECTIONS). DEPOSIT THE EXCAVATED MATERIALS ALONG THE SIDES OF THE RIFFLE TO CREATE AN INNER BERM (SEE ROUGHENED TOE DETAIL). THE FINAL ELEVATION OF THE INNER BERMS SHALL BE 60% OF THE BANKFULL DEPTH AS DEFINED ON THE PLANS. ADDITIONAL CLEAN GRAVEL FILL MAY BE REQUIRED TO ACHIEVE THE PROPOSED DIMENSIONS. INCLUDED IN PAY ITEM - IMPORTED RIVER GRAVEL FILL.

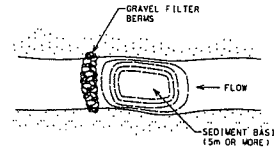
3. COARSE ALLUVIAL FILL MAY BE SCREENED FROM DESIGNATED AREAS AND USED FOR FILL ALONG BANKFULL BENCHES. THE EXCAVATION AND RELOCATION OF CHANNEL BED AND/OR COARSE FLOODPLAIN MATERIAL SHALL BE INCLUDED IN PAY ITEM - ON-SITE RIVER GRAVEL FILL.

4. THE FINAL WATER SURFACE SLOPE OF THE THE RIFFLES SHALL NOT EXCEED 0.007 FT/FT.



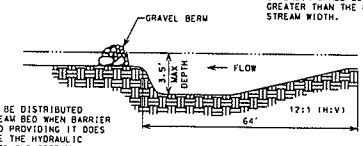
TYPICAL RIFFLE C/S

NO SCALE



PLAN VIEW

WIDTH OF BASIN SHOULD NOT EXTEND BEYOND THE NORMAL STREAM BANKS. MINIMUM LENGTH OF BASIN SHALL BE TWO TIMES GREATER THAN THE NORMAL STREAM WIDTH.



ROCKS MAY BE DISTRIBUTED ALONG STREAM BED WHEN BARRIER IS REMOVED PROVIDING IT DOES NOT REDUCE THE HYDRAULIC CAPACITY OF THE STREAM.

PROFILE VIEW

DE-7 INSTREAM SEDIMENT TRAP

NO SCALE

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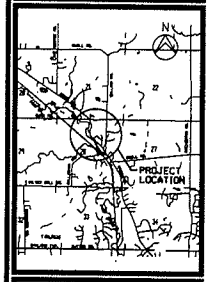
7-6-11	ISSUED FOR USCG PERMIT Rev.1

DESIGNED J.F.S.
DRAWN J.A.H.
CHECKED J.F.B.
APPROVED E.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

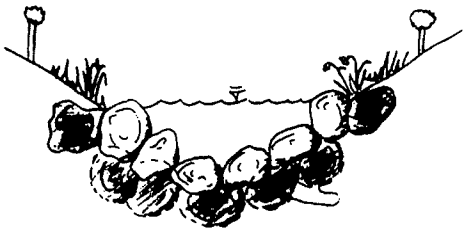
OAKLAND COUNTY MICHIGAN

DETAILS A

HRC JOB NO. 20110115
SCALE NO SCALE
DATE MARCH 2011
SHEET NO. DS-A1 OF

DESIGN FILE - V:\2011\01\20110115\Civil_Irr_DS-A1.dgn PCB TBL-HydraulicPrintDistributed_Fr_5550.pb TIME - 15:01:2011 11:25 USER NAME - hrc CUR. TBL-11x17PrintDistributed.tbl QUEUE - \\Plot\HRCBlue

Revised



Cross Section

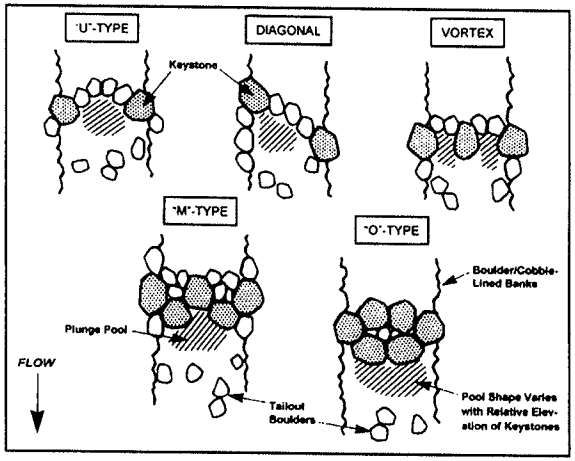
Plan View

Step/pool structure

STEP DETAILS

1. STEP STRUCTURES CONSIST OF BOULDERS AND LARGER KEYSTONES STRATEGICALLY PLACED ALONG THE BED TO CONTROL THE GRADE AND DIRECT THE FLOWS.
2. EACH STEP ROCK SHALL BE PLACED ON FOOTER STONES AND SHINGLED UPSTREAM APPROX. 8-12 INCHES. BACKFILL THE STEP STRUCTURE WITH GRAVEL AND COBBLE PROVIDED BY THE EXCAVATION FOR THE FOOTERS.
3. THE STEP STRUCTURE SHOULD GENERALLY BE LAID OUT IN ACCORDANCE WITH THE STEP-POOL STRUCTURE DETAIL. THE CONFIGURATION OF EACH STRUCTURE IS LAID OUT TO ALTERNATE THE BASE FLOWS BACK AND FORTH ACROSS THE CHANNEL, DURING AND FOR A PERIOD AFTER CONSTRUCTION, SIGNIFICANT ADJUSTMENT OF THE STRUCTURES WILL TYPICALLY BE REQUIRED TO APPROPRIATELY ADJUST THE FLOWS AS DIRECTED BY THE ENGINEER IN THE FIELD.
4. DIFFERENT STEP STRUCTURE CONFIGURATIONS MAY BE USED BASED ON SITE CONDITIONS. DIAGONAL STEP STRUCTURES SHOULD BE USED PREDOMINANTLY WITH THE STEP STRUCTURE INCREASING IN ELEVATION AT A 5-7 DEGREE SLOPE SIMILAR TO A VANE STRUCTURE. STEP STRUCTURES SHOULD ALTERATE LEFT TO RIGHT TO VARY THE FLOW DIRECTION (SEE DETAIL).
5. THE BOULDERS SHALL BE MANUALLY CHINKED AND BACKFILLED WITH A COBBLE AND GRAVEL MIX FROM STREAMBED EXCAVATION FOR THE FOOTER STONES.
6. THE PROJECT ENGINEER WILL STAKE THE LOCATIONS OF THE STEP STRUCTURE AND J-HOOK LOCATIONS FOR THE CONTRACTOR.

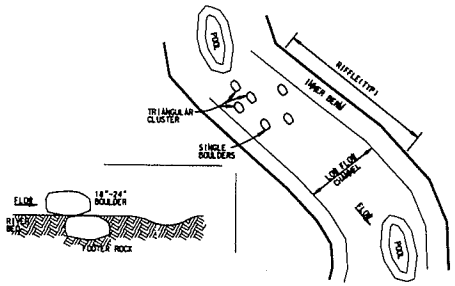
WEIR WIDTH = 12.5 FT
POOL WIDTH = 15 FT
WEIR SPACING (STA 50+05 TO 49+75) = 19 FT
WEIR SPACING (STA 27+12 TO 26+25) = 15 FT
STEP HEIGHT = 0.8-1.0 FT
MAX. POOL DEPTH = 2-3 FT
BOULDER SIZE = 18-24 IN.
AVG. DIAMETER OF KEYSTONES = 32 IN.



STEP STRUCTURE CONFIGURATIONS

HABITAT BOULDERS - IN RIFFLES

1. THE BOULDERS SHOULD CONSIST OF NATURAL FIELD STONE WITH A SPECIFIC WEIGHT OF APPROX. 2.65. FLATTER OR MORE ANGULAR BOULDERS SHALL HAVE A MEAN DIAMETER OF 15-18" AND MORE ROUNDED BOULDERS SHALL BE 18-24".
2. INSTALL ALL HABITAT ENHANCEMENT BOULDERS WITHIN THE LOW FLOW CHANNEL (THALWEG) ALONG THE UPSTREAM THIRD OF EACH RIFFLE.
3. PLACE SIX SINGLE BOULDERS, TRIANGULARLY SPACED APPROX. 8-12 FT APART.
4. INSTALL THREE ADDITIONAL BOULDERS (ON THREE FOOTERS) IN A TRIANGULAR CLUSTER, POINTING UPSTREAM, AND SPACED ABOUT 6 INCHES APART. EXCAVATE THE BED TO ALLOW FOOTER ROCKS TO BE INSTALLED UNDER EACH OF THE THREE BOULDERS AT THE PROPOSED BED ELEVATION. SHINGLE THE BOULDERS ABOUT 6-8 INCHES UPSTREAM OF THE FOOTERS.
5. INSTALL 18 HABITAT BOULDERS TOTAL (6 BOULDERS PER RIFFLE WITH FOOTERS) TO BE PAID PER UNIT PAY ITEM.



