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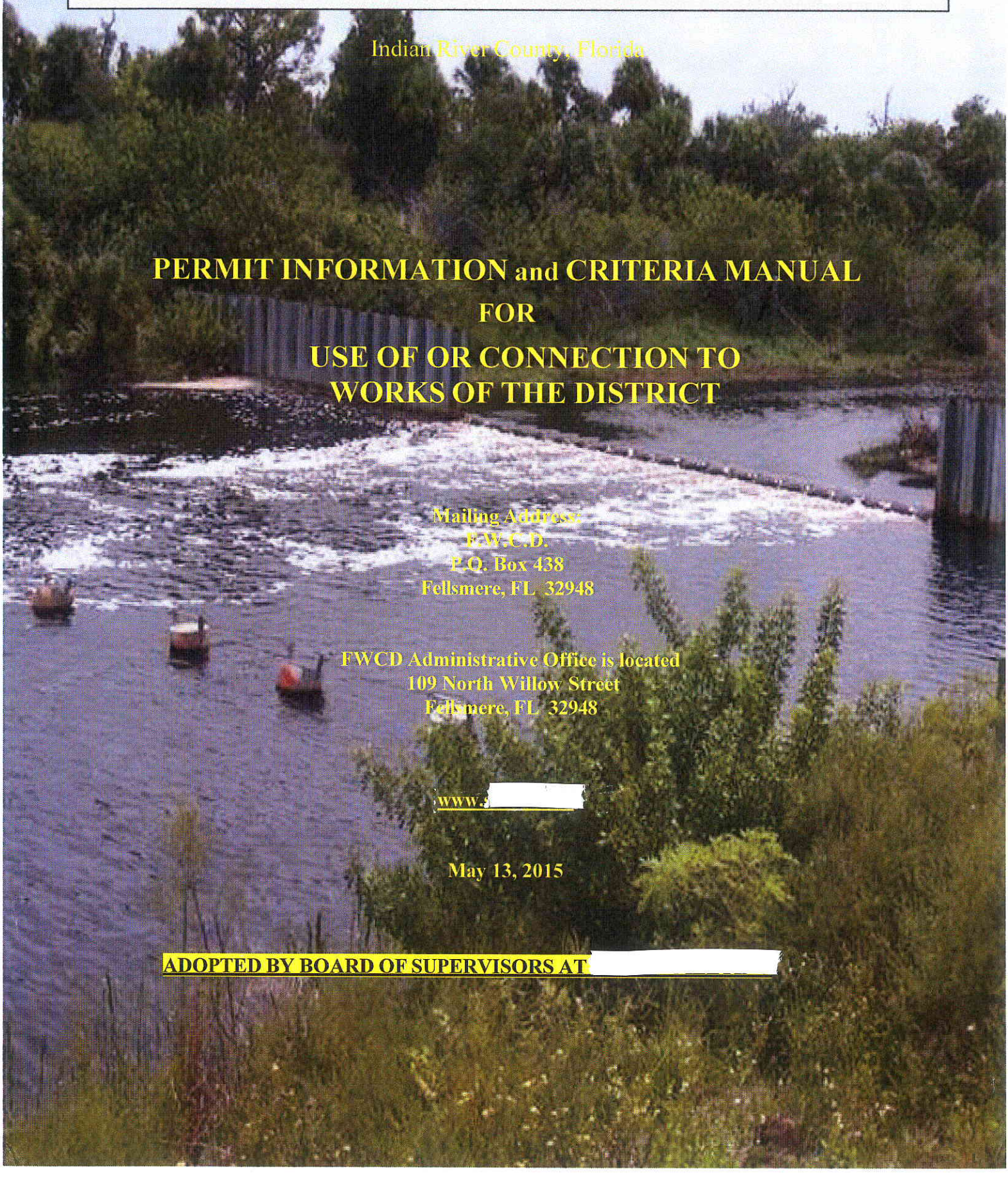
Fellsmere Water Control DISTRICT

Indian River County, Florida



PERMIT INFORMATION and CRITERIA MANUAL
FOR
USE OF OR CONNECTION TO WORKS OF THE DISTRICT

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May 13, 2015

ADOPTED BY BOARD OF SUPERVISORS AT [redacted]

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

EXHIBITS

SECTION 1

A. INTRODUCTION

The purpose of this *Permit Information and Criteria Manual for Use of or Connection to Works of the District* ("Manual") is to provide information describing the criteria and permitting requirements relating to the utilization of, and connection to, the works of the Fellsmere Water Control District (District).

This Manual should be used by permit applicants to prepare permit applications. It will be used as a guideline by the District staff to evaluate applications and proposals for permits. The criteria and requirements contained herein are subject to change, without notice, by the Board of Supervisors ("Board") of the District.

All projects within the District's boundaries or those which may utilize District works (i.e. Fellsmere Main Canal), regardless of size, location, direct or indirect connections, require review and permitting and/or authorization by the District.

All waters discharged into the District's canal systems shall meet water quality standards in accordance with laws and/or rules of: the State of Florida; the Federal Government; and the St. Johns River Water Management District (SJRWMD).

As applicable and in matters largely governing in-kind replacements or renovations to existing facilities, the Board may waive strict application of the criteria appearing in this Manual when such action is determined to be in the best interest of the District and general public, consistent with the objectives of the District.

B. DISTRICT POWERS AND RESPONSIBILITIES

The District is organized and exists under Chapter 298, F.S. In the context of this Manual, it is primarily responsible for drainage, flood control and protection, water management, and operation and maintenance of District works of improvement and rights-of-way (ROW) within the District boundaries. The rights of the District are paramount.

The primary function of the District is to control water within its boundaries with respect to drainage in times of excess water. The District maintains the dikes, main canals, lateral canals, and sub-lateral ditches as shown in the Water Control Plan.

All District land owners' having legal access to District surface waters have a right to discharge water into the District's canals and laterals provided that these activities are conducted in accordance with the regulations established and adopted by the District's Board of Supervisors. As the designated agent of the Board, the District Administrator and/or District Engineer are authorized to promulgate, implement, and assure compliance with the regulations adopted by the Board, unless specified otherwise in the regulations.

The District land area is generally composed of three watersheds; a gravity drainage area; a pumped drainage area; and an area that has been purchased by the State of Florida and is now incorporated into a reservoir system known as the SJRWCD Upper St. Johns River Basin.

Drainage in the gravity area is by a network of District Laterals and ditches which flow by gravity to the Indian River via the Fellsmere Main Canal. The water level in the canals and ditches follows the flow line of the ditches and pipe inverts until it reaches a salinity barrier weir set at elevation 2.25 NGVD near the outfall to the North Fork of the St Sebastian River. Any landowner desiring a different water table or elevation of water within the boundaries of the land owners' property different from that maintained in the laterals and ditches of the District is responsible for constructing and maintaining such culverts or other controls to meet internal needs. It is recognized that the District canals, laterals and ditches do not have water level control gate and pipe structures. Therefore it is impossible for the District to maintain water levels in the District system which will suit the needs of every landowner served without auxiliary control by the landowner to provide for their specific internal requirements.

Drainage in the pumped area is controlled by the single land owner entity, Fellsmere Joint Venture, (FJV). The pumped drainage discharges into the SJRWMD Upper Basin area. FJV maintains the various pump stations, and operate the pumps based on the SJRWMD ERP permit conditions. FWCD does provide for the maintenance of the canal / ditch system.

Drainage in the SJRWMD Upper St Johns River Basin area is by gravity. Water levels in the individual reservoirs are managed by SJRWMD to cascade from south to north and eventually discharge to tidal waters near Jacksonville. The FWCD does not provide for the maintenance of the Upper Basin area. All FWCD right of ways located in this area have been sold to the SJRWMD.

Land owners' in either the gravity drainage area or the FJV pumped drainage area are to apply for and receive a permit from the District's Board of Supervisors for the construction of any culverts, pumps or other facilities on District rights of ways or into the rights of way for any purpose so the District can maintain uniform control of its facilities. Land development projects are to apply for and receive a permit from the District's Board of Supervisors even if there is no direct connection to the District's facilities. This requirement is necessary to ensure that the 2 inch per day volume discharge and the maintenance of the flood plain storage volume criteria are in compliance.

Best Management Practices

The District recognizes and supports various Best Management Practices (BMP's) adopted by the Florida Department of Agriculture and Consumer Services (FDACS), the United States Department of Agriculture's Natural Resources Conservation Service (USDA-NRCS), and the Indian River Citrus League (IRCL).

Land owners' are encouraged to implement BMP's to accomplish effective environmental management through a total systems approach centered on water management, water quality, and water supply. The BMP philosophy represents the everyday working goal of the District and is promoted continually. BMP program elements include a wide range of applications including weed barriers, disease control, side slope rehabilitation/stabilization, shoal removal, vegetation/sediment trapping and removal, biological control and physical structure rehabilitation and/or replacement.

C. DISTRICT CHARACTERISTICS

1. District Limits

The District's remaining maintenance (taxing) area encompasses all of Township 31 South, Range 37 East, less and excepting that portion sold by FJV to St. Johns River Water Management District and included in the "Fellsmere Water Management Area (FWMA)"; all that portion of Township 32 South, Range 37 East lying North of Sub-lateral Ditch 34 alignment (and North of "Blue Cypress Water Management Area"); and those portions of the Southeast ¼ of Township 31 South, Range 36 East, and the Northeast ¼ of Township 32 South, Range 36 East bounded on the North, West and South side by St. Johns River Water Management District's "Fellsmere Water Management Area" and "Blue Cypress Marsh conservation Area".

2. Existing District Facilities

Drainage Facilities

The original Plan of Reclamation was developed in the early 1900's and resulted in the construction of a network of perimeter dikes, canals, laterals and ditches. The original overall District watershed included 50,000 acres ± of land primarily used for Agriculture. The system includes east-west sub-lateral ditches approximately ¼ mile on center. Due to the naturally occurring 10 mile ridge (I-95) east of the District; the land generally slopes from east to west. The ¼ mile ditches flow west into the lateral canals. The lateral canals flow north to the Fellsmere Main Canal. The Fellsmere Main Canal is located along the north boundary of Indian River County and is graded to drain east through the 10 mile ridge and into the west prong of the St. Sebastian River. A plug in the Fellsmere Main Canal, and internal culverts with flashboard risers, separates the gravity drained watershed and the pumped drained watershed.

With the acquisition of lands and development of the Upper St. Johns River Basin project by the St. Johns River Water Management District, the watershed basin of the original Fellsmere Water Control District has been drastically reduced. A majority of the remaining area within the Fellsmere Water Control District and owned by FJV is pumped, or partially pumped, into portions of the Upper St. Johns River Basin.

The remaining gravity drained portion of the Fellsmere Water Control District is drained by two lateral canals (Park Lateral and Lateral "U"). Generally, Park lateral drains all the land within Fellsmere Water Control District lying east of Park Lateral (including "The Original Town of Fellsmere) and north of Sub-lateral PL-24, containing approximately 14.0 square miles. Park Lateral also partially drains the former "Berry Groves" parcel (now owned by FJV), containing approximately 6 square miles, that is pumped south into the "Blue Cypress Water Management Area" (BCWMA), during heavy rainfall events.

Lateral "U" Canal gravity drains all of the land west of Park Lateral Canal and north of Sub-lateral U-20, containing approximately 8.4 square miles, and partially drains a portion of its southern basin (between Sub-lateral U-20 and U-28) containing approximately 2.5 square miles, that is pumped south into BCWMA during heavy storm events.

The remaining non-gravity drained portions of the District is drained through pump stations, all owned and operated by FJV (SunAg, Inc.), into water management areas of the Upper St. Johns River Basin.

Water Control

The District does not own or operate any pumps or gate structures. The District does not own or maintain any culverts. However, the District maintains the rights to access, modify, remove, replace, (or in some cases not replace), and operate the gravity connection culverts that allow lands within the District boundary to drain to the lateral ditch system should the land owner be non-compliant with the operation and maintenance requirements of the District.

Drainage Laterals and Main Canal

The gravity drainage portion of the District drains to the north via two main Lateral Canals (Park Lateral and Lateral U) which run south to north. These two Laterals connect to the Fellsmere Main Canal. The Main Canal is located on the northern boundary of the District and flows from west to east and ultimately drains into the western prong of the St. Sebastian River. The water elevation in these laterals are not controlled by any radial gate discharge structures. At the east outfall of the Main Canal there is a salinity weir, (see cover picture). Tributary to the two main laterals is a series of sublaterals which run east to west and drain west following the natural fall of the land into their respective laterals via culverts. The laterals are numbered 1 to 35 from north to south with the Park Lateral collecting all drainage to the east of Park Lateral and Lateral U collecting all drainage from Park Lateral west to Lateral U.

The pumped drainage areas are generally drained using the original network of FWCD Main, Canal, Lateral Canals, and sublateral canal that were originally intended to gravity drain via the Main Canal outfall to the east. However, in the early years of the District the major land owners of the western areas permitted and constructed private pump stations to drain to the west into the Blue Cypress Lake and Marsh areas. Flooding problems and the agricultural crop needs for better drainage were addressed with the levee and pump system.

Irrigation Facilities

The District neither owns nor manages irrigation facilities. As noted previously, the District does not own or maintain water control gate structures, therefore the District is not managed for irrigation supply. Irrigation water sources typically used by District land owners' within the gravity drained portion of the District are either wells or on-site lakes to collect and re-use rain water. In the past only a couple of land owners have requested permits to install irrigation pumps to withdraw water from the Park Lateral; however they are not functioning at this time. All facilities for irrigation shall be installed, operated and maintained by individual land owners' and shall remain private. The District makes no guarantee of the water volume available for irrigation at any time. Land owners may install, after District permit authorization, private irrigation systems connecting to District Works in accordance with this Permit Manual and associated Exhibits.

