



FUCC

FLORIDA UTILITIES Coordinating Committee

The May 1976 meeting was called to order by the Chairman, B. A. Kempson at 9:00 a.m. Self introductions were as follows:

✓ B. A. Kempson	Gulf Power (Pensacola)	434-8342
✓ W. J. Hopgood	FPL	442-5183
✓ John Clark	United Telephone	453-3243
✓ Paul Mundy	General Telephone	224-4203
✓ Ed Williams	SBT&T (Miami)	263-3108
✓ C. E. Hanle	SBT&T (Ft. Laud.)	776-2788
✓ H. V. Gardner	Orlando Utilities	841-1230
✓ Bob Foote	The Winter Park Tel. Co.	628-3445
✓ E. H. Jones	Asphalt Institute	Tallahassee
✓ George Mason	City of Jacksonville	633-3630
✓ Charles Flynn	City of Jacksonville	633-3060
✓ Bill Duncan	FPL (Daytona)	252 1541
✓ A. N. Brockman	SBT&T (Jacksonville)	353-2252
✓ J. W. Register	AT&T	354-1756
✓ Ken Brown	Tampa Electric	876-4111
✓ Pop Edwards	AT&T	832-9029
✓ Ernest Salley	Florida DOT	488-8866
✓ W. T. Crews	Florida DOT	752-3300
✓ Buddy Dees	Florida DOT	752-3300
✓ Dennis LaBelle	FPL (Miami)	552-4430
✓ C. R. Wood	Clay Electric Co-op	473-4911
✓ Jimmy Price	Clay Electric Co-op	473-4911
✓ Ray Colby	Florida Gas Company	646-1208
✓ Gene Gohring	Florida Gas Transmission	646-1228
✓ Charles Carpenter	SBT&T (Miami)	263-3690
✓ W. W. Vierday	Florida Power Corp.(St. Pete)	866-4511
✓ Ken Hood	Florida DOT	488-8866
✓ J. M. Austin	Florida DOT (Ft. Laud.)	524-8621
✓ J. R. Cole	FPL (Miami)	442-5195
✓ S. M. Pounds	Jacksonville Electric Authority	633-4700
✓ Joe Prussiano	Fee Appraiser, Miami	651-4550
✓ Pete Gerrell	City of Tallahassee	576-1171

Minutes of the February 1976 meeting were read. There being no amendments, corrections, or deletions, the minutes were adopted.

- OLD BUSINESS -

Street Light Base Detail: (Ed Williams - Chairman, Standing Committee)

Mr. Williams reported that the Florida Department of Transportation has come up with a new design for street light bases. The new design considerably affects underground utilities. The DOT has selected to use a larger cylinder as a street light base. The cylinder measures 30" in diameter and six feet in length. When this large base is constructed in a municipal area as suggested by the Accommodation Guide, in most cases there will be conflicts with existing underground utilities. In stressing greater consideration to other Right-of-Way users, Mr. Williams suggested that this matter be considered by the Committee for further study and research. A motion was then made by Ray Colby to create a subcommittee for the detailed studies on street lights. After a second, the motion carried. Those who volunteered for this subcommittee were as follows:

Bud Vierday - Florida Power Corp. - Chairman
Ken Brown - Tampa Electric
Ed Williams - SBT&T
Vic Gardner - Orlando Utilities
Bob Corn - Florida Gas Transmission
Lee Young - Peoples Gas
Dennis LaBelle - Florida Power & Light Co.

During our discussions Mr. Salley, DOT State Utility Engineer, recommended that any DOT contacts regarding street lighting design be directed either through Mr. Owens, DOT Engineer of Traffic and Transportation or Mr. Davenport, DOT Street Lighting Engineer.

Plant Facilities and R/W Appurtenances Subcommittee - (Chairman - Paul Mundy)

Mr. Mundy reported that he had received a letter from Mr. Morris, DOT Maintenance Engineer, dated March 23, 1976. The letter was read to those in attendance and is enclosed for general information. The Committee is presently waiting for DOT reply before they convene again.

Jacking and Boring Subcommittee:- (Chairman - Walter Anderson)

In Mr. Anderson's absence, Mr. Williams reported that on April 27, 1976, the Subcommittee had met to review the DOT Supplement. The context of their meeting is included in the enclosed letter dated May 3, 1976.

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Those in attendance at the meeting received a copy of the revised guidelines. After general discussions and comments, a motion was made by Ken Brown that the F.U.C.C. give its Subcommittee a vote of confidence to pursue further negotiations with the DOT. The motion was seconded by Pop Edwards and approved by all present.

-GUEST SPEAKER-

After a coffee break, Chairman Kempson introduced our guest speaker, Mr. Ed Jones. Mr. Jones is the District Engineer for the Asphalt Institute in Tallahassee, Florida.

The main topic of Mr. Jones' presentation was based on how to take advantage of alternate pavement designs to eliminate the adjustment of utilities.

Mr. Jones demonstrated that in many cases the overall relocation of underground utilities in a highway improvement project may be avoided by replacing some of the standard materials by others of greater bearing, in a typical section. This results in a shallower section, thus enabling many of the utilities which would otherwise have been relocated, to stay undisturbed.

Naturally these situations would apply to individual cases where the embankment material is suitable