HABITAT BOULDERS TYPICAL LAYOUT
NO SCALE

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JUL 12 2011
DNRE/WRD
PERMIT CONSOLIDATION UNIT

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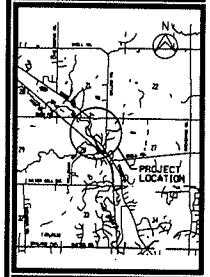

PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS A

HRC JOB NO. 20110115
SCALE NO SCALE
DATE MARCH 2011
SHEET NO. DS-A2

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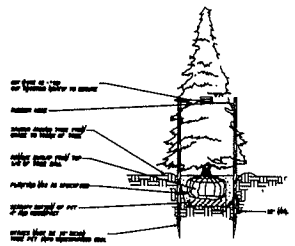
Revised



EVERGREEN TREE PLANTING
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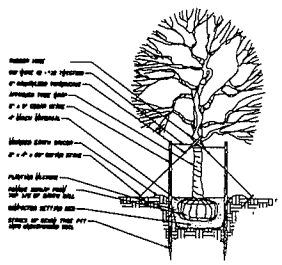

DECIDUOUS TREE PLANTING
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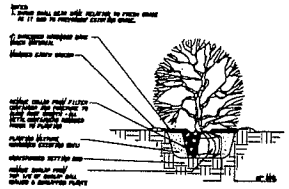

TYPICAL SHRUB PLANTING
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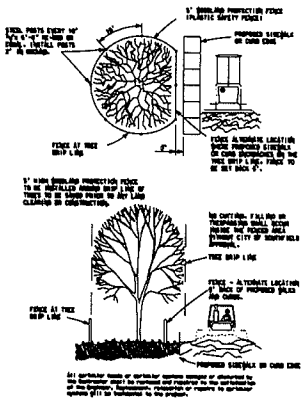
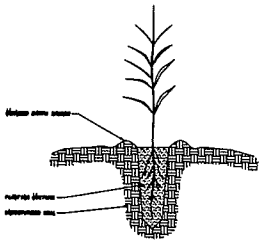


TREE PROTECTION DETAILS
NO SCALE



PLANT PLUG
NO SCALE

SEED MIX "A"		
SCIENTIFIC NAME	COMMON NAME	OZ./LBS
ELYMUS RIPARIUS	RIVERBANK WILD RYE	3.5
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	3.0
SCIRPUS ATROVIRENS	DARK GREEN RUSH	1.5
BROMUS CILIATUS	FRINGED BROME	2.0
ASCLEPIAS INCARNATA	SWAMP MILKWEED	1.5
EUPATORIUM MACULATUM	JOE PYE WEED	0.5
EUPATORIUM PERFOLLATUM	BONESET	0.5
LOBELIA SIPHILITICA	BLUE LOBELIA	0.5
THALICTRUM DASYCARPUM	PURPLE MEADOW RUE	1.0
VERBENA HASTATA	BLUE VERVAIN	2.0
	TOTAL WEIGHT	16.0

SEED MIX "B"		
SCIENTIFIC NAME	COMMON NAME	OZ./LBS
ELYMUS RIPARIUS	RIVERBANK WILD RYE	2.0
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	3.0
SCIRPUS ATROVIRENS	DARK GREEN RUSH	1.0
BROMUS CILIATUS	FRINGED BROME	1.0
ELYMUS HYSTRIX	BOTTLEBRUSH GRASS	1.0
ELYMUS VILLOSUS	SILKY WILD RYE	2.0
BOUTELOUA CURTIPENDULA	SIDE-OATS GRAMA	2.5
GLYCERIA STRIATA	FOWL MANNA GRASS	1.5
CAREX TRIBULOIDES	POINTED OVAL SEDGE	0.5
LEERSIA ORYZOIDES	RICE CUTGRASS	1.5
	TOTAL WEIGHT	16.0

SEED MIX "C"		
SCIENTIFIC NAME	COMMON NAME	OZ./LBS
ELYMUS RIPARIUS	RIVERBANK WILD RYE	4.0
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	4.0
ELYMUS CANADENSIS	CANADA WILD RYE	4.0
ELYMUS HYSTRIX	BOTTLEBRUSH GRASS	4.0
	TOTAL WEIGHT	16.0

LANDSCAPE NOTES

1. VERIFY ALL CONDITIONS ON SITE PRIOR TO COMMENCING CONSTRUCTION AND REPORT ANY DISCREPANCIES IMMEDIATELY TO ENGINEER OR OWNER.
2. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND SERVICES PRIOR TO COMMENCING WORK. CONTRACTOR IS RESPONSIBLE FOR ANY COST INCURRED DUE TO DAMAGED UTILITIES.
3. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES REFLECTED ON THE PLANT LIST. IF A DISCREPANCY EXISTS BETWEEN THE LIST AND THE PLAN, THE PLAN SHALL BE HELD VALID.
4. INSTALLATION AND SIZE OF ALL PLANT MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARDS SET FORTH BY THE AMERICAN ASSOCIATION OF NURSERY MEN AND OWNER.
5. THE LANDSCAPE CONTRACTOR SHALL CONTACT THE ENGINEER OR OWNER'S REPRESENTATIVE PRIOR TO BEGINNING CONSTRUCTION. DISCREPANCIES BETWEEN THE PLANS AND ACTUAL SITE CONDITIONS OR OTHER PROBLEMS OCCUR, SHALL BE RESOLVED AT THIS TIME.
6. THE LOCATION OF ALL PLANTS SHALL BE SCALED FROM THE DRAWINGS OR INTERPOLATED FROM THE PLANT LIST.
7. IF ROUGH GRADE IS DONE BY OTHERS, CONTRACTOR SHOULD REVIEW THEIR GRADE AND ADDRESS ANY PROBLEMS WITH THE OWNER. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL GRADING AND SITE SURFACE DRAINAGE, SWALES TO PONDS, CATCH BASIN ETC. NO LOW SPOTS THAT HOLD STANDING WATER WILL BE ACCEPTED.
8. ANY RAISED EARTH BERMS SHOWN ON THE PLANS SHALL BE MADE ENTIRELY OF LIGHT ORGANIC SOILS AND SHALL BLEND SMOOTHLY INTO EXISTING TOPOGRAPHY.
9. MULCH-IN ALL PLANT MATERIAL IMMEDIATELY AFTER INSTALLATION.
10. SUBMIT SAMPLES OF MULCH, TOPSOIL, PRE-EMERGENT, STONE, ETC., AS REQUIRED BY THE PROJECT.
11. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR SUPPLY AND PLACEMENT OF TOPSOIL PER SPECIFICATIONS.
12. ALL TREES SHALL HAVE CLAY LOAM ROOT BALLS - NO SAND BALLS ACCEPTED.
13. TEMPORARY PROTECTION FENCING SHALLBE INSTALLED AROUND PERIMETER OF WORK AREA TO PROTECT EXISTING TREES AND PROPERTY AS DIRECTED BY PROJECT ENGINEER.
14. BID SHRUB PIT A MINIMUM OF 1" LARGER THAN SHRUB ROOT BALLS AND TREE PITS 2" LARGER THAN ROOT BALLS. BACKFILL WITH THE THREE PARTS TOP SOIL, TWO PARTS SOIL FROM EXCAVATED PLANTING HOLE AND ONE PART PEAT. PLANT TREES AND SHRUBS AT THE SAME GRADE LEVEL AS THEY WERE GROWN PLANTED AT THE NURSERY. IF WET CLAY SOILS ARE EVIDENT, PLANT TREES AND SHRUBS HIGHER.
15. REMOVE ALL TOPS, TWINE AND BURLAP FROM THE TOP 1/3 OF TREE AND SHRUB EARTH BALLS AND FROM TREE TRUNKS. REMOVE ALL NON-BIODEGRADABLE MATERIAL SUCH AS PLASTIC OR WIRES COMPLETELY.
16. SHRUB BEDS ARE TO BE MULCHED WITH SHREDDED BARK MULCH TO A MINIMUM DEPTH OF 4". ONLY NATURAL-COLORED SHREDDED HARDWOOD BARK MULCH WILL BE ACCEPTED.
17. UPON COMPLETION, ALL PLANT MATERIALS MUST BE PRUNED AND TEMPORARY REPAIRED. THE AMOUNT OF PRUNING SHALL BE LIMITED TO THE MINIMUM NECESSARY TO REMOVE DEAD OR DAMAGED TERMINAL BRANCHES AND TO COMPENSATE FOR THE LOSS OF ROOTS FROM TRANSPLANTING. ALL CUTS SHALL BE MADE FLUSH, LEAVING NO STUBS. PAINT ALL CUTS OVER 1INCH DIA. WITH TREE PAINT.
18. EXISTING LAWN AREAS THAT ARE DAMAGED DURING CONSTRUCTION MUST BE INSPECTED BY THE OCWRC TO DETERMINE VIABILITY. IF THE EXISTING LAWN IS FOUND TO BE LEVEL, HEALTHY, DENSE AND FREE FROM WEEDS, LAWN MAY NOT REQUIRE REPLACEMENT OR REGRADING. IF REGRADING IS REQUIRED OR IS PART OF THE APPROVED PLAN, THEN THE FOLLOWING REQUIREMENTS WILL APPLY:

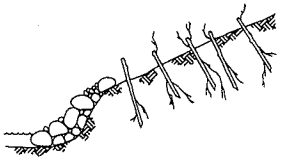
   EXISTING LAWN FOUND TO BE IN POOR CONDITION MUST FIRST BE SPRAYED WITH ROUND-UP FOR EQUAL TO KILL THE EXISTING LAWN AND WEED SEEDS. WAIT FOR A MINIMUM PERIOD OF SEVEN (7) DAYS FOR THE HERBICIDE TO TAKE EFFECT. THEN REMOVE ALL DEAD SOD AND SEEDS TO A MINIMUM OF FOUR (4) - SIX (6) INCHES. ADD TOPSOIL TO ALL LAWN AREAS TO BE REPLACED. BACK FILL AND COMPACT TOPSOIL TO THE TOP OF ALL CURBS AND WALKS PRIOR TO SEED/INSTALLATION. REGRADE TO ELIMINATE ALL SWAMPS AND DEPRESSIONS AND RESEED ALL AREAS.

   EXISTING LAWN FOUND TO BE ACCEPTABLE IN GOOD CONDITION BUT WITH BARE, SPARSE OR BUSHY AREAS MUST BE REGRADED BY FILLING IN LOW AREAS, RAKING, OVERSEEDING AND TOP DRESSING ALL SPARSE AND BARE SPOTS AND BY INSTALLING A SEED AND FEED MIXTURE.
19. THE CONTRACTOR AGREES TO GUARANTEE ALL PLANTS FOR ONE YEAR FROM THE TIME OF PLANTING AND FINAL INSPECTION BY THE OWNER'S REPRESENTATIVE. THIS GUARANTEE INCLUDES FURNISHING NEW PLANTS AS WELL AS LABOR AND MATERIALS FOR THE INSTALLATION OF REPLACEMENTS. ALL REPLACEMENT PLANTS SHALL BE GUARANTEED FOR AN ADDITIONAL PERIOD OF ONE YEAR.
20. PLANT MATERIAL WITH 20% OR GREATER DIE BACK, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, SHALL BE REPLACED AS STIPULATED ABOVE.
21. TOPSOIL SHALL BE FERTILE, FRIABLE NATURAL TOPSOIL OF CLAY LOAM CHARACTER CONTAINING AT LEAST 5% BUT NOT MORE THAN 20% BY WEIGHT OF ORGANIC MATTER WITH A PH RANGE FROM 6.0 TO 7.5. SOIL SHALL BE FREE OF CLAY LUMPS, COARSE SAND, STONES, PLANT ROOTS, STICKS OR OTHER FOREIGN MATERIAL.

NOTE:

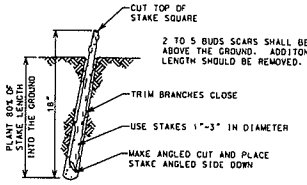
ALL LIVE STAKES, JOINT PLANTINGS, & 1 GALLON CONTAINERIZED SHRUBS SHALL CONSIST OF THE FOLLOWING SPECIES TO BE INSTALLED IN THE LISTED LOCATIONS PER THE PLAN DETAILS AND SPECIFICATIONS.

PLANT SPECIES			
SCIENTIFIC NAME	COMMON NAME	LOCATION	TYPE
CORNUS SERICEA	RED-OSIER DOGWOOD	SITE 2	JOINT PLANTINGS CONTAINERIZED SHRUBS
SALIX EXIGUA	SANDBAR WILLOW	SITE 4	LIVE STAKES



NOTES:

1. HARVEST AND PLANT STAKES DURING THE DORMANT SEASON.
2. USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST 1 YEAR OLD.
3. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION. USE A PILOT BAR IN FIRM SOILS.
4. SOAK CUTTINGS FOR 24 HOURS (MIN.) PRIOR TO INSTALLATION.
5. TAMP THE SOIL AROUND THE STAKE.
6. PLANT STAKES 1'-3' AWAY FROM EACH OTHER.



LIVE STAKING
NO SCALE

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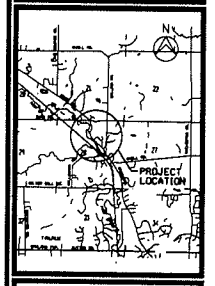
CHECKED	J.F.B.
APPROVED	K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS B

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-B OF

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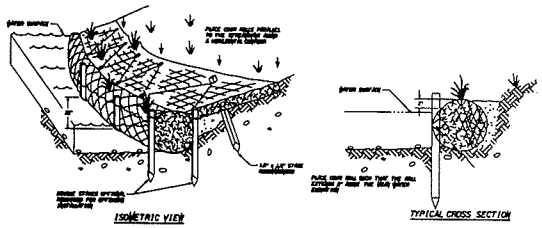

COIR ROLLS/COIR MATS
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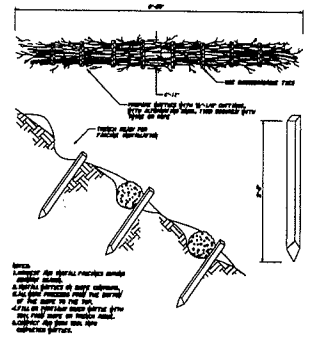


LIVE FASCINE
NO SCALE

Figure 1

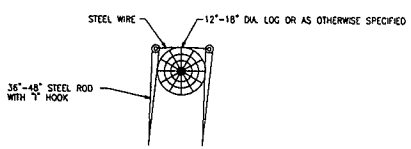
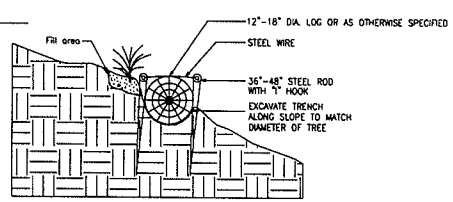


Figure 2

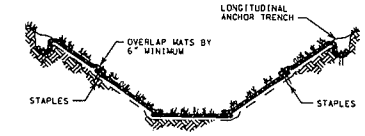


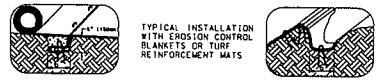
LOG PLACEMENT WITH BANK SUPPORT

INSTALLATION GUIDE FOR LOG SLOPE PROTECTION

1. IF THE SHORELINE OR STREAMBANK THAT NEEDS TO BE RESTORED IS SEVERELY ERODED, GRADE THE SHORELINE OR STREAMBANK ACCORDING TO THE NATURAL TERRAIN OF THE AREA (2:1 SLOPE IS GENERALLY RECOMMENDED. HOWEVER OTHER SLOPES MAY BE INSTALLED IF APPROVED BY THE PROJECT ENGINEER). IMMEDIATELY PLACE AN EROSION CONTROL BLANKET ALONG THE GRADED SLOPE TO PREVENT EROSION.
2. PLACE LOGS ALONG THE STREAMBANK IN THE AREAS INDICATED.
3. SECURE LOGS TO THE STREAMBANK USING STEEL RODS WITH J-HOOKS AND WIRE. IN GENERAL, 36" LONG RODS WITH J-HOOKS AE RECOMMENDED FOR 12" DIA. LOGS AND 48" LONG RODS ARE REQUIRED FOR LOGS 18" - 36" DIA. PLACE THE RODS ON EITHER SIDE OF THE LOG WITH THE J-HOOKS FACING UPWARD. TIE WIRE TO ONE J-HOOK AND TIGHTEN ACROSS THE LOG AND SECURE TO THE OTHER J-HOOK. PLACE STEEL RODS WITH J-HOOKS EVERY 10 FEET ALONG THE LENGTH OF THE LOG WITH A MINIMUM OF 2 SETS PER LOG SECTION.
4. ONCE THE LOGS AE INSTALLED PROPERLY, RESTORE THE AREA PER PLANS AND SPECIFICATION.
5. ALTERNATIVE MATERIALS AND METHODS MAY BE ACCEPTABLE. HOWEVER, THE PROJECT ENGINEER MUST REVIEW AND APPROVE SAMPLES OF ALL MATERIALS TO BE USED AND ALTERNATE METHODS TO INSTALL LOGS.
6. LOCATION LOGS MAY BE ADJUSTED AS DIRECTED BY THE PROJECT ENGINEER.