SECTION 2

RULES FOR USE OF OR CONNECTION TO WORKS OF THE DISTRICT

A. Permits Required

No utility or other improvement shall be constructed across, under, along or within a canal or right-of-way over which the District has jurisdiction, nor shall any use whatsoever occur within a District right-of-way or easement, unless a valid application for a construction or use permit has been approved and issued by the District. No land alteration or site development altering the quantity and quality of surface water runoff for any property within the jurisdictional limits of the District shall occur unless a valid permit application has been reviewed and approved by the District.

The permit application process consists of two parts which both require District approval; authorization for construction and inspection/project certification. Upon District approval of the application submittal, the applicant will receive a permit. After construction is complete, the applicant shall complete the Inspection/Project Certification requirements outlined below for the permit process to be deemed complete. In the case of an emergency, authorization (written if practical) may be given by the Supervisor of Operations or District Engineer as per Board delegation.

Any proposed use, crossing, or connection to works of the District shall not inhibit maintenance of the canal system. Easements may be required to facilitate uninterrupted maintenance access to the works of the District. Alternative arrangements for maintenance at the full expense of the project applicant may be considered at the Board's discretion on a case-by-case basis.

A map showing the general location of the District's rights-of-ways may be acquired from the District's office.

B. Permit Fees

Permit applications shall be accompanied by the required fees. An application will be considered or reviewed only after the application is completed and signed, and the required fees are submitted. The permit process and application can also be found on the District's web site http://www.srid-fl.com/ fellsmerewatercontroldistrict.com

C. Inspection / Project Certification

Any utility or other improvement constructed under a valid permit shall be subject to inspection by the District to assure compliance with the terms of the permit before use of the utility or improvement will be allowed.

Additionally, within 30 days after completion of the permitted activity, the Applicant/Permittee shall submit notice of completion to the District for approval. Unless otherwise specified by the District, this shall consist of a written, signed, and sealed statement of completion, certification by a currently registered Florida Professional Engineer, and two (2) complete sets of final "Record Drawings", signed and sealed by the project Engineer of Record or a currently licensed Florida surveyor. These statements must specify the actual date of construction completion and must certify that all improvements have been constructed in substantial conformance with the plans and

specifications approved by the District and will function as intended and designed. If deviations from the approved drawings are discovered during the certification process, the certification must be accompanied by a copy of the approved permit drawings with deviations noted. All planned dimensions, pipe sizes, pipe lengths, pipe inverts, control structure weir size and crest elevations, stormwater management storage areas, etc. shall be surveyed and certified.

D. Pre-Application Meeting

Every applicant is encouraged to contact the District staff prior to preparing an application for District review and evaluation. The staff can offer assistance in providing information and answering questions.

For applications embracing large, complex projects, the District requires a pre-application meeting to discuss criteria and other requirements. This is particularly true for the connection of new drainage and irrigation facilities, and for bridge crossings.

A permit pre-application checklist may be obtained from the District office or the District's website.

E. Pre-Construction Meeting

For large or complex projects, a pre-construction meeting is required as determined by the District.

F. Permit Application Requirements

Permit application forms may be obtained from the District office or the District's website. The application form must be signed by the owner of the private property to be served by the proposed work or improvement, or by the authorized representative of a utility of governmental agency requesting a permit. Supporting documentation must be provided demonstrating authorization to obtain permits on behalf of, or for improvements which will be maintained by, a governmental agency, or from an agent authorized to obtain permits on behalf of a private owner.

Depending upon the nature and extent of the proposed project, the submittal of certain maps, drawings, calculations and engineering details sufficient to define the nature, scope, intent and function of the proposed activity may be required to support the application. These supporting documents may include, but are not limited to:

1. Project location and area, in acres, to be served by the proposed improvement. Include section, township, and range; canal number; and location within the canal right-of-way related to some known and identifiable feature.

2. Whether the proposed use is a new installation, a modification of an existing improvement, or a replacement of existing works.

3. A description of the proposed use of, or encroachment on, works of the District.

4. A description of the portion of the works of the District to be used.

5. Two copies of full-size construction plans and specifications reflecting the proposed

use in plan and elevation views, and as related to the applicable works of the District. The plans provided shall be signed and sealed by the Engineer of Record and shall clearly indicate the project design datum (NGVD-29 or NAVD-88).

6. Two copies of boundary and topographic survey information signed and sealed, for the project area and adjacent canal right-of-way.

7. If available, drawings in electronic format such as AutoCAD or Portable Document Format (pdf).

8. As appropriate, supporting calculations signed and sealed by the Engineer of Record, demonstrating that the proposed improvements meet all applicable District criteria.

9. Any proposed improvement which may alter the natural groundwater gradient to a District canal, including but not limited to excavations or water impoundments, shall submit a seepage analysis demonstrating that the proposed improvement will not adversely impact the stability of the adjoining canal bank.

10. Proposed project drainage calculations shall address the 2"/day maximum allowable discharge volume requirement for any 24 hour period during a 25 year – 24 hour event. The design engineer shall coordinate with the District Engineer on the tail water time vs. stage relationship.

11. Proposed project drainage calculations shall address the maintenance of flood plain storage. Cut and fill calculations demonstrating that compensating storage volume is being created to offset and proposed fill in the flood plain shall be prepared by the design engineer registered and currently licensed to practice Civil Engineering in the State of Florida. The existing conditions shall be based on a topographic survey prepared and signed and sealed by a Surveyor registered and currently licensed to practice in the State of Florida.

12. If a proposed project includes a request to "culvert" a section of a sub-lateral ditch greater than 100 feet, additional permit requirements must be met. See Paragraph D under Section 3 for additional details on this requirement.

13. Include a copy of the appropriate Exhibit sketch, (see Exhibit section of the manual) for each proposed improvement in the permit application. Complete all requested information on each Exhibit.

14. FWCD will require a bond for any proposed use of the District's right-of-way to provide assurance that the District's lands are properly restored at the completion of the proposed project.

Land owners' enrolled in BMP programs for water control with FDACS, USDA-NRCS, or similar agricultural associations are encouraged to submit their plans as part of the supporting documentation to a permit application. On a case by case basis and at the discretion of the Board, the District may accept supporting documents prepared for adopted BMP's or Conservation Plans in lieu of portions of the permit submittal requirements.

Insufficient or unclear drawings shall result in the return of an application without action by

the District. Inadequate re-submittals which do not fully address the District's request for information may also be returned without action by the District.

G. Financial Responsibility

Financial responsibility for all connections and or a proposed improvement is the responsibility of the District landowner as the applicant requesting such actions.

H. Installation and Maintenance Responsibility

Installation and maintenance responsibility for the use of, or construction of facilities, in, on, over or under District rights-of-way shall be that of the Permittee or the entity identified in the permit. The acceptance of the FWCD permit provides the District the right to enter the permitted property and inspect such facilities to determine their capability to provide effective stormwater management in accordance with the District permit. Failure of the applicant to maintain the facilities will result in the District correcting such matters as deemed applicable and the billings of these remedial actions to the responsible party at a rate of costs plus twenty percent. Failure to maintain the permitted use or works may result in the revocation of the permit, and at the District's sole discretion, the removal of the crossing, connection, or use.

I. Obstruction of District Right of Way/Property

The obstruction of District right-of-way/property by the placement of, but not limited to, materials; equipment; buildings; debris, is a violation of Florida Statutes as noted in 298.66,

Title XXI
DRAINAGE

Chapter 298
DRAINAGE AND WATER CONTROL

298.66 Obstruction of public drainage canals, etc., prohibited; damages; penalties. –

(1) A person may not willfully, or otherwise, obstruct any public canal, drain, ditch or watercourse or damage or destroy any public drainage works constructed in or maintained by any district.

(2) Any person who willfully obstructs any public canal, drain, ditch or watercourse or damage or destroys any public drainage works constructed in or maintained by any district shall be liable to any person injured thereby for the full amount of the injury occasioned to any land or crops or other property by reason of such misconduct and shall be liable to the district constructing the drainage work for double the cost of removing such obstruction or repairing such damage.

(3) Any person who willfully, or otherwise, obstructs any public canal, drain, ditch, or watercourse, impedes or obstructs the flow of water therein, or damages or destroys any public drainage works constructed in or maintained by any district, commits a felony of the third degree, punishable as provided in s. 775.082, s. 775.083, or s. 775.084.

History. – s. 5, ch. 6190, 1922; s. 52, ch. 6458, 1913; RGS 5293, 5294; ss.1-3, ch. 10110, 1925; CGL 1518, 1519, 7413-7415; s. 163, ch. 71-136; s. 28, ch 79-5; s. 48, ch. 2010-205.

SECTION 3

SUBLATERAL CROSSING CRITERIA

A. Sublateral Crossing Policy

It is the policy of the District to:

1. Allow a District landowner vehicular access to his property from one side of a canal to the other provided that it is the only alternative for accessing the subject property.

2. Limit the spacing between culverted crossings in a sublateral to not less than 330 feet. Exceptions for developed areas with "grandfathered" crossings or small tract areas may be granted by the Board on a case by case basis.

3. ***Drainage Sub-Laterals*** - Limit hydraulic losses in its canal systems so that a single crossing, whether culvert or bridge, induces a head loss in the system of not more than 0.10 feet. The head loss shall be calculated using a design flow for the drainage area served by the canal at the crossing location, which includes all the drainage upstream of the proposed crossing. The design flow rate shall be based on the removal rate specified for laterals in the Water Control Plan.

4. The FWCD has adopted two minimum pipe size policies that are currently used to establish minimum pipe size ditch crossing. See Exhibit VIII and IX.

4. The District may require joint use crossings to serve more than one owner when such action will result in fewer structures in District canals.

The District shall establish the drainage area to be used for determination of the design flow at each crossing, and shall evaluate applications for canal crossing permits using the foregoing policies and the minimum pipe size tables noted in Exhibit I, VIII, and IX as a guideline.

B. Application for Sublateral Crossing Permit

A permit application for a new, or an existing unpermitted, crossing shall include, as a minimum, the following information on the nearest culverted or bridge crossings both upstream and downstream from the proposed crossing, all provided by the applicant at no expense to the District:

1. The location, in feet, from the nearest existing upstream and downstream crossings to the location of the proposed crossing.

2. For culverts, the: invert elevations (referenced to NAVD-88); diameter; length; material type; wall type; and wall thickness. Three surveyed cross-sections of the sublateral right-of-way: one at the location of the proposed crossing, and one fifty to one-hundred feet upstream and downstream of the proposed crossing. At a minimum, surveyed elevations must be provided at each right-of-way line, sublateral top of bank, toe of slope, and at the lowest point of the sublateral bottom. The location of any existing improvements and their proximity to the project area shall also be shown.

3. Any end treatment or bank revetment proposed as part of the project design.

4. Improvements within the District right-of-way provide sufficient access for District maintenance equipment.

A permit application for replacement of an existing permitted crossing may not need to include all of the information specified above, but replacement of an existing permitted facility may require upgrading in size or adjustment of the invert elevation to comply with the latest adopted standards.

C. Culverted Crossing

A road crossing a District sublateral may be culverted, provided, however, it is no closer than 330 feet from an existing crossing. The culvert must be sized to pass the design flow with a maximum head loss as specified in A, above.

The culvert design, including invert elevation, diameter, length and end treatment, must be consistent with the water management objectives of the sublateral in which it is installed, as determined by the District.

If a proposed crossing will violate the 330-foot minimum spacing guideline, or result in an unacceptable head loss, then the culvert may be oversized at the option of the District. The District shall determine drainage areas, invert elevations, and culvert oversizing requirements.

Any proposed crossing requiring more than one culvert to pass the design flow under the conditions stated shall not be permitted.

Construction of a culverted crossing shall conform to the requirements of *Exhibits I and II.*

D. Sub-lateral Culverting

In the case where a proposed project requires a section of ditch to be culverted in excess of 100 ft in length to allow construction of a turning lane or some other land development improvement, then additional requirements may be required to mitigate the following impacts to the FWCD drainage system;

1. The reduction of runoff storage capacity in the ditch
2. The loss of water storage capacity in the soil horizon next to the ditch
3. The increased cost of maintenance of culverts vs. open ditch
4. Maintaining flow of stormwater during construction
5. Pipe end treatments must allow for low head loss
6. Pipe size to adequate to allow no increase in the upstream pre-development peak stage.
7. Exemptions
8. The FWCD Board of Supervisors Approval

1. Storage Volume Calculations and Compensation for 25 Year and 100 Year Storm Events

A. Within the ditch section to be replaced with a culvert, all flood storage must be maintained from pre to post development. Predevelopment storage volume calculations shall be based on

the existing canal cross section up to the 25 year peak stage and the length of the sub-lateral canal to be filled. The cross section area will be based on enough cross sections to obtain a reasonable approximation of existing conditions as determined by a Florida Registered Land Surveyor and shall be based on (1929 NGVD). The design engineer must estimate the 25 and 100 year flood elevation from the FIRM maps or on the results of the FWCD study.

B. The post development storage volume reduction is the difference between the pre-development volume found in Part A above less the volume of storage in the culvert system voids.

