Judson A. Morse Drain

BRUCE D. CROZIER ENGINEERING INC.
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Overview
- Urban Drain With Agricultural Drainage Area
- Case Study - Sample of urban drain in a natural watercourse serving a small residential sector but sized for a predominantly large agricultural drainage area with an overview of construction and assessment methods.

Site Meeting

General Format of Presentation
- Site conditions prior to construction
- Drainage problem
- Method to correct
- Design features
- People problems
- Construction features & access
- Assessment features

Introduction
- Location: Essex County
- County Topography: FLAT
- Mainly Agricultural - TRADITIONAL LAND CROPS
  - PLANTED ROW CROPS
  - CROPPED HOMES - STORMWATER MANAGEMENT
  - GREENHOUSES - DIRECT RUNOFF
- Residential Areas: NORTH-WEST
- SMALL - TEMINION ESSEX, TEYMNH
- Agricultural Drains in County - WELL OVER 100
- Problems Arise - DRAINS SERVING BOTH SECTORS

This product illustrates problems encountered.

Site Conditions Prior to Construction
- Drainage area = 232 acres (606 sq. Acres)
- Area requiring drainage = 8 acres
- Upstream lands = 224 acres
- Land use:
  - open agriculture = 142 ac (64%)
  - residential = 32 ac (14%)
  - greenhouses w/m = 16 ac (7%)
  - greenhouses direct = 35 ac (15%)
  - road = 7,451,000 meters
- Fall in drainage area = 20 meters in 1,000 meters
- Ravine:
  - depth 7 to 10 meters
  - avg width 32 to 45 meters
Drainage Problems

- Erosion
- Safety with respect to children
- Sudden bank failures
- Stability of homes on bank

Existing Condition Photos

Aerial Photograph

Vertical face at outlet

Bottom of Neumann's

Bottom of Neumann's
Amicone pipe replacing buckfill

Method to Correct Problems

- Hydraulic & soils reports
- Prepared preliminary report
- Options
  - rock channel throughout
  - clay channel & drop structures
  - pipe enclosure
  - combination rock channel & pipe enclosure

Design Features

- 1200 mm diameter H.D.P.P.
- Manholes H.D.P.P.
- Seepage pipes & catch basins
- Sub-drain pipes & clay dams
- Rock protection
- Over flow pipes & flow route
- Clay fill (to 1/3 ravine depth)
Limits of Drainage Area
Proposed West Side & Access

Proposed East Side
Rock Lining Cross Sections

Pipe Enclosure Cross Sections
People Problems

- Extreme difference of opinion - upstream lands
- People rebel zoning
- Litigation uncertainty - 4 properties sold
  - 1 landowner died, son inherited & against
- New home construction during report stage
  - Wanted open drain & landscape
  - Bank failure needed USGS approval to refill
  - Used preliminary design to install pipe
  - Worked on weekend with own forces
  - Did not accept work
- Landowner attempting sewage pipe installation
  - Bank failure and nearly buried
- Landowner sold property, did not disclose assessment

Construction Features & Access

- Control of base flow
  - Suggested
  - Actual used
    - Ditch
    - Pipe deflection
- Construction & maintenance access
- Selected borrow pit sites

Consideration of Report

Construction Photos

Access ramp through Russell's

Stake access east of Longbeach - rock area
**Private slope regrading**

**Assessment Features**

- Project Cost $423,080
- Assessment breakdown
  - benefit $15,615 (4%)
  - outlet $88,910 (21%)
  - special benefit $318,555 (75%)
- Assessment to upstream lands $79,800 (19%)
- Individual assessments (area requiring drainage)
  - rock channel area $4,000 to $6,000
  - pipe enclosure area $32,000 to $62,000

**As-Built Photos**

**Outlet area before**

**Outlet area after**

**Outlet area after**
Rock area (east) after

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