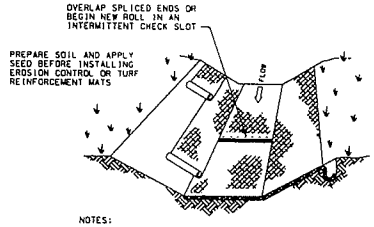
LOG PLACEMENT





INTERMITTENT SLOT

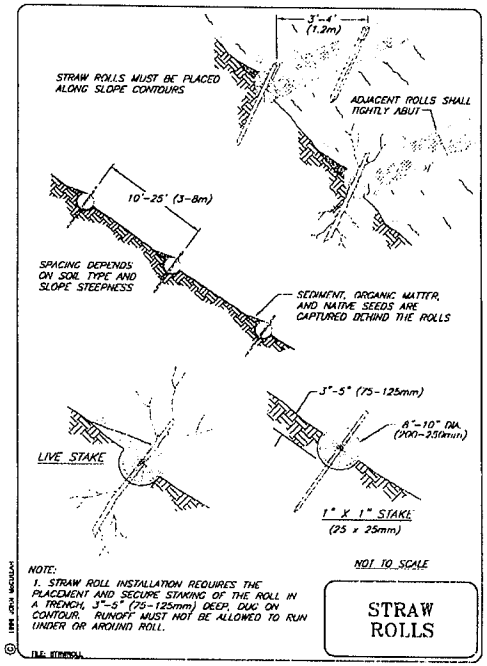
LONGITUDINAL TRENCH



NOTES:

1. DEPTH OF CHANNEL TO BE SPECIFIED BY ENGINEER.
2. DESIGN VELOCITIES EXCEEDING 2FT/SEC REQUIRE TEMPORARY BLANKETS OR SIMILAR LINERS TO PROTECT SEED AND SOIL UNTIL VEGETATION BECOMES ESTABLISHED.
3. GRASS LINED CHANNELS WITH DESIGN VELOCITIES EXCEEDING 6FT/SEC SHOULD INCLUDE TURF REINFORCEMENT MATS.

SC-7 ROLLED EROSION CONTROL BLANKET
NO SCALE



NOTE:
1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"-5" (75-125mm) DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.

STRAW ROLLS

NOTICE:
ALL EXISTING UTILITIES SHOWN ON THIS TOPOGRAPHIC SURVEY HAVE BEEN TAKEN FROM VISUAL OBSERVATION, AND RECORD MAPPING WHERE AVAILABLE. NO GUARANTEE IS MADE, OR SHOULD BE ASSUMED, AS TO THE COMPLETENESS OR ACCURACY OF THE UTILITIES SHOWN ON THIS DRAWING. PARTIES UTILIZING THIS INFORMATION SHALL FIELD VERIFY THE ACCURACY AND COMPLETENESS PRIOR TO CONSTRUCTION ACTIVITIES.

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DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-6-11	ISSUED FOR MDEQ PERMIT REVIEW

DESIGNED J.F.B.
DRAWN J.A.H.
CHECKED J.F.B.
APPROVED K.D.W.
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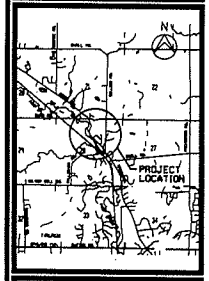

PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS G

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-G

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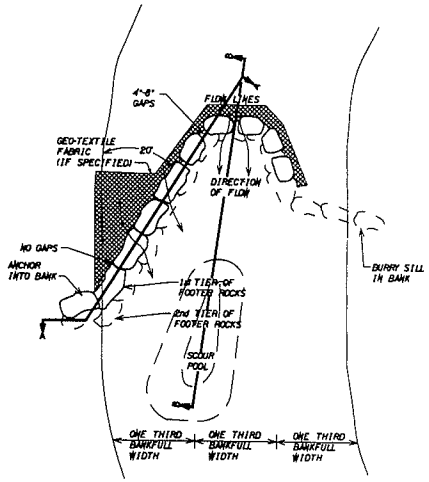
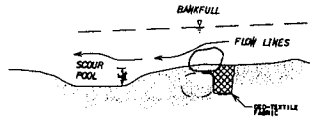
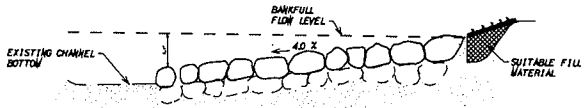
Revised



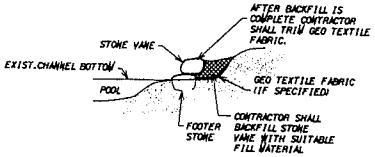
PLAN VIEW



CROSS-SECTION B-B
PROFILE VIEW OF CENTER OF ROCK J-HOOK

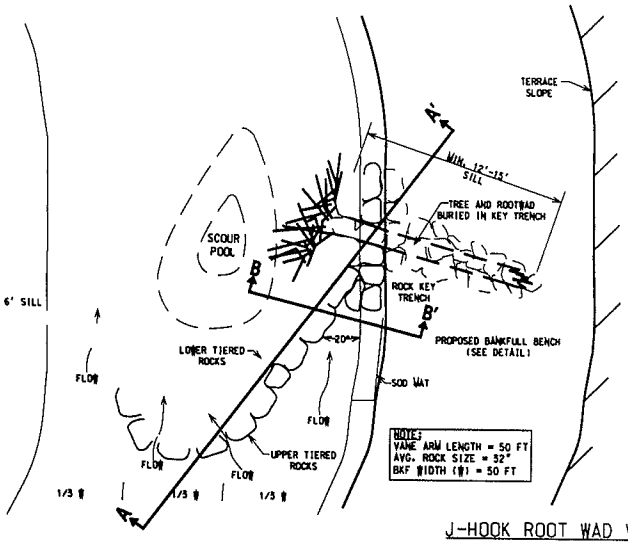


CROSS-SECTION A-A

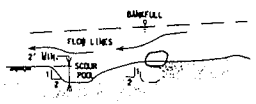


SECTION C-C

J-HOOK VANE

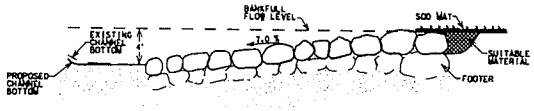


J-HOOK ROOT WAD VANE

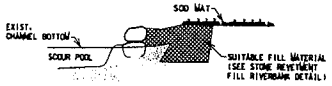


PROFILE VIEW OF CENTER OF CROSS VANE

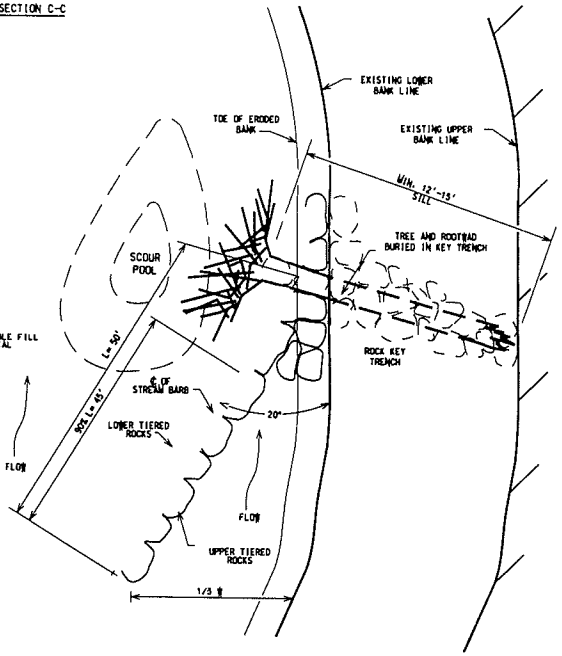
NOTE:
ALL STONE USED IN "J" HOOK VANE CONSTRUCTION SHALL BE NATURAL STONE RANGING FROM 24" TO 40" IN ITS LEAST DIMENSION WITH THE RATIO OF MAXIMUM TO MINIMUM DIMENSION NOT EXCEEDING 2:1.