C. The storage volume reduction must be compensated within the subject sub-lateral's drainage basin. The storage may be include in the onsite stormwater management system. The volume needed to fully compensate the volume lost due to the culverting of the sub-lateral must be in addition to that which is needed to address the 2" limitation and the flood plain cut and fill balance required for the onsite improvements. The volume must be available between the control elevation of the stormwater system and the 25 year peak stage elevation for the 25 year storm event analysis. If the storage in not available on-site, the compensation shall be within the North Diversion Ditch watershed.

D. Similar to the Sub-section C above, the 100 year event analysis shall demonstrate that the volume lost due to the culverting will be fully compensated. However, this additional volume to meet the 100 year event (above the 25 year event) may be provided between the 25 and 100 year elevations.

2. Soil Storage and Adjacent Water Table Levels

A. The existing open ditch section lowers the adjacent water table by seepage into the ditch. When the ditch section is replaced with a culvert, the soil storage must be maintained.

B. A slotted or perforated pipe to allow seepage will mimic an open section. The slotted/perforated pipe should be installed within a gravel layer and wrapped with filter cloth.

C. As an option, the design may include a smaller perforated pipe installed parallel to the main culvert. The smaller pipe invert must be installed at the elevation of the flow line of the existing ditch. The pipe shall be wrapped in gravel (6" min. thickness) and filter cloth. The minimum pipe size shall be 18". Connections to the main culvert section shall be at 200 ft. centers (max.).

3. Maintenance

A. The F.W.C.D. does not assume ownership of any culverts placed in the district sub-laterals.

B. The expected life span of pipe sections varies by pipe material, soil chemistry, quality of installation, traffic loads, oxidation, and other factors. All pipes will eventually wear out and need to be replaced. A 100 (min.) year life span pipe is required due to the extensive impacts that replacement will create. The District strongly encourages the use of RCP to meet this objective.

C. The Applicant, land owner, the Indian River County or the City of Fellsmere, must provide and bear the cost of any required maintenance or replacement. If the Applicant fails to maintain the culvert, the District shall sub-contract for the maintenance and/or removal and charge the Applicant for all cost including administration.

4. Maintaining Flow of Stormwater During Construction

Flow of stormwater must be maintained in FWCD Ditches throughout the construction phase of such culverted section of the ditch. To prevent elevated water stages in the upstream canal sub-basin, any temporary blockage of a canal for such culvert installation will require the provision on site, of a pump (equal in flow capacity to 2"/day for the upstream watershed) or other by-pass method. In addition, maintain onsite the equipment and manpower with the capability to immediately remove any temporary dam, and any other construction related impediments, to provide the full capacity and flow conditions of the canal in the event of a storm event. All such proposed temporary blockages and by-pass methods shall be approved in advance, and coordinated throughout the construction phase, by/with the FWCD.

5. End Treatments

End treatments to prevent trash from entering pipe may be required on a case by case basis.

6. Pipe Size

The entire flow channel of the culvert including the top, bottom, and sides shall be smooth with no rough corners to catch trash. Also, reduction or change of the cross section is not allowed in the direction of flow. The pipe size shall be based on the FWCD pipe size table or the size needed to maintain (with no increase) the upstream predevelopment peak stage, whichever is larger.
The District's Engineer will provide the Applicant's Engineer the appropriate node/reach exhibit and summary of pre-development peak stage and flows for the 25 yr and 100 yr events.

7. Exemptions

Culverted ditch sections less than 100 feet long are exempt from the mitigation policies noted in Parts 1 and 2 above.

8. FWCD Board of Supervisors

The permit will require approval by the Board of Supervisors before issuance. CONSTRUCTION CAN NOT START UNTIL THE PERMIT IS ISSUED.

E. Bridges

By resolution adopted by the FWCD Board only bridge crossings are permitted over the District's Park Lateral, Lateral U, or the Main canal system. Other laterals and sub-laterals may be considered for non-bridge crossings. This will be reviewed on a case by case basis upon which final determination will be at the Board's discretion.

All bridges crossing District rights-of-way must be designed and certified by a Florida Professional Engineer with certification in bridge design. All bridges crossing District canals must provide for continuous and uninterrupted access for District equipment along both canal

berms.

Public road bridges within the District subject to use by the public shall be designed to carry minimum anticipated loads per Florida Department of Transportation Design Standards.

The following minimum horizontal and vertical clearances shall control the design of bridges over District canals:

Horizontal:

Center Span: 25-foot clear bent spacing, measured perpendicular to the canal centerline.

Approach Spans: Minimum 20-foot spacing between bent centers, measured perpendicular to the canal centerline.

Vertical:

Minimum Low Member Elevation: The minimum low member elevation shall be a minimum of one (1) foot above the 100 year peak stage.

All bridges crossing a District right of way shall include the following minimum maintenance and stabilization measures:

1. Sacrificial pilings for weed collection. Note, not required if bridge is a single span design.

2. Hardened revetment consisting of FDOT Rock Rubble Riprap meeting the Ditch Lining specification shall be constructed from the top of bank to the toe of slope. The length of the revetment shall cover a minimum of 25 feet upstream and downstream and also under the span of the bridge. The geotextile material underlying the riprap revetment shall be anchored at the top of slope and overlap a minimum of four feet at each joint, and be placed continuously under bedding stone layer.

3. For the span of the bridge and 25 feet on each side, the bottom of the canal shall be lined with a bedding stone layer (FDOT No. 4 stone), a thickness of at least 6 inches.

4. Note, each bridge crossing will be reviewed for the above minimum criteria and additional requirements may be requested by the FWCD on a case by case basis to meet the District drainage and maintenance objectives.

F. Crossing Criteria Flexibility

The foregoing criteria are to be used as guidelines in designing and evaluating the crossing improvements. Alternative methods of meeting the District's objectives may be considered, depending on the magnitude and nature of resultant impacts on a case by case basis. As stated, the Board may modify these criteria, provided that the primary goal of meeting District water control objectives is not compromised.

SECTION 4

DRAINAGE CONNECTIONS TO DISTRICT CANALS

A. Drainage Connections Existing Connections

Drainage connections with District canals installed prior to the adoption of these Rules may be replaced in like size and kind as a matter of custodial maintenance. However, an application for permit must be submitted to the District and approved prior to initiation of such replacement to assure compatibility of the completed work with the District's objectives including, but not limited to, restoration of the District's rights-of-way in an acceptable manner. Applicable application fees will apply.

New Connections and Enlargement of Existing Connections

New connections and the enlargement of existing connections discharging storm water runoff to District canals shall be designed and installed to limit discharge from the drainage area served by the proposed connection.

Gravity connections, the applicant must demonstrate that the proposed installation will limit storm water runoff to the volumetric equivalent of not more than 2 inches of depth over the area served including the upstream area for any 24-hour period from the 25-year frequency, 72-hour duration rainfall.

For drainage design purposes, the applicant shall contact the District for information concerning canal tailwater time vs. stage elevation for use in preparing the applicant's stormwater management system and the related drainage calculations.

All gravity drainage connections to District canals shall be made in accordance with the details shown on Exhibit III. The applicant shall provide a surveyed cross-section through the canal at the location of proposed connection, demonstrating the proposed configuration within the FWCD right-of-way. Design specifications (e.g., bank stabilization) may be imposed in order to prevent bank erosion. The typical drainage connection configuration is shown on Exhibit III.

For all drainage connections, the application submittal shall include calculations to demonstrate that stormwater discharge from the site development is in compliance with current state and federal water quality standards for the West Prong Sebastian River.

Additionally, for all drainage connections and subject to District system limitations noted above, the applicant shall submit calculations demonstrating that the storage volume of the water management facilities complies with the SJRWMD Applicant's Handbook and that the project recovers to the designed control elevation within 12 days of a storm event. For the use of detention and retention areas, the applicant shall include assurance that the soils can provide adequate percolation for the intended purpose.

C. All Connections

1. The location of all connections shall be clearly marked by placing a post of contrasting colors over the culvert or pipe. The post shall be placed over the culvert or pipe at the top of the canal slope.

2. The Permittee shall install and maintain connections in a manner that will prevent the introduction of vegetative growth into the District's canal system.

3. The use of private pumps for discharging water into District laterals or canals is prohibited.

SECTION 5

OPEN CHANNEL CONNECTIONS

Because open channel connections disrupt continuous access along canal R-O-W by District maintenance equipment, open channel connections to District canals and laterals shall not be permitted.

(cont...)

SECTION 6

SPOIL DISPOSITION

Earthen material (spoil) excavated from a District canal or right-of-way is the property of the District. The District may dispose of this spoil in a manner which, in the opinion of the District, is in its best interests. This includes, but is not limited to, authorizing the adjacent landowner to use it on his adjacent property at no cost, or by selling to someone other than the adjacent landowner. Permission must be secured from the District before removing any spoil.

At the discretion of the District and at the request of the property owner adjacent to the canal from which spoil is to be removed and upon permission of the District, such spoil may be taken by the landowner and used on their adjacent land. The landowner shall be responsible for repairing or restoring any damage to District facilities resulting from the removal of the spoil material is determined by the District. Restoration of the canal, berm and right-of-way shall be per District specifications, see Exhibit IV.

The intent of this policy is to permit a landowner to use adjacent spoil to benefit his land if the District has no need for it. However, each request shall be evaluated and acted upon independently, depending on the needs of the District and its land owners' at the time the request is considered. Such action on behalf of the District may be authorized by the District Administrator and/or District Engineer as per Board delegation.

(cont...)

SECTION 7

UTILITY CONSTRUCTION

A. Aerial Crossings

1) Overhead lines shall not be permitted to cross directly over District water control structures. Overhead communications and similar utility crossings over District water bodies are discouraged in favor of directional drill installations and will only be permitted as a variance granted by the Board.

2) If permitted by the District Board of Supervisors, overhead communication and similar utility line crossings of District rights-of-ways and Project Works shall have the following minimum vertical clearance as measured to the elevation of the lowest wire:

   a) 45 feet of the lowest electrical conductor (35 feet from all other utilities) above the elevation of the canal maintenance berm, as measured from the lowest point of sag; or

   b) 25 feet above the dike crown; whichever produces the higher wire elevation. Refer to Exhibit V.

3) Overhead power lines shall have minimum vertical clearances as shown on Exhibit V. In all cases, minimum vertical clearance shall be measured from the elevation of the lowest point of sag of the line within the District right-of-way or easement to the highest point of the berm or dike crown.

B. Over-Water Crossings

Conventional underground utilities such as water, sewer and gas may be installed over water crossings where attached or immediately adjacent to a Bridge. All other utilities shall install crossings by directional drill. The design and construction of pile-supported or free-span utilities over a District canal at a Bridge shall be subject to the same horizontal and vertical design clearance requirements specified for Bridges.

A cross-section of the canal along the centerline of the proposed work from top-of-bank to top-of-bank, drawn to scale and referenced to NAVD, shall be submitted with the application along with a plan-view at the same scale. The cross-section and plan-view shall be representative of the bridge, canal, maintenance berm and the ground configuration within the canal right-of-way at the proposed crossing location, and shall include sufficient elevation shots to identify all breaks, but with shots not greater than 10-foot increments.

C. Under-Canal Crossings

Open cut installations of under canal crossings are prohibited. Under-canal utility crossings of any type including, but not limited to, communication cables and water or wastewater lines, shall be installed to provide a minimum cover of five (5) feet over the utility line in the Sub-laterals and eight (8) feet in the main Laterals. This cover shall be measured from the top of the utility line's protective encasement to the existing canal bottom, original design section or, if known, ultimate section, whichever produces the lowest installation.

At a minimum, all communication and power lines shall be encased in a continuous length of seamless steel pipe, or approved equivalent, throughout the width of the canal right-of-way. A scaled drawing showing the existing cross-section of the canal and right-of-way with elevations referenced to NAVD, along with a plan-view at the same scale shall be submitted with the application.

Geotechnical information, including boring log(s), shall also be provided. If the issued permit involves the submission of boring logs for the utilization of the District's rights of ways, and/or the crossing of District canal systems, the submitted bore logs as part of the final submission data must include a reference to an elevation datum, and not merely a bore depth indication. Furthermore, submitted bore logs are to be certified by the applicant.

HDPE-type plastic pipe may be used for directional bore installations only. Water, wastewater and similar pressurized lines transmitting non-volatile fluids or gases shall be buried with encasement. The encasement pipe shall meet the requirements of Standard Dimension Ration (SDR) 17 as a minimum strength. The carrier pipe shall meet the requirements of SDR 11 as a minimum strength. Directional drilled HDPE shall have a tracing wire in conformance with Indian River County standards.

Criteria for the crossing of other types of pressurized lines including, but not limited to, natural gas and steam lines, shall be determined and applied in accordance with Indian River County and industry standards at the time of application evaluation.

Vertical and horizontal spacing with other existing or proposed installations in the project vicinity shall be clearly shown on scaled construction plans. Clearances must meet minimum requirements of the jurisdictional utility or governing agency.

The under-canal crossing shall be marked by the Permittee by placing permanent above-ground markers or signs over the utility at each canal right-of-way line. The markers must identify the type of utility buried and the name and contact telephone number of the utility owner. All markers must be clearly visible, and must be maintained by the Permittee.

D. Utility Paralleling Canal or Right-of-Way

The District discourages the installation of any utility paralleling a canal within the canal right-of-way. If an applicant can demonstrate, to the satisfaction of the District's Board, that refusal to allow such an installation will result in an undue hardship, then the District may consider such an application. However, the establishment of criteria and terms and conditions of such an approval, if granted, are solely within the jurisdiction of the Board.

If granted by the Board, the utility paralleling the right of way shall be installed no greater than five (5) feet from the right of way line with a minimum cover of three (3) feet. The utility shall be marked along the right of way line at a minimum spacing of 1,000 feet.

E. Right of Way Use Fee

The use of the District's right of way shall be under a separate license agreement as part of the approved permit process. The fee for utilization of the District's R-O-W is $1,750 per mile or fraction thereof on an annual basis. The minimal annual fee for such use is $1,750 per year, (to be reviewed annually).

SECTION 8

OTHER USES AND REQUIREMENTS

A. Water Control Structure Installation and Operation

The installation of a water control feature on a culvert for water conservation and irrigation purposes by a landowner may be allowed by the District. The District shall evaluate each application and the potential impact it may have on its system to assure that such a request is consistent with the District's objectives and does not adversely affect any upstream landowner.

B. Beehives

The District is required by law to adopt and use methods and processes reasonably adequate to render any place of employment safe and to protect the well-being of its employees. Therefore, the placement of beehives on District rights-of-ways shall not be permitted.

C. Use of District Rights-of Way for Access

The District is provided a right of way for the purpose of operating and maintaining the District's system. Such rights of ways are not presumed to be opened for access by District land owners' except those land owners' adjacent to the right of way and solely for the purpose of access and not obstruct or hinder the capability of the District to operate and maintain the District system. The District may have the need to alter the design of the drainage system in the future, therefore the location of the access is not a perpetual use.

D. Fencing of Canal Right-of-Way for Cattle Production

The capability to move water through the District's system of canals is essential for drainage and irrigation purposes. Anything that inhibits or diminishes this capability is contrary to District policy and state law. The uncontrolled movement of cattle across a canal without the benefit of a culvert or bridge crossing is one way that the effectiveness of a canal can be degraded. Not only do cattle carry material into the canal from the canal bank and the berm, but the path they create accelerates erosion, aggravating an already unacceptable condition.

Therefore, it is the policy of the District that the owner of any property used for cattle production adjacent to a District canal must fence that property to prevent the unauthorized movement of cattle across the canal right-of-way. Anyone contemplating the installation of fence along a FWCD right of way should contact the District to review the fence location before installation.

If cattle owners wish to have cattle cross a canal, it must be over a culverted or bridged crossing meeting the District's regulations. A permit application must be submitted by the applicant and approved by the District before the culvert may be installed.

E. Access Gates in Canal Right-of-Way

A landowner may install an approved swing gate on a District canal berm. Land owners are strongly encouraged to coordinate with the District to ensure the following criteria are met:

1. The gate must be at least fourteen (14) feet wide to accommodate District maintenance equipment.
2. The construction materials and installation methods must be coordinated with and approved by the District.
3. The landowner must interlock his padlock with the District's padlock.
4. The gate must be continuously maintained by the land owner. At all times, the District shall have the right to operate any private gate located on District R-O-W without any interruption. The District maintains the rights to: remove; modify; or replace; any private gate on District R-O-W should the land owner be non-compliant with the operation and maintenance protocols of the District.

F. Docks/Observation Platforms

District canals are operated and maintained, to the extent possible, to provide for an unobstructed flow way which achieves the permitted level of flood protection. Therefore, the placement of docks, observation platforms or other structures that could restrict flow, catch debris and clog the canal, or constitute a hindrance to the mobilization of District staff and equipment shall not be permitted.

G. Plantings

There shall be NO plantings within the rights-of-way of the District, except for grass and approved ground covering as determined solely by the District. The canal slope is to be graded in accordance with the District's specifications.

H. Windbreaks

Any installation by land owners' serving the purposes of a windbreak shall be installed fifty (50) feet from the centerline of the right of way or thirty (30) feet (horizontal and vertical clearance) from the top of bank of sub-laterals, whichever provides the greater distance from the top of bank. FWCD lateral and sublateral right of ways vary in width and setbacks may exceed those of sub-laterals, and will be addressed on a case by case basis. Such windbreaks installation shall be maintained by the landowner. Failure to maintain windbreaks which then become an obstruction to the District's ability to perform operations and maintenance activities will be cause for removal by the District in accordance with State Statutes.

FELLSMERE WATER CONTROL DISTRICT
PERMIT INFORMATION AND CRITERIA MANUAL
FOR USE OF OR CONNECTION TO WORKS OF THE DISTRICT

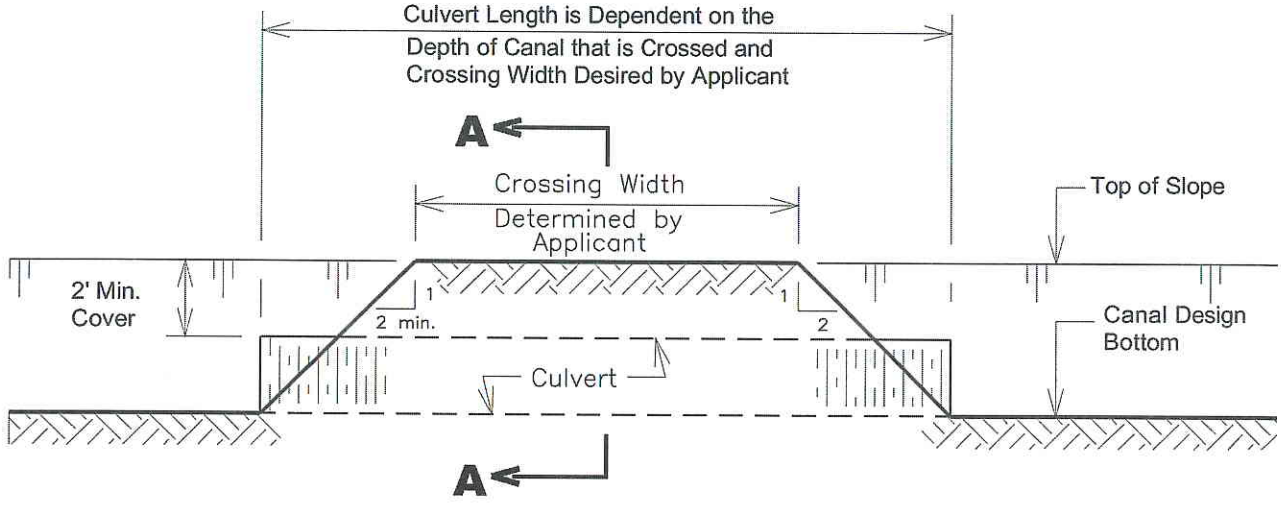
EXHIBIT 'I'

DESIGN DISCHARGE FOR CULVERTED CROSSINGS IN DRAINAGE SUBLATERALS

CULVERT DIAMETER (INCHES)		MAXIMUM ALLOWABLE AREA SERVED (ACRES)
CMP	RCP	
30	24	40
36	30	60
42	36	80
48	42	120
54	48	160
60	60	240
66	66	300

Notes:

1. Design discharge for culvert crossings of drainage sublaterals shall be based on a maximum flow of four inches per day over the drainage area. The rate of four inches per day is equivalent to 107.56 cubic feet per second per square mile (CSM).
2. Head losses as a result of a culvert crossing shall not exceed 0.1 foot, based on 40 L.F. of pipe.
3. Each culvert shall be set at an elevation which ensures that it will be fully submerged during its use, thereby utilizing the full cross sectional area of the culvert.
4. Alternate culvert diameters may be approved per the review of the Superintendent of Operations and District Engineer for compliance with minimum design criteria.

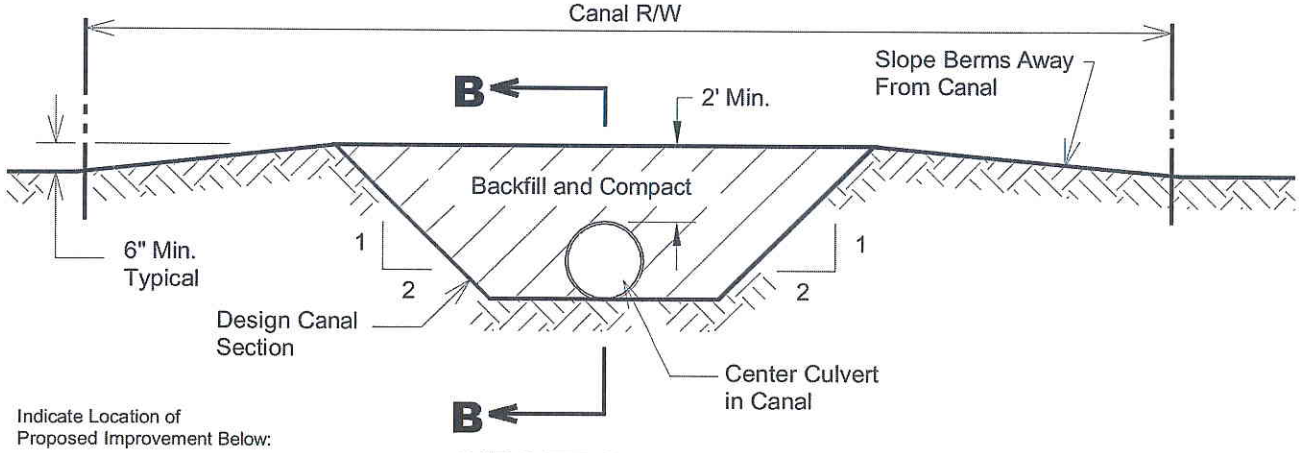


SECTION B-B

Not to Scale

NOTES:

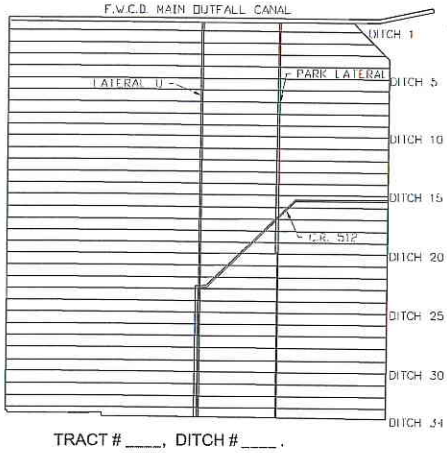
1. Concrete or sand-cement endwalls may be used to shorten the culvert length. All work shall be in accordance with the latest Florida D.O.T. Specifications.
2. All disturbed slopes, berms and other areas shall be seeded, fertilized and mulched (or sodded) in accordance with the latest Florida D.O.T. specifications within 10 days of the completed activity.
3. Drainage shall not be blocked or impaired at any time.
4. The applicant shall notify the Fellsmere Water Control District Office 24 hours prior to construction of the crossing.



SECTION A-A

Not to Scale

Indicate Location of
Proposed Improvement Below:



TRACT # ____, DITCH # ____.

VICINITY PLAN

FELLSMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **CULVERTED SUBLATERAL CROSSING**	
DATE:	**APPLICATION NUMBER :**
SUBLATERAL NAME:	**APPLICANT:**

EXHIBIT "II"

FELLSMERE WATER CONTROL DISTRICT
PERMIT INFORMATION AND CRITERIA MANUAL
FOR USE OF OR CONNECTION TO WORKS OF THE DISTRICT

EXHIBIT III – A

DESIGN DISCHARGE FOR CULVERT CONNECTIONS TO DRAINAGE SUBLATERALS

CULVERT DIAMETER (INCHES)		MAXIMUM ALLOWABLE AREA SERVED (ACRES)
CMP	RCP	
30	24	40
36	30	60
42	36	80
48	42	120
54	48	160
60	60	240
66	66	300

Notes:

1. Design discharge for culvert connections to drainage sublaterals shall be based on a maximum flow of four inches per day over the drainage area. The rate of four inches per day is equivalent to 107.56 cubic feet per second per square mile (CSM).

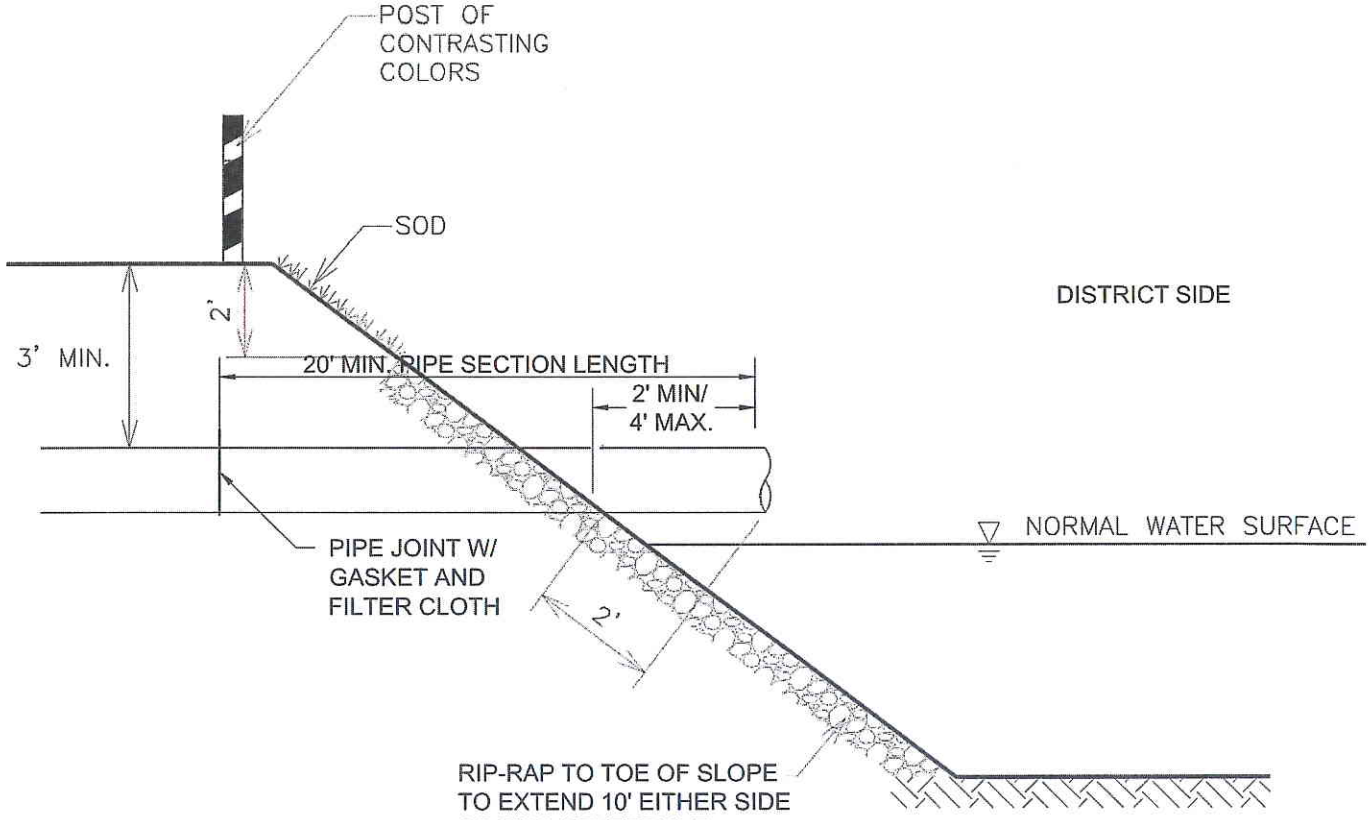
2. Head losses as a result of a culvert crossing shall not exceed 0.1 foot, based on 40 L.F. of pipe.