CROSS-SECTION A-A'



SECTION B-B'



ROCK ROOT WAD VANE

NOTES:
1. TREES USED FOR CONSTRUCTION OF VANES TO BE SALVAGED ON-SITE.
2. ROCK KEY TRENCH TO BE CONSTRUCTED USING 12" TO 24" BOULDERS. (BOULDERS TO BE PAID FOR IN UNIT PRICE BID FOR "J-HOOK OR ROCK ROOTWAD VANE".
3. UPPER AND LOWERED TIERED ROCKS ARE TO BE INCLUDED IN UNIT PRICE BID FOR "ROCK ROOTWAD VANE" OR "J-HOOK ROOTWAD VANE." ALL ROCKS ARE TO BE 24" TO 40" (AVG. 32"). INSTALL ALL VANE STRUCTURES PER SECTION 02232.
4. BACK FILL VANE AREA WITH RIVER GRAVEL FILL. TO BE PAID FOR IN UNIT PRICE BID FOR "J-HOOK OR ROCK ROOTWAD VANE".
5. SCOUR POOLS TO BE EXCAVATED AS NECESSARY TO MEET THE ELEVATIONS AS SHOWN ON THE STREAM PROFILE. ALL EXCAVATION FOR SCOUR POOLS TO BE INCLUDED IN THE UNIT PRICE BID FOR "ROCK ROOTWAD VANE" OR "J-HOOK ROOTWAD VANE." BACK FILL VANE ARE AREA WITH RIVER GRAVEL FROM SCOUR POOL EXCAVATION AS INCIDENTAL TO EACH STRUCTURE.

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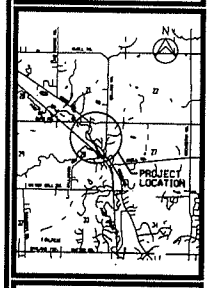
DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS D

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-01

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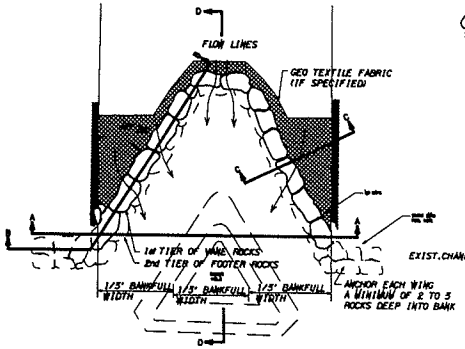
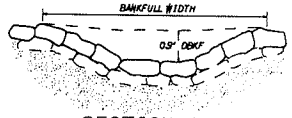
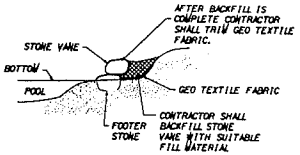


PLAN VIEW: ROCK CROSS VANE

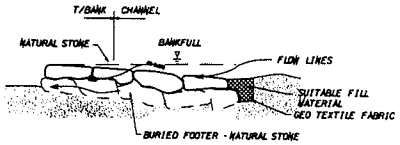


SECTION A-A

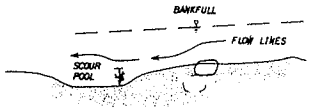
BANKFULL WIDTH AND DEPTH VARIES BY CROSS-SECTION



SECTION C-C



SECTION B-B



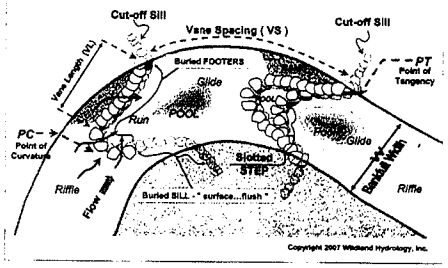
SECTION D-D

PROFILE VIEW OF CENTER OF ROCK CROSS VANE

ROCK CROSS VANE NOTES:

1. ENGINEER TO APPROVE SAMPLE OF ROCK MATERIAL BEFORE INSTALLATION.
2. THE ANGLE OF THE ARMS WITH THE UPSTREAM BANK SHOULD BE APPROXIMATELY 20 TO 25 DEGREES. ALL FOOTER AND VANE ARM ROCKS SHOULD TOUCH ADJACENT ROCKS TO FORM A TIGHT FIT. CHINK GAPS WITH ROCK IF NECESSARY AND COMPACT. VANE ARM ROCKS SHALL BE PLACED ON TOP OF ONE LAYER OF FOOTER ROCKS. THE VANE (UPPER LAYER OF) ROCKS SHALL BE SHINGLED UPSTREAM.
3. OVERALL MAXIMUM DROP CONTROLLED BY THE CROSS VANE SHALL NOT EXCEED TWO FEET. TO PREVENT FLANKING, A 5' LONG STONE SILL SHALL BE INSTALLED PERPENDICULAR TO THE CHANNEL AT THE DOWNSTREAM TERMINUS OF EACH ARM.
4. COORDINATE THE CROSS VANE CONSTRUCTION WITH THE INSTALLATION OF EROSION CONTROL BLANKETS ON ALL STREAMBANK AND UPLAND AREAS TO INSURE THAT THEY ARE PROPERLY KEYED IN AT THE TOE OF THE BANK.
5. ALL STONE USED IN CROSS VANE CONSTRUCTION SHALL BE MOSTLY FLAT NATURAL STONE AND/OR LEDGE ROCK RANGING FROM 15" TO 24" IN ITS LEAST DIMENSION WITH THE RATIO OF MAXIMUM TO MINIMUM DIMENSION NOT EXCEEDING 2:1

Location & Spacing: J-Hook Vane-with sill.....Cross-Vane with Step & sills



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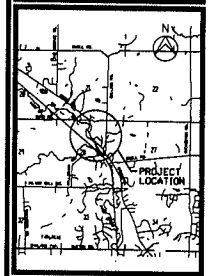


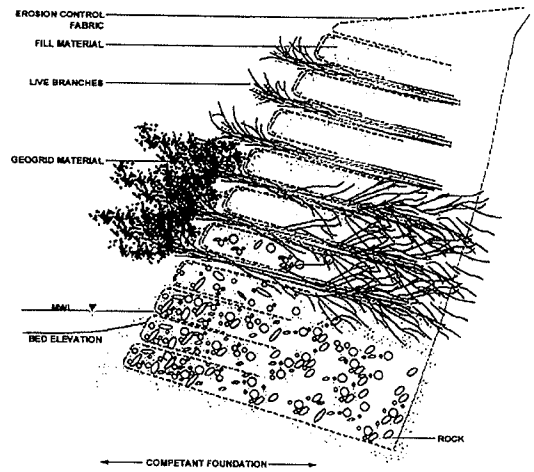
PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS 0

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-02

Revised



SECTION

VEGETATED REINFORCED SOIL SLOPE(VRSS)

(SEE SPECS SECTION 02238)

STONE REVETMENT FILL RIVERBANK

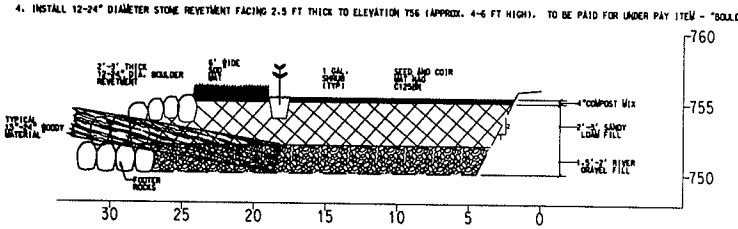
DIVISION 1 - RIGHT BANK (RB) STATION 317+70 TO 315+80 AND RB STATION 316+10 TO 315+80.

1. INSTALL 15-24" DIAMETER LARGE WOODY MATERIAL ON STONE FOOTERS EVERY 6-12 FT PERPENDICULAR TO BANK AND INCLUDE IN PAY ITEM FOR "TREE REMOVAL". ON-SITE MATERIAL REMOVED FOR CONSTRUCTION SHALL BE USED AT THE DIRECTION OF THE PROJECT ENGINEER. STONE FOOTERS AND REVETMENT MATERIALS ARE INCLUDED IN PAY ITEM - BOULDERS 12"-24".