3. Drainage culverts shall be of sufficient length to extend from a point in the canal, determined by the District Administrator, to a point in the landowner's canal without reducing the width or impairing the use of the canal right of way or maintenance berm.

4. Each culvert shall be set at an elevation which ensures that it will be fully submerged during its use, thereby utilizing the full cross sectional area of the culvert.

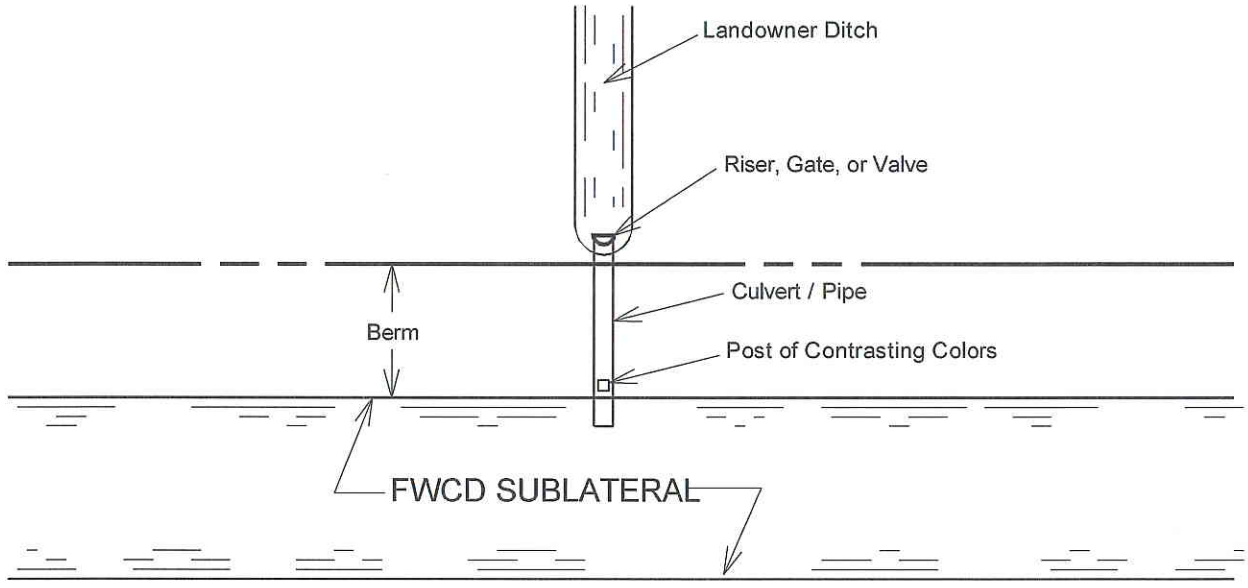
5. All drainage culvert connections shall be a minimum diameter of 24 inches.

6. Alternate culvert diameters may be approved per the review of the District Administrator and District Engineer for compliance with minimum design criteria.



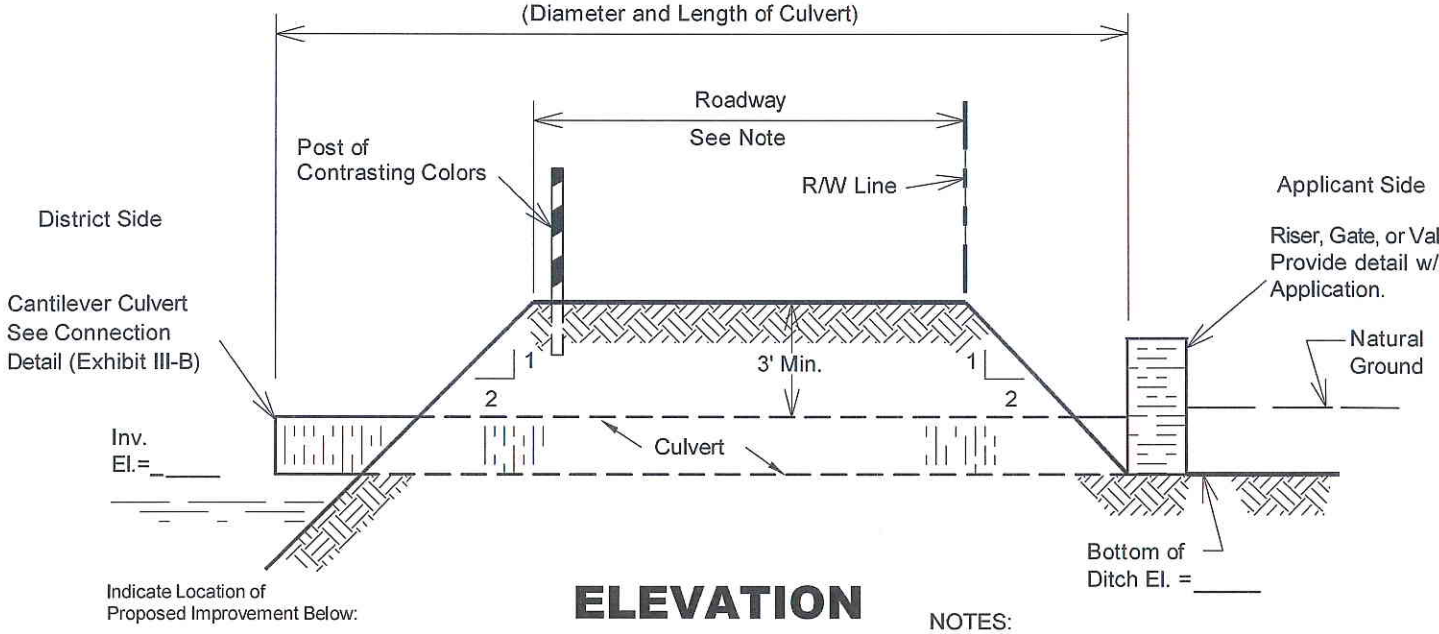
FELLSMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **CONNECTION DETAIL**	
DATE:	**APPLICATION NUMBER:**
SUBLATERAL NAME:	**APPLICANT:**

EXHIBIT "III-B"



PLAN VIEW

Not to Scale



ELEVATION

Not to Scale

NOTES:

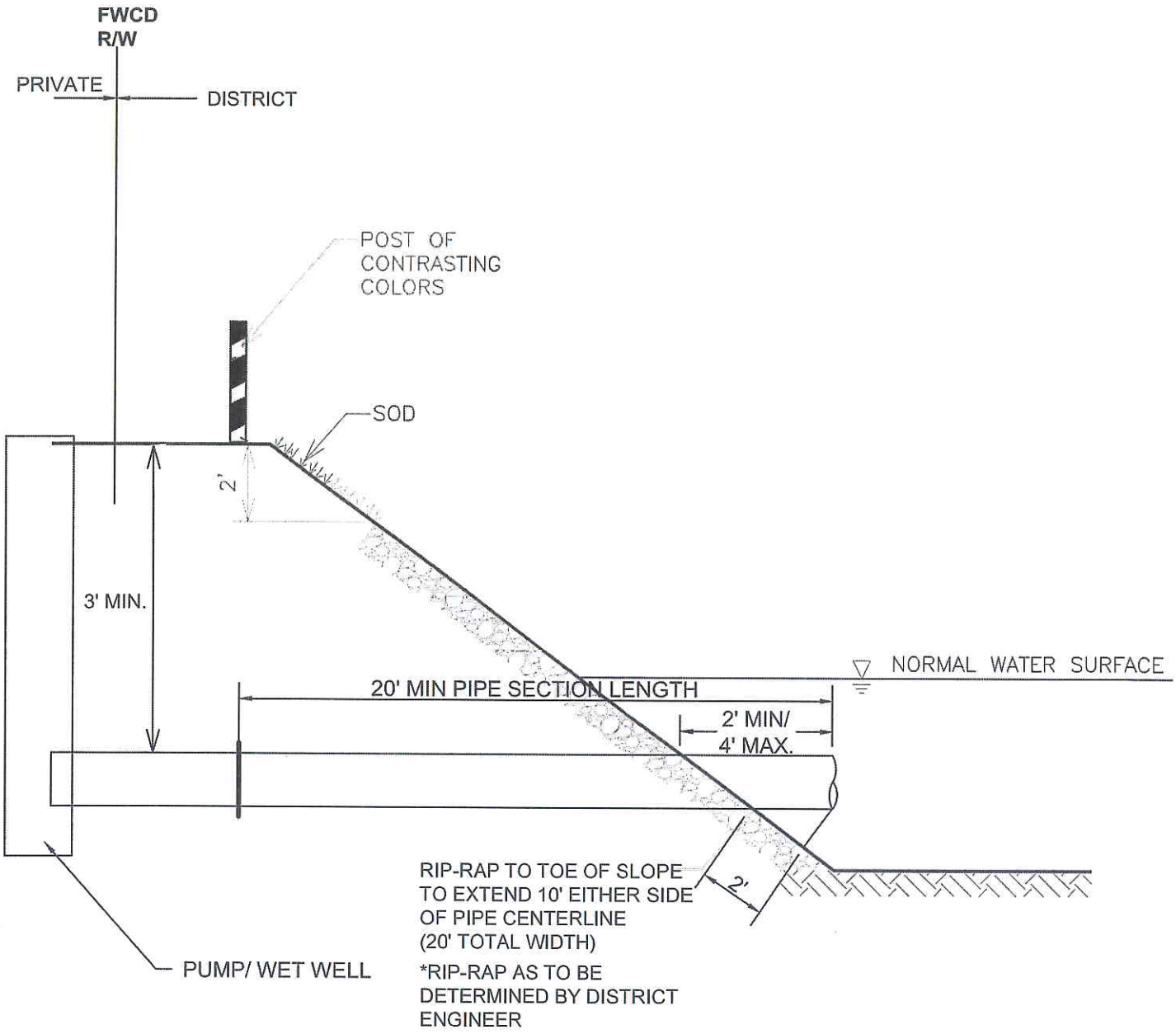
- Back of Roadways shall be the greater of 25' from Top of Bank or 50' from centerline of Right of Way.
- All elevations refer to N.A.V.D. 88

TRACT #____, DITCH #____.

VICINITY PLAN

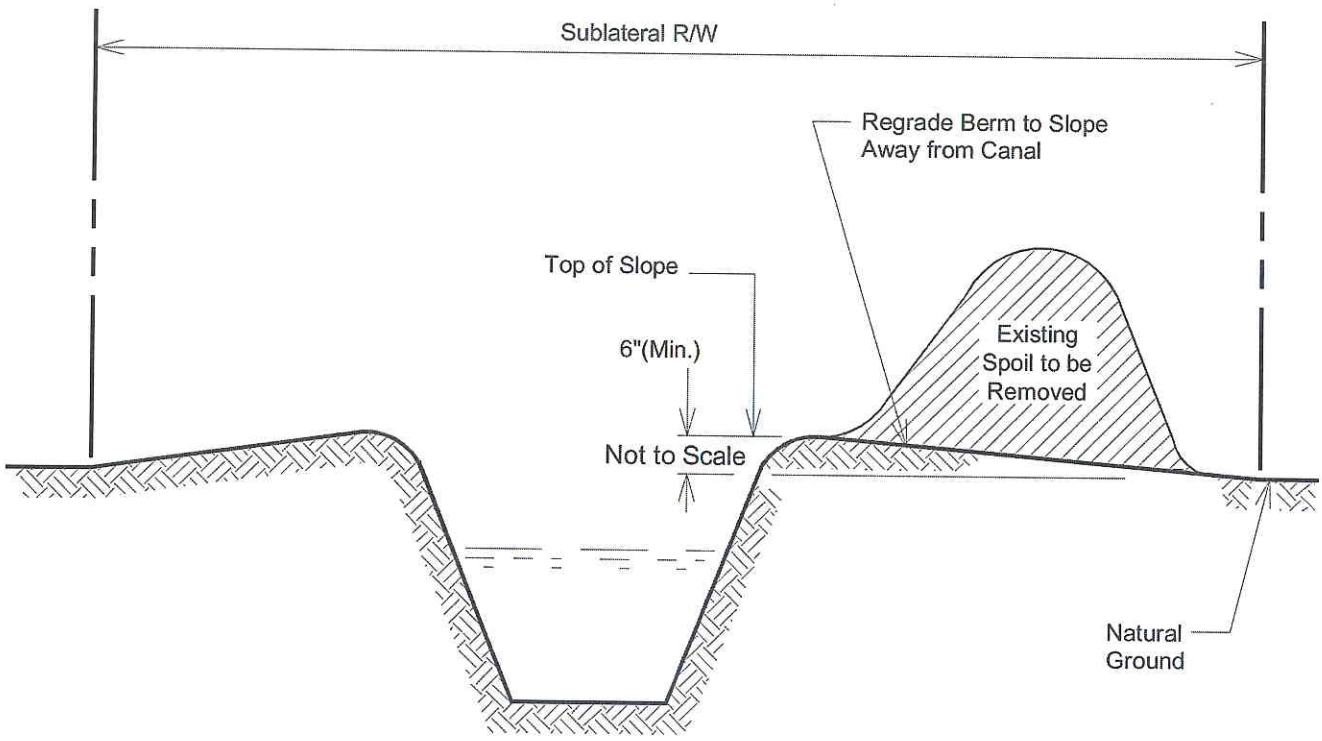
FELLSMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **TYPICAL PLAN AND PROFILE OF CONNECTIONS TO DRAINAGE SUBLATERALS**	
DATE:	APPLICATION NUMBER:
SUBLATERAL NAME:	APPLICANT:

EXHIBIT "III-C"



FELLSEMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **IRRIGATION CONNECTION DETAIL**	
DATE:	**APPLICATION NUMBER:**
SUBLATERAL NAME:	**APPLICANT:**

EXHIBIT "III-D"



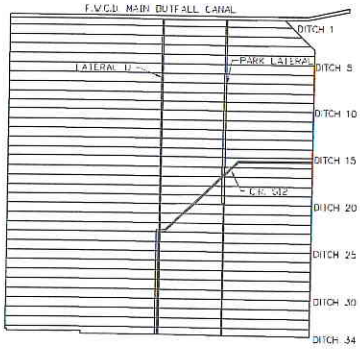
NOTES:

1. All disturbed areas shall be grassed in kind within 10 days of the completed activity.
2. Grade to blend the disturbed area with the areas on both sides.

Indicate Location of
Proposed Improvement Below:

ELEVATION

Not to Scale

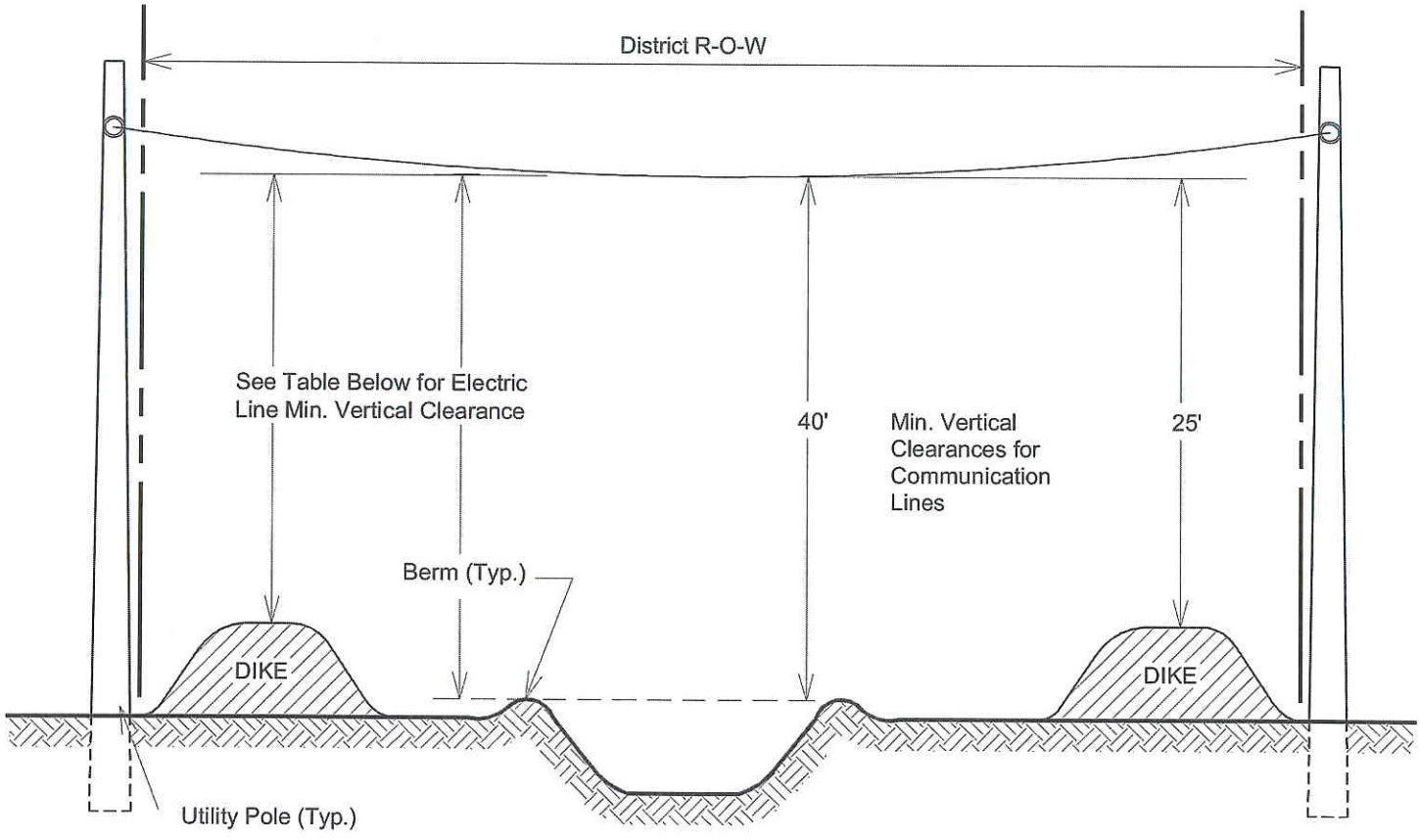


TRACT # ____, DITCH # ____.

VICINITY PLAN

FELLSMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **RESTORATION OF SUBLATERAL BERMS**	
DATE:	**APPLICATION NUMBER :**
SUBLATERAL NAME:	**APPLICANT:**

EXHIBIT "IV"



ELEVATION

Not to Scale

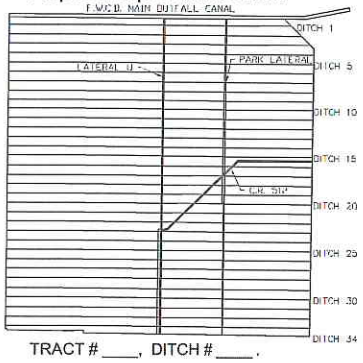
TABLE OF ELECTRICAL VERTICAL CLEARANCES

Crossing Over	Voltage Of Crossing Circuit						
	Phase To Phase	Guys (Grounded)	69kV	115kV	138kV	240kV	500kV
	Phase TO Ground		50kV & Under	67kV	80kV	138kV	289kV
Minimum Vertical Clearance From Berm		40'-0"	45'-0"	45'-8"	46'-2"	48'-0"	54'-0"
Minimum Vertical Clearance From Dike		25'-0"	25'-0"	25'-0"	25'-0"	25'-0"	35'-0"

NOTES:

- Overhead lines shall not be permitted to cross directly over District water control structures. Overhead communications and similar utility crossings over District water bodies are discouraged in favor of directional drill installations and will only be permitted as a variance granted by the Board.
- Poles Shall Not Be Located Within District Right-Of-Way.
- Clearances Shown Shall Be With Wires At Maximum Design Temperature And Final Sag.

Indicate Location of Proposed Improvement Below:



TRACT # ____, DITCH # ____.

VICINITY PLAN

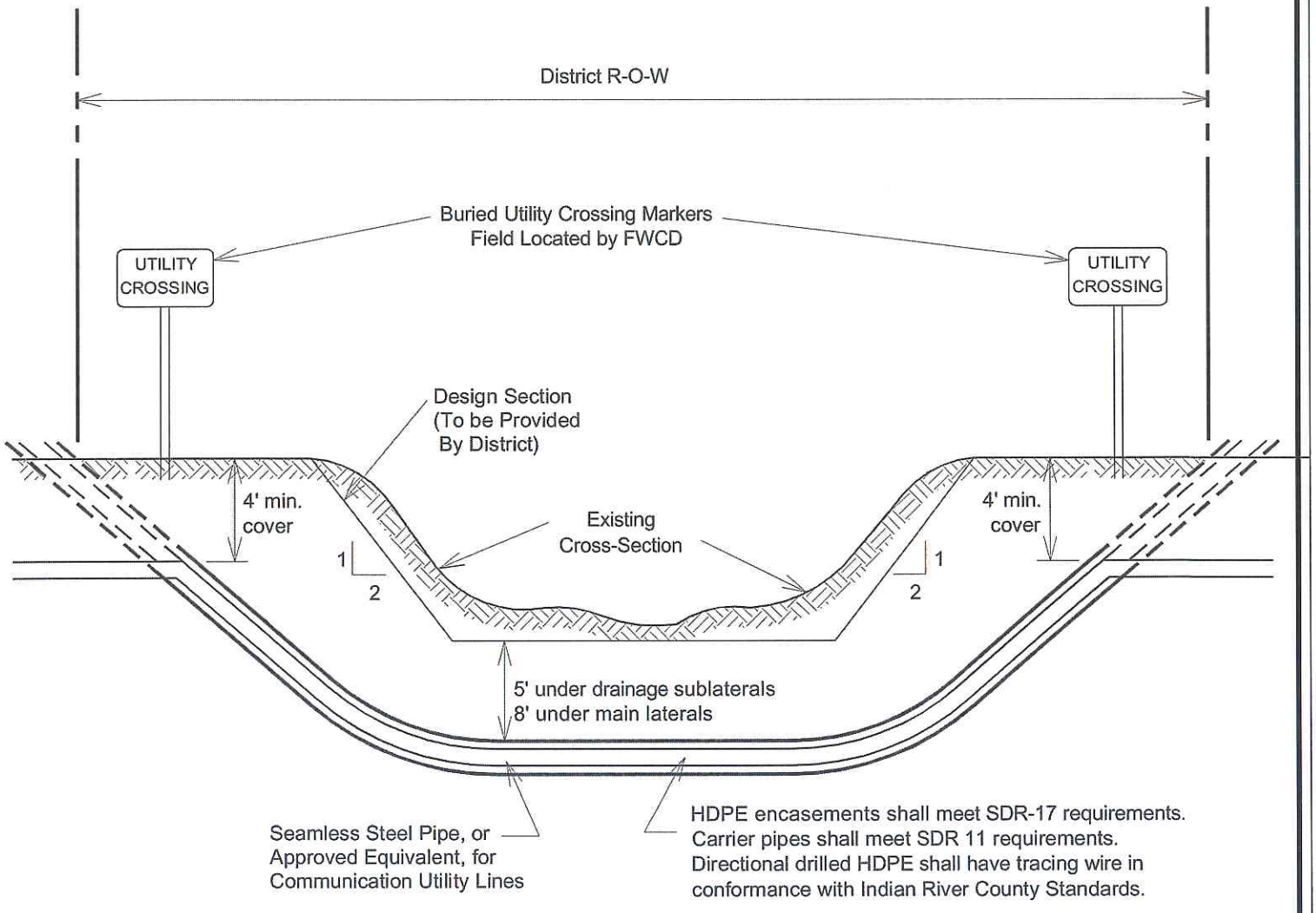
FELLSMERE WATER CONTROL DISTRICT

SKETCH TO ACCOMPANY

OVERHEAD UTILITY CROSSING

DATE:	**APPLICATION NUMBER :**
SUBLATERAL NAME:	**APPLICANT:**

EXHIBIT "V"



* As Measured to the Top of Pipe or Top of Encasement, Whichever is Higher.

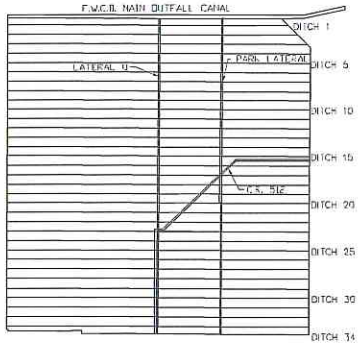
NOTES:

- Open cut installations under lateral or sublateral crossings are prohibited.
- Cover shall be measured from the top of the utility line's protective encasement to the existing canal bottom, original design section or, if known, ultimate design section, whichever produces the lowest installation.