2. THE EXISTING SECTIONS OF 4 FT LONG, 36" DIA. CONCRETE PIPE ON THE RIGHT BANK NEAR STATION 317+00 MAY BE PLACED VERTICALLY ALONG THIS AREA. BACKFILLED WITH THE SPECIFIED GRAVEL/SOIL FILL MATERIALS, AND BURIED IN PLACE WITH OTHER EXISTING CONCRETE ALONG THE BANKFULL BENCH.

3. BACKFILL THE AREA BETWEEN THE STONE REVETMENT AND BASE OF SLOPE TO DEPTH SPECIFIED WITH RIVER GRAVEL MATERIAL. COLLECT RIVER GRAVEL FROM THE SEDIMENTATIN BASIN AREA AND COMPACT UPON INSTALLATION. ALL GRAVEL FROM SEDIMENTATION BASIN AREA TO BE PAID FOR UNDER UNIT PRICE FOR "ON-SITE RIVER GRAVEL". IF ADDITIONAL GRAVEL IS NECESSARY THAT IS NOT AVAILABLE ON-SITE, IT SHALL BE PAID FOR AT UNIT PRICE BID FOR "IMPORTED RIVER GRAVEL". THIS FILL MATERIAL LAYER MAY BE PLACED FIRST TO ALLOW EQUIPMENT ACCESS ALONG THE OUTER BEND.

4. INSTALL 12-24" DIAMETER STONE REVETMENT FACING 2.5 FT THICK TO ELEVATION 756 (APPROX. 4-6 FT HIGH). TO BE PAID FOR UNDER PAY ITEM - "BOULDERS 12"-24".



TYPICAL STONE REVETMENT FILL RIVERBANK

NO SCALE

ROUGHENED TOE PROTECTION FILL RIVERBANK (SEE SECTION 02231)

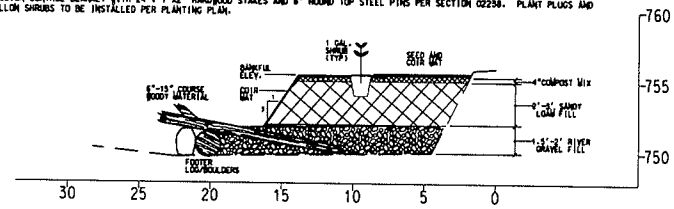
DIVISION 2 - STATION 320+70 TO 319+50 LEFT BANK AND 320+40 TO 319+40 RIGHT BANK.
DIVISION 3 - STATION 315+60 TO 315+00 LEFT BANK AND 315+80 TO 315+20 RIGHT BANK.

1. ON-SITE FILL MATERIAL SHALL BE USED TO THE EXTENT POSSIBLE. COARSER MATERIAL FROM THE SEDIMENTATION BASIN AREAS SHALL BE USED FOR RIVER GRAVEL FILL AND PAID UNDER ITEM - "ON-SITE RIVER GRAVEL FILL". (THIS UNIT COST SHALL INCLUDE EXCAVATION AND PLACEMENT OF GRAVEL). THE USE OF ANY ADDITIONAL RIVER GRAVEL MATERIAL FROM OFF-SITE SOURCES SHALL BE PRE-APPROVED BY THE ENGINEER AND INCLUDED UNDER PAY ITEM - "IMPORTED RIVER GRAVEL FILL". MATERIAL EXCAVATED FROM THE POINT BAR ON THE LEFT BANK STATION 318+00 TO 315+00 SHALL BE USED FOR SANDY LOAM FILL PLACEMENT. ADDITIONAL SANDY LOAM REQUIRED SHALL BE EXCAVATED FROM BORROW PIT AS SHOWN ON PLAN VIEW. EXCAVATION OF SANDY LOAM SHALL BE PAID FOR UNDER "EARTH EXCAVATION" AND PLACEMENT SHALL BE PAID FOR UNDER "EARTH PLACEMENT".

2. INSTALL 6-15" DIAMETER COARSE WOODY MATERIAL ON STONE AND/OR LOG FOOTERS EVERY 4-6 FT PERPENDICULAR TO BANK AND PROJECTING 1-2 FT BOULDERS. PAYMENT FOR COARSE WOODY MATERIAL AND LOG FOOTERS IS INCLUDED IN PAY ITEM FOR "TREE REMOVAL".

3. BACKFILL THE AREA BETWEEN THE CENTRAL LOW FLOW CHANNEL AND BASE OF SLOPE TO DESIGN ELEVATION WITH RIVERBED GRAVEL MATERIAL.

4. COVER THE RIVER GRAVEL BACK FILL WITH SANDY LOAM FROM THE POINT BAR EXCAVATION TO DESIGN ELEVATION AND COMPACT TO STANDARD PROCTOR AND DENSITY. COVER SANDY LOAM FILL MATERIAL WITH 4" OF COMPOST PLANTING MEDIUM, SEED, AND INSTALL EROSION CONTROL BLANKET WITH 24", 1"x2" HARDWOOD STAKES AND 8" ROUND TOP STEEL PINS PER SECTION 02238. PLANT PLUGS AND GALLON SHRUBS TO BE INSTALLED PER PLANTING PLAN.



ACTUAL CHANNEL DIMENSIONS VARY

TYPICAL ROUGHENED TOE PROTECTION FILL RIVERBANK

NO SCALE

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8 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 800-482-7171 STOP, LOOK, PROCEED

CLINTON RIVER WATERSHED COUNCIL

HRC
HUBBELL, ROTH & CLARK, INC
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FAX (1st. Floor): (248) 454-6312
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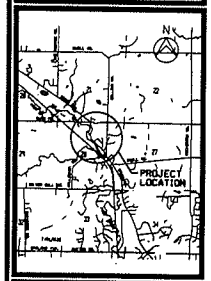
DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER MDEQ-WRD PRE APP. COMMENTS
7-6-11	ISSUED FOR MDEQ PERMIT Rev.1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

DETAILS 0

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-03

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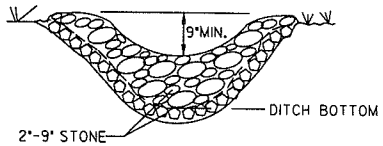
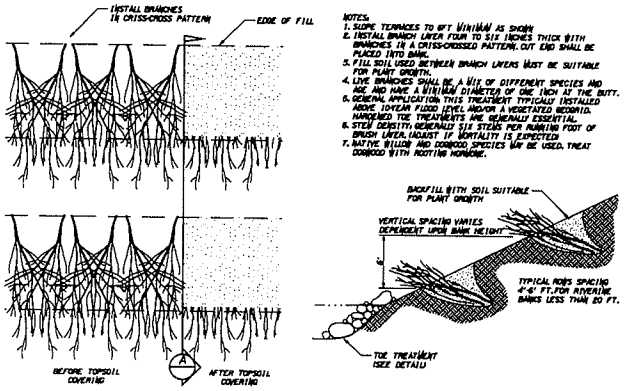
Revised



SECTION A-A
NOT TO SCALE

CHECK DAM

1. SET SPACING OF CHECK DAMS SO THAT THE ELEVATION OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION AS THE TOE OF THE UPSTREAM DAM.
2. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
3. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
4. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.



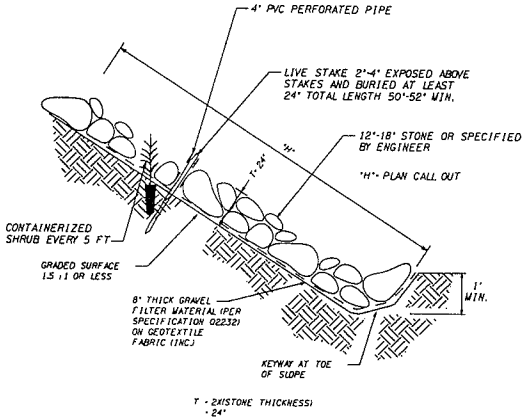
NOTES:
1. SLOPE TERRACES TO 6FT MINIMUM AS SHOWN
2. INSTALL BRANCH LAYER FOUR TO SIX INCHES THICK WITH BRANCHES IN A CRISS-CROSSED PATTERN. CUT END SHALL BE PLACED INTO BANK.
3. FILL SOIL USED BETWEEN BRANCH LAYERS MUST BE SUITABLE FOR PLANT GROWTH.
4. LIVE BRANCHES SHALL BE A MIX OF DIFFERENT SPECIES AND AGE AND HAVE A MINIMUM DIAMETER OF ONE INCH AT THE BUTT.
5. GENERAL APPLICATION THIS TREATMENT TYPICALLY INSTALLED ABOVE 10YEAR FLOOD LEVEL AND/OR A VEGETATED RECORDED. HARDENED TOE TREATMENTS ARE GENERALLY ESSENTIAL.
6. STEM DENSITY: GENERALLY SIX STEMS PER RUNNING FOOT OF BRUSH LAYER. ADJUST IF MORTALITY IS EXPECTED
7. NATIVE WILLOW AND DOGWOOD SPECIES MAY BE USED. TREAT DOGWOOD WITH ROOTING HORMONE.