ELEVATION

Not to Scale

Indicate Location of
Proposed Improvement Below:



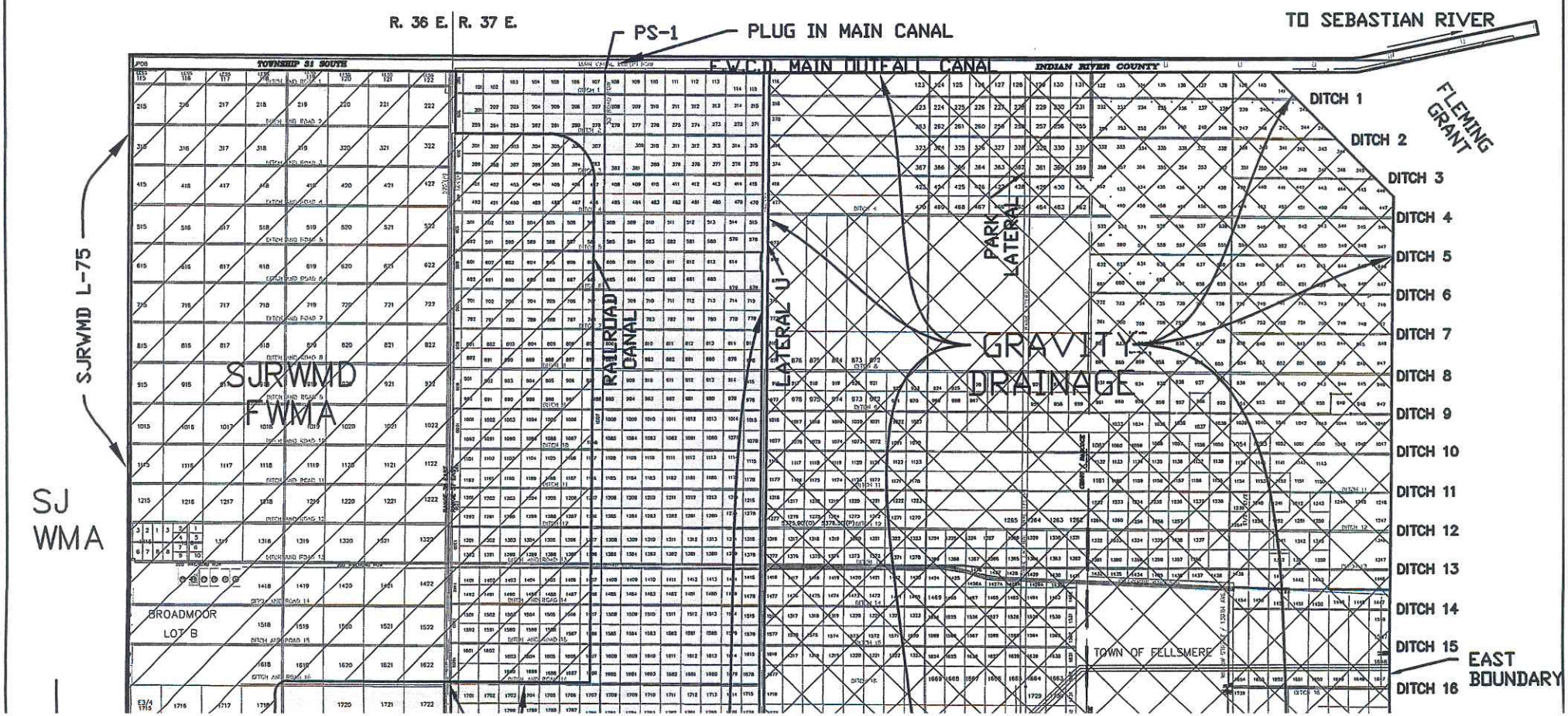
TRACT #____, DITCH #____.

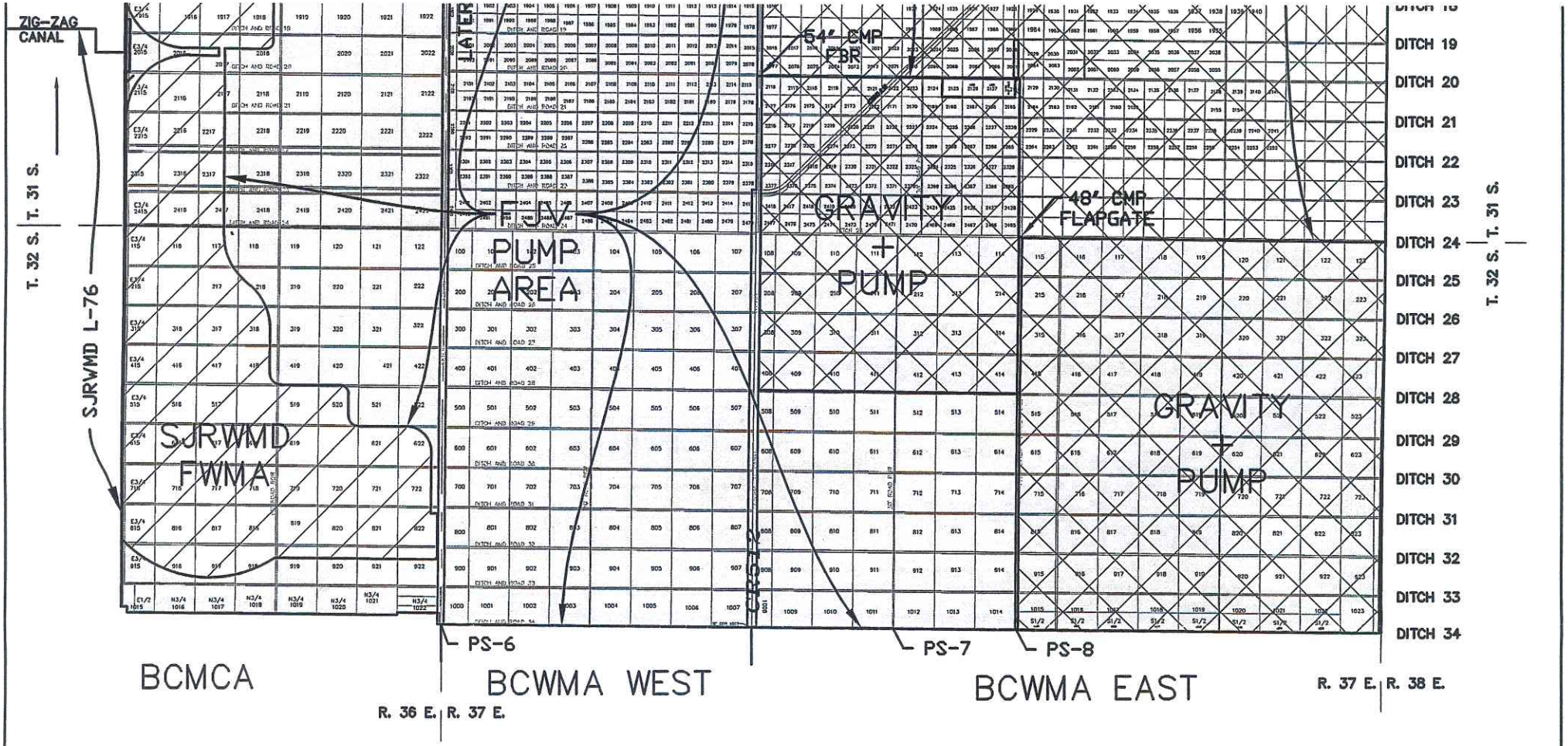
VICINITY PLAN

FELLSMERE WATER CONTROL DISTRICT	
SKETCH TO ACCOMPANY **UNDER CANAL UTILITY CROSSING**	
DATE:	**APPLICATION NUMBER :**
SUBLATERAL NAMES:	**APPLICANT:**

EXHIBIT "VI"

EXHIBIT VII
FELLSMERE WATER CONTROL DISTRICT
OVERALL MAP





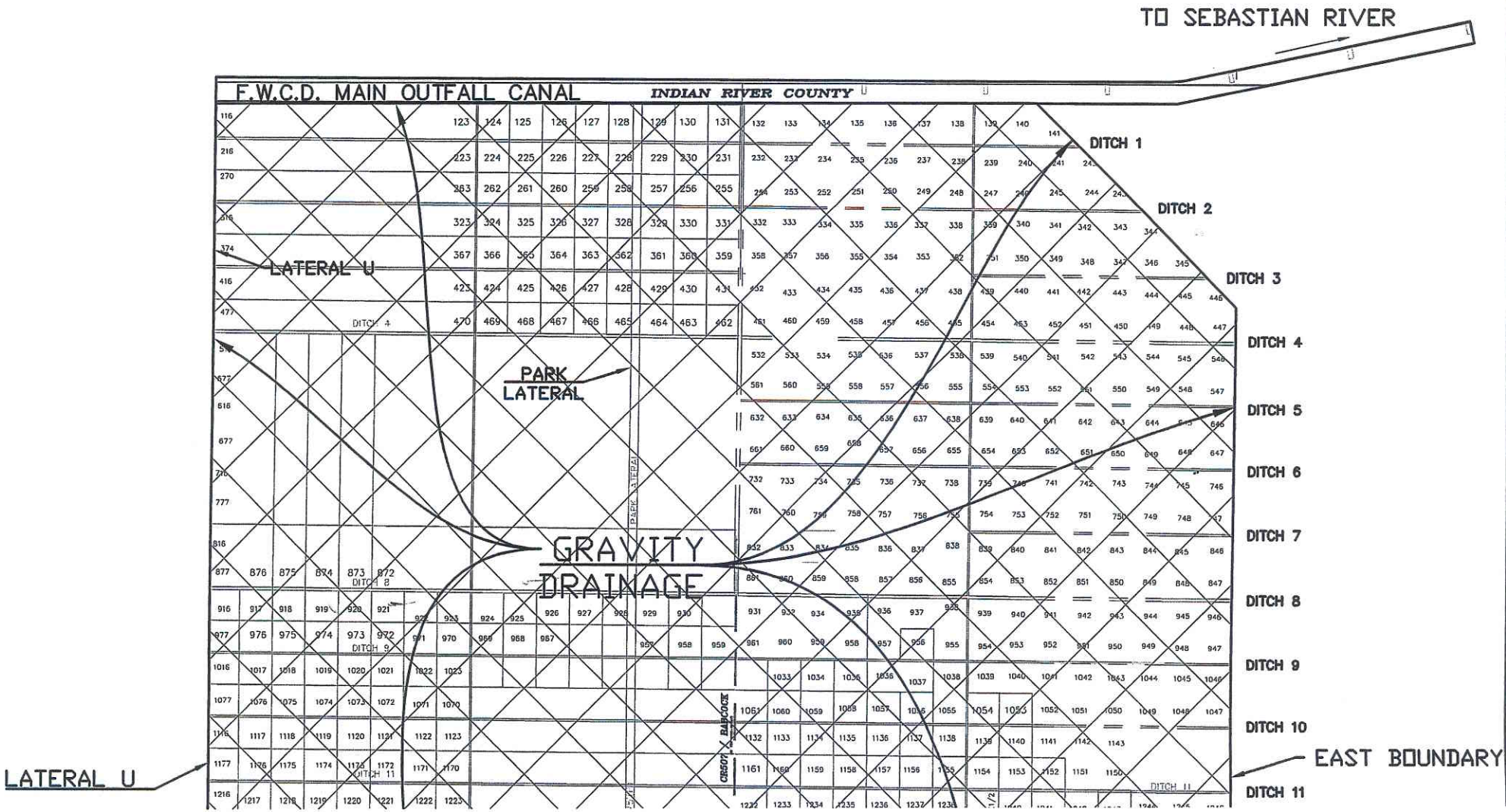
LEGEND

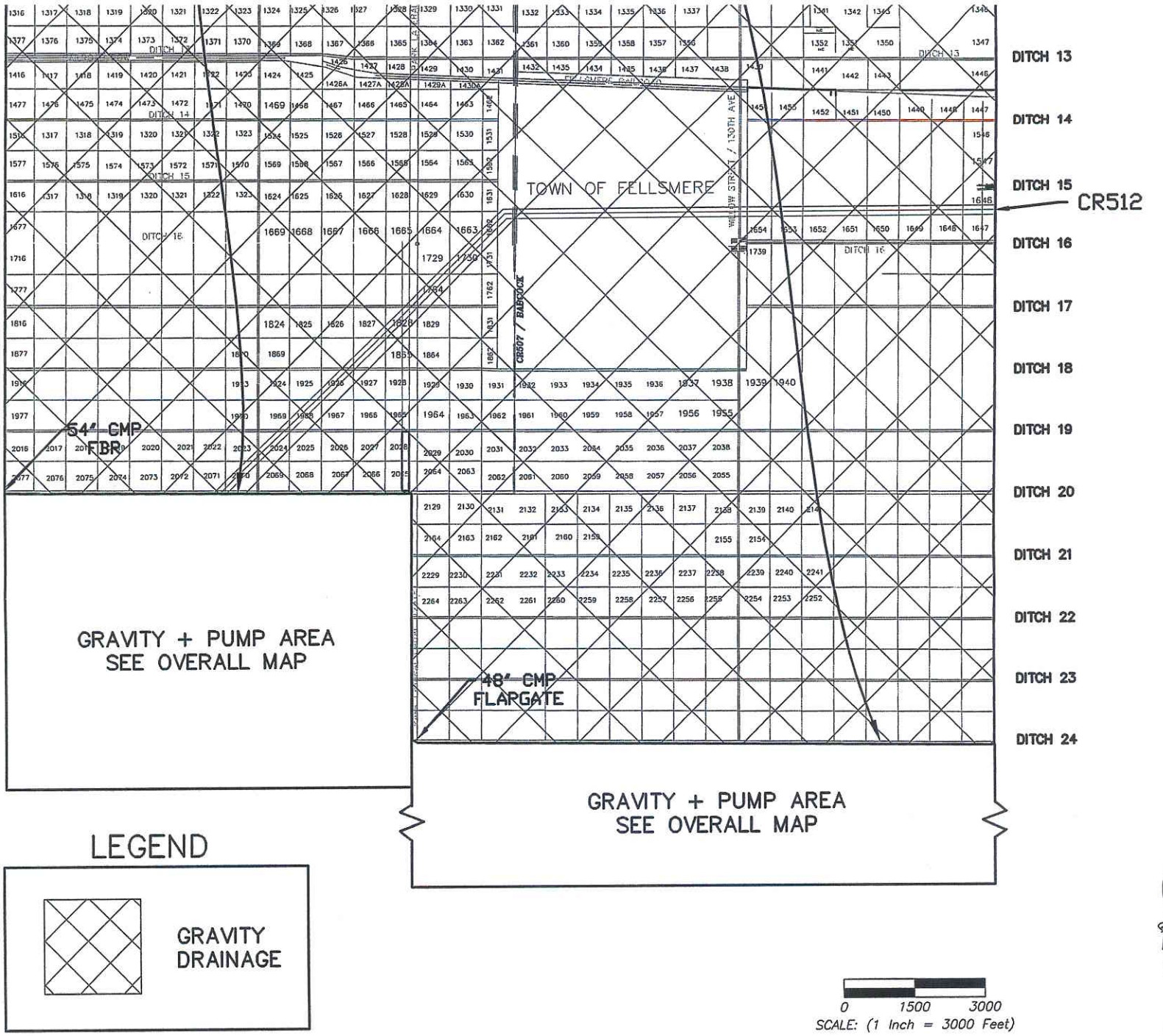
- SJRWMD CONSERVATION/RESEVOIR
- GRAVITY DRAINAGE
- GRAVITY + PUMP
- FJV PUMP AREA