PLAN VIEW

SECTION A

BRUSH MATTRESS

NO SCALE



STONE TOE PROTECTION NOTES:
1. EXCAVATE A 1 FT.DEEP AND 1.5 FT WIDE TRENCH ALONG THE TOE (BASE) OF THE STREAMBANK. INCLUDED IN UNIT PRICE. EXCESS MATERIAL TO BE USED ON SITE AS CALLED FOR OR DISPOSED OF OFF SITE.
2. INSTALL 8 INCH THICK LAYER OF GRAVEL BEDDING ALONG THE EXCAVATED BASE AND LOWER 2 FEET OF SLOPE. SEE SECTION 02232 FOR GRAVEL FILTER MATERIAL (INC)
3. PLACE A (MIN.) 2 FT. HIGH, 2-2.5 FT. THICK) STONE REVETMENT ALONG THE BASE OF THE STREAMBANK.
4. USE 12"-18" WASHED FIELD STONE FOR THE RIP RAP UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
5. FILL IN VOIDS W/ SMALLER STONES 4"-12"
6. INSTALL TO HEIGHT CALLED FOR ON PLANS OR AS DIRECTED BY PROJECT ENGINEER HEIGHT TO BE MEASURED ALONG SLOPE FROM CUT IN TRENCH.
7. PAID FOR AS "STONE TOE PROTECTION" -SYD.

JOINT PLANTING NOTES:
1. INCORPORATE 1 GALLON CONTAINERIZED SHRUB PLANTINGS INTO THE UPPER LAYER OF THE STONE REVETMENT EVERY 5 FT PER THE SHRUB DETAIL.
2. JOINT PLANTINGS PAID FOR AS "CONTAINERIZED SHRUBS" -EACH

LIVE STAKE NOTES:
1. RATHER THAN CONTAINERIZED SHRUBS, USE 24 INCH LONG, 4 INCH DIA. PERFORATED PVC PIPE INTO THE UPPER HALF OF THE STONE REVETMENT TO PROTECT THE LIVE STAKES INC. IN UNIT PRICE PER LIVE STAKE. THE PIPE SHALL BE PERPENDICULAR TO THE SLOPE AND SPACED 3-4 FT APART WITH TRIANGULAR SPACING (AVG. 2 STAKES PER 3 SYD). MINIMUM 2" TO 4" AND TWO LIVE BUDS SHALL BE EXPOSED ABOVE THE STONE FILL.
2. DURING THE DORMANT SEASON (NOVEMBER TO APRIL), INSTALL THE LIVE STAKES INTO THE SLOPE WITHIN EACH PIPE SECTION WITH A DEAD BLOW HAMMER (HEAD FILLED WITH SHOT OR SAND) TO AVOID DAMAGING THE STAKES. INSTALL EACH STAKE AT LEAST 2 FT INTO THE BANK AND LEAVE 2-4 INCHES OF STAKE PROTRUDING FROM THE REVETMENT FACE. STAKES MUST BE PLANTED WITH THE BUDS FACING UP.
3. AN IRON BAR MAY BE USED TO CREATE PILOT HOLES IF NECESSARY IN STONEY OR CLAY SOILS.
4. FOLLOWING THE INSTALLATION OF THE LIVE STAKES, HALF FILL EACH PIPE WITH COMPOST PLANTING MEDIUM AND 1 TABLESPOON OF MYCORRHIZAE INNOCULANT.
5. LIVE STAKES PAID FOR AS "LIVE STAKE" -EACH AND SHALL INCLUDE 4" PVC PIPES, LIVE STAKE, INSTALLATION AND BACKFILL OF PIPES.

STONE TOE PROTECTION WITH JOINT PLANTINGS OR LIVE STAKES

NO SCALE

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JUL 12 2011
UNITED STATES
PERMIT CONSOLIDATION UNIT

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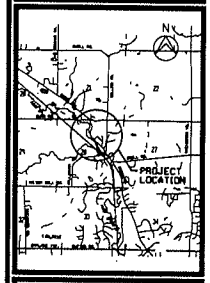
DATE	ADDITIONS AND/OR REVISIONS
7-12-11	REVISED PER USACE-PCC PRE APP. COMMENTS
7-6-11	ISSUED FOR USACE PERMIT Rev.1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.W.



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY, MICHIGAN

DETAILS Y

HRC JOB NO. 20110115	SCALE NO SCALE
DATE MARCH 2011	SHEET NO. DS-Y OF

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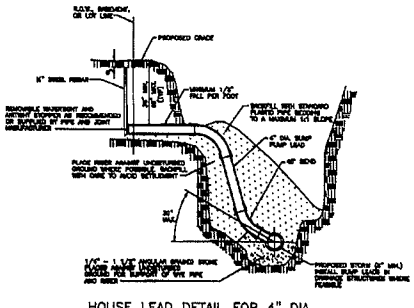
Revised



HOUSE LEAD DETAIL FOR 4" DIA. PLASTIC SUMP PUMP LEADS
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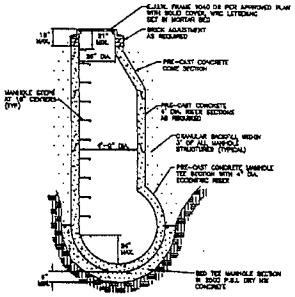

PRE-CAST TEE MANHOLE DETAIL
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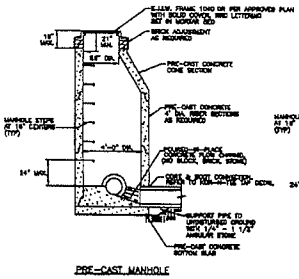
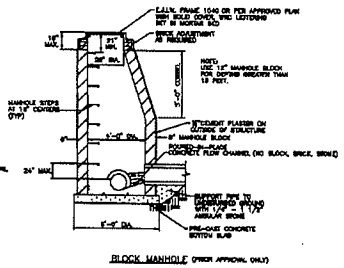
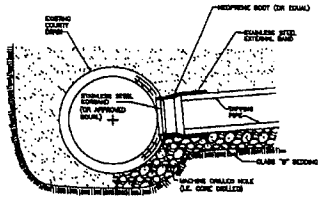


PRE-CAST MANHOLE



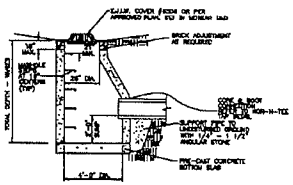
BLOCK MANHOLE (OWCR APPROVAL ONLY)

STANDARD MANHOLE DETAILS
NO SCALE



CONNECTION DETAIL FOR DIRECT TAPS TO PIPE WALL OF EXISTING COUNTY DRAINS.

KOR-N-TEE TAP (OR APPROVED EQUAL)
NO SCALE



PRE-CAST CATCH BASIN DETAIL
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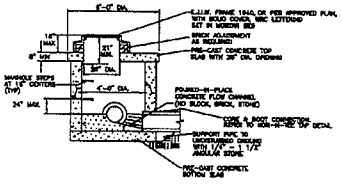

PRE-CAST LOW HEAD MANHOLE DETAIL
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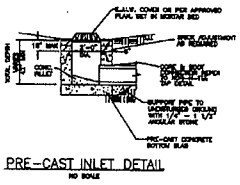
(OWCR APPROVAL ONLY)



PRE-CAST INLET DETAIL
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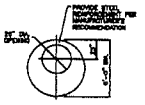
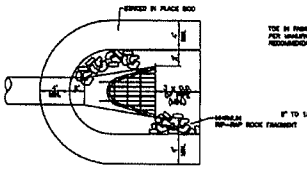
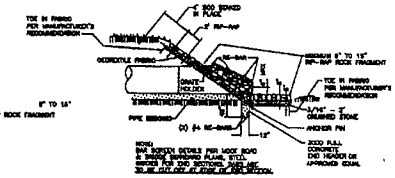


PRECAST CONCRETE TOP SLAB DETAIL



PLAN VIEW



PROFILE VIEW

END SECTION AND BAR SCREEN DETAIL
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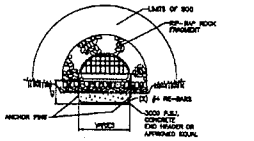
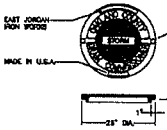
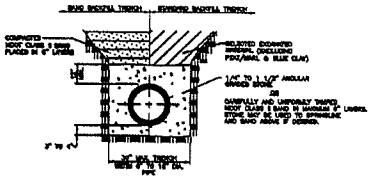


END VIEW

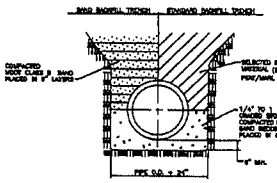


EAST JORDAN IRON WORKS OR APPROVED EQUAL
HEAVY DUTY MATERIAL ASTM A48 CL.35
COVER WT. 150 LBS., CATALOG NO. 10400A
PATTERN NO. 1040A, PRODUCT NO. 104000 GASKETS:
2" INCH RAISED LETTERS, 1" WIDE RAISED LETTERS
ALL RECESSED FLUSH.

LETTERED MANHOLE COVER FOR O.C.D.C.



P.V.C. SOLID WALL, ABS, AND TRUSS PIPE BEDDING DETAIL
NO SCALE



CLASS "B" BEDDING TRENCH DETAIL FOR 27" DIAMETER AND LARGER CONCRETE PIPE
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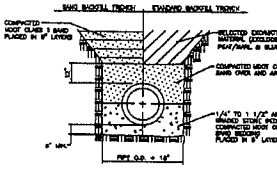
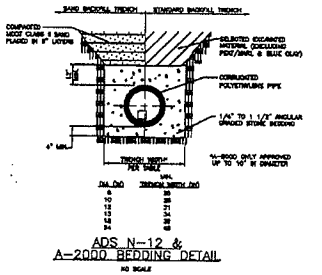


CLASS "B" BEDDING TRENCH DETAIL FOR 24" DIAMETER AND SMALLER CONCRETE PIPE
NO SCALE



ADS N-12 & A-2000 BEDDING DETAIL
NO SCALE

GENERAL NOTES

1. Type and sizes of pipe shall be as specified on plans.
2. Class "B" bedding shall be used throughout, unless otherwise specified on the plan.
3. All end sections 18" and larger shall be provided with a bar screen unless otherwise approved.
4. Standard rip-rap shall be 6"-18" fragmented rock, heavy rip-rap shall be 18"-24" fragmented rock. (No Broken Concrete)
5. MANHOLE REQUIREMENTS:
   - All new catch basins, inlets, and manholes shall have WRC approved flexible, watertight seals where pipes pass through walls. Manholes shall be of precast sections with modified groove tongue and rubber gasket, type joints. Pre cast manhole cone sections shall be WRC approved modified concentric cone type.
   - Tape through manhole joints or cone sections are prohibited unless otherwise approved.
   - Manhole steps to be plastic coated steel meeting the requirements in ASTM D 3142, Type II, Grade 4810B, M1, Industrial P.S.I. Polypropylene, (or approved equal). Steps to be installed during manhole manufacture. Place at 16" centers 4.0" from centerline of cover.
   - Cone section with modified groove tongue joints and with steel inserts cast in place. Top to have flush surface.
   - ASTM C-478 riser section with modified groove tongue joints.
   - Non-rust, trap-rod, press swige 5, or non-rusted bolt (with stainless steel lockwed) flexible rubber manhole joints. (or approved equal).
6. CONCRETE PIPE REQUIREMENTS:
   - Concrete pipe to be per ASTM C76 standards.
   - A sift be required to TV at pipe 30 days after installation
   - The contractor shall provide reinforced concrete pipe as specified on the plans.
   - All reinforced concrete pipe shall have modified grooved tongue joints with o-ring type rubber gasket, per A.S.T.M. specifications C443.
7. FLEXIBLE (PLASTIC) PIPE REQUIREMENTS:
   - The completed installation of all flexible pipe shall at no point have out-of-round pipe deflections greater than 5% of normal diameter of pipe. Deflection testing shall be done with a ring point mandrel a minimum 30 days after installation and again at 1 year after installation. It will also be required to TV all pipe 30 days and again 1 year after installation. A minimum rise to verify measured must be provided prior to testing.
   - Flexible culverts will not be permitted under roads.
8. CORRUGATED POLYETHYLENE (ADS N-12) PIPE REQUIREMENTS:
   - ADS N-12 12" pipe shall be smooth-lined modified per ASTM F667, AASHTO M294, and AASHTO M252.
   - Joints, pipes, and fittings shall be watertight as specified per ASTM D3212 and ASTM F1417. Gasket joints shall be installed in accordance with procedures specified by the pipe manufacturer.
   - 8" through 24" are the only pipe diameters accepted.
9. SUMP PUMP LEAD REQUIREMENTS:
   - All sump pump leads connected to a County Drain pipe shall be pre-manufactured.
   - Sump pump leads connected to a manhole shall be cored and leaded. Refer to Kor-N-Tee Tap Detail.
   - Sump pump mains and leads shall be a (1) SDR 35, non-perforated, solid wall PVC, (2) Truss Pipe, (3) A-2000 or (4) approved equal, with premium joints.
   - Ends of all 4" sump pump leads shall be temporarily capped and their location staked, witnessed and recorded.
   - All sump pump leads to be taken to the property line, easement line or as indicated on the plan.
   - Sump pump styles must have a cleanout with a minimum inside diameter of 24" and be constructed at changes of alignment, ends of sump pump mains or as indicated on the plan.
10. RESTORATION REQUIREMENTS:
   All disturbed area within the County Drain right-of-way shall be restored as follows:
   - Under roads, sidewalks, driveways and parking areas, backfill material shall be placed loosely into trenches in six (6) inch layers with each layer compacted to not less than 85% of maximum dry density as determined by the ASTM D 1557 Compaction Standard (modified proctor compaction test). All other areas shall have each layer compacted to not less than 90% of maximum dry density.
   - Finish subgrade
   - Place 3" thickness clean topsoil acceptable to the engineer to attain finished grade. Topsoil must not be contaminated and may not be a mixture of natural embedding soils, subsoil materials, or other materials. It must consist of natural loam, sandy loam, silty loam or clay loam humus-bearing soil adapted to the maintenance of plant life. Topsoil must be neither excessively acidic nor excessively alkaline. It must be of natural origin, exclusive of any peat or muck.
   - Apply seed and fertilizer as follows:

Location	Seeding Requirements	Fertilizer Requirement
Slopes and Ditch Banks, Etc.	M.D.O.T. "Roadside Mix" Turf Seed Mixture Title (30% Kentucky Blue, 30% Perennial Rye, 30% Hard Fescue, 10% Creeping Red Fescue) applied at 230 lb/acre	M.D.O.T. Seeding and Bedding Fertilizer, Class A
Other Areas	M.D.O.T. "Roadside Mix" Turf Seed Mixture Title (30% Kentucky Blue, 30% Perennial Rye, 30% Creeping Red Fescue) applied at 230 lb/acre	M.D.O.T. Seeding and Bedding Fertilizer, Class A

   - Sod is required in restricted lawn areas. Refer to WRC General Specifications for additional requirements and information.
   - apply straw or marsh hay mulch to an air-dry condition to all seeded areas over the surface to a uniform thickness at 2 tons/acre.
   - mulch shall be anchored in place with biodegradable netting, not larger than 1½" by 2" nor smaller than ¾" by ¾".
   - The contractor shall be responsible to insure the growth of all seeded areas, and shall re-seed as necessary to overspray Dia.

STORM DRAIN NOTES AND DETAILS

CHKD. DATE:	12/21/01
SCALE:	NONE
DESIGNED BY:	WRC
DRAWN BY:	WRC 12/21/01

WRC
WATER RESOURCES COMMISSIONER
24W R 16/17-24

OAKLAND COUNTY DRAIN COMMISSIONER
1200 N. TELEGRAPH, BLDG. 96 E.
PONTIAC, MICHIGAN 48341-0481

SHEET NO.: 1 of 1

Revised