0 2500 5000

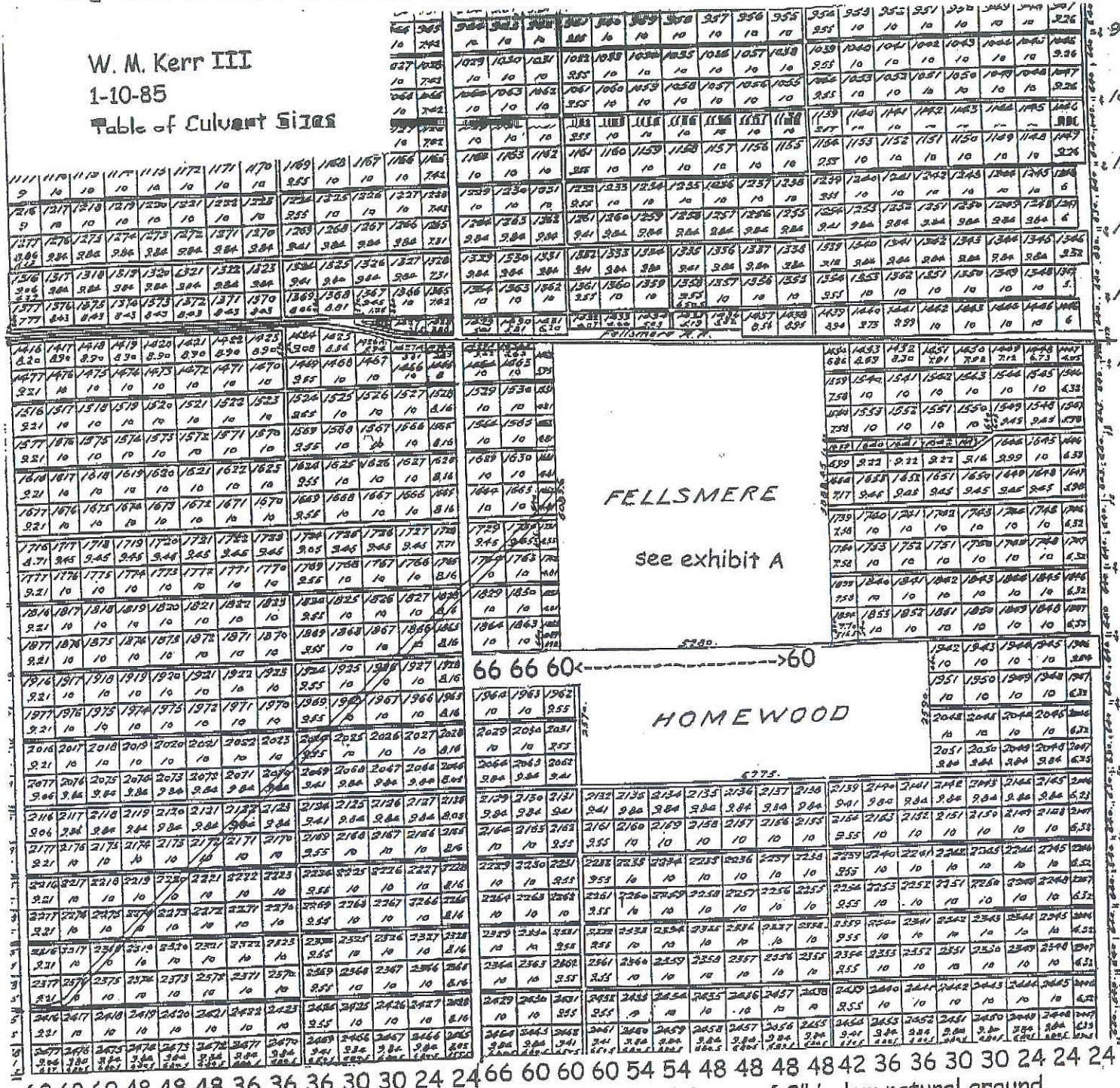
SCALE: (1 Inch = 5000 Feet)

EXHIBIT VII
FELLSMERE WATER CONTROL DISTRICT
GRAVITY DRAINAGE BLOW UP




DITCH 13
DITCH 14
DITCH 15
CR512
DITCH 16
DITCH 17
DITCH 18
DITCH 19
DITCH 20
DITCH 21
DITCH 22
DITCH 23
DITCH 24
TOWN OF FELLSMERE
WILLOW STREET / 130TH AVE
CR507 / BABCOCK
54" CMP
FLAPGATE
48" CMP
FLAPGATE
GRAVITY + PUMP AREA
SEE OVERALL MAP
GRAVITY + PUMP AREA
SEE OVERALL MAP
LEGEND
GRAVITY
DRAINAGE
0
1500
3000
SCALE: (1 Inch = 3000 Feet)

W. M. Kerr III
1-10-85
Table of Culvert Sizes



All culverts set at bottom of canal or with top of pipe a minimum of 2" below natural ground, whichever, is lower. Culverts 42" & smaller may be aluminum if desired. All steel culverts to be aluminum coated steel. All culverts STD D.O.T. Gage.

PARK LAT

N

EAST BOUNDARY

EXHIBIT VIII

1/2

CITY OF FELLSMERE

All pipes RCP with mitered ends not to exceed 64 linear feet

66" 60" 60" 50" 54" 54" 48" 48" 48" 36" 36" 30" 30" 30" 24"

Myrtle
Olemander
Maple
Magnolia
Cypress
Orange
Broadway
Pine
Hickory
Bay
Elm
Oak
Lime
Mulberry
Willow

EXHIBIT VIII

2/2

CARTER ASSOCIATES

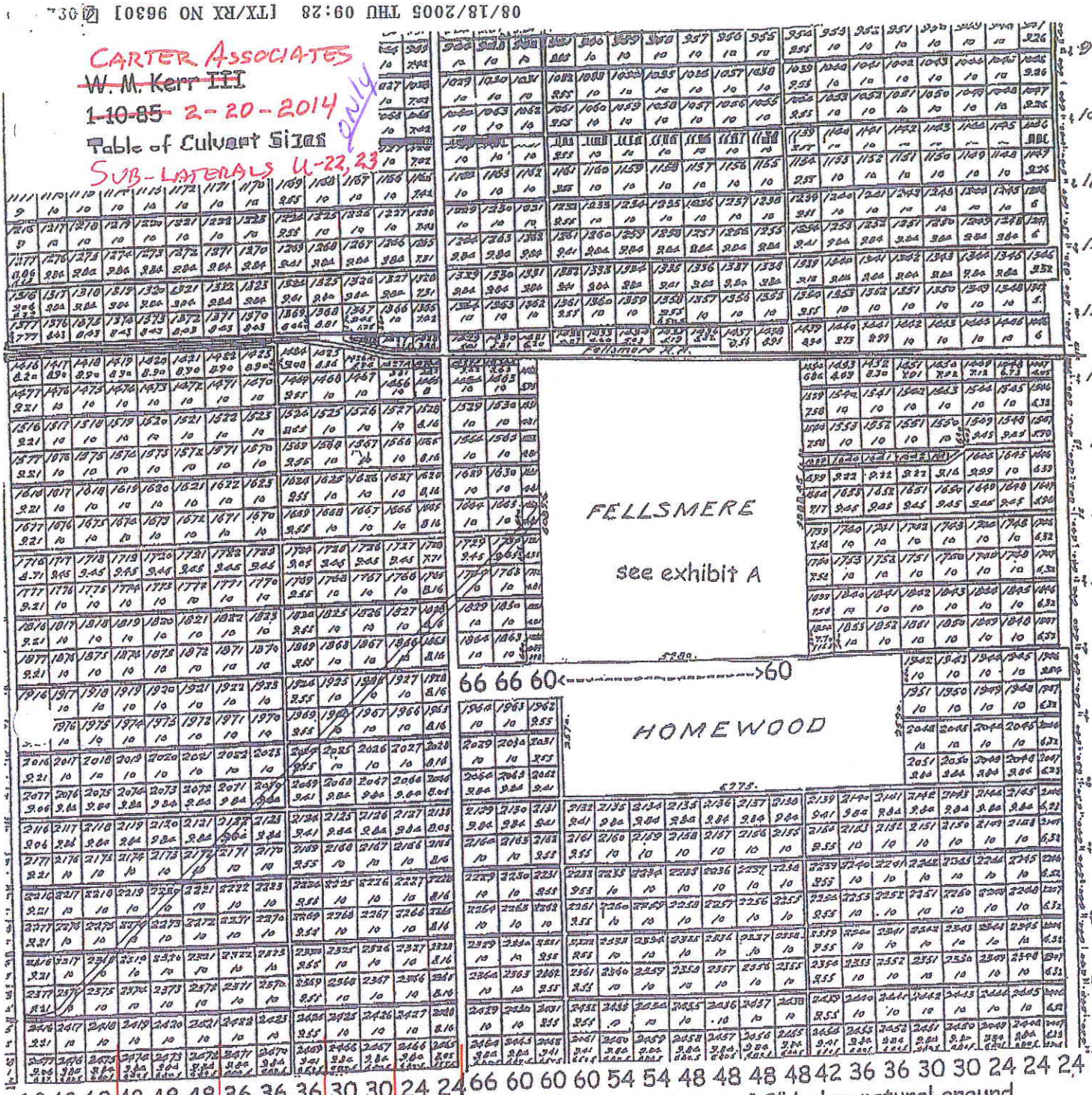
~~W. M. Kerr III~~

~~1-10-85~~ 2-20-2014

Table of Culvert Sizes

SUB-LATERALS U-22, 23

ONLY



All culverts set at bottom of canal or with top of pipe a minimum of ~~2"~~ below natural ground, whichever, is lower. Culverts 42" & smaller may be aluminum if desired. All steel culverts to be aluminum coated steel. All culverts STD D.O.T. Gage.

260	200	140	80	40	ACRES
60"	60"	48"	36"	30"	RCP
66"	60"	60"	42"	30"	CMP

PARK LAT

N

ADOPTED BY FWCD @ 3/13/14 BOARD MTG.

EAST BOUNDARY

EXHIBIT IX

1/2

Fellsmere Water Control District

Pipe Sizing for Sub-Lateral U-22,23

2/18/2014

		ΔH (FT)			
Pipe Size	Flow	0.1	0.2	0.3	0.4
24" CMP	Q (cfs)	3.84	5.4	6.61	7.61
24" RCP	Q (cfs)	6.14	8.65	10.58	12.18
30" CMP	Q (cfs)	6.7	9.43	11.54	13.29
30" RCP	Q (cfs)	10.15	14.3	17.49	20.14
36" CMP	Q (cfs)	10.49	14.77	18.07	20.8
36" RCP	Q (cfs)	15.2	21.41	26.18	30.15
42" CMP	Q (cfs)	15.24	21.47	26.26	30.24
42" RCP	Q (cfs)	21.27	29.97	36.65	42.2
48" CMP	Q (cfs)	20.99	29.57	36.17	41.65
48" RCP	Q (cfs)	28.38	39.97	48.89	56.29
60" CMP	Q (cfs)	35.53	50.04	61.2	70.48
60" RCP	Q (cfs)	45.65	64.3	78.64	90.56
66" CMP	Q (cfs)	44.33	62.44	76.36	87.94
66" RCP	Q (cfs)	55.81	78.62	96.16	110.73

4" Rainfall

Area (AC)	Flow (cfs)
40	6.72
80	13.44
140	23.52
200	33.6
260	43.68

Pipe Assumptions

1. 4 inch/day minimum flow capacity with 0.1 ft head loss
2. Pipe Length = 80 LF, with .2/80 = 0.0025 slope
3. Pipe ends project from fill (no headwalls, etc...)
4. Concrete Pipe - n=0.011
   CMP - n=0.024
5. Pipe flowing full

EXHIBIT IX 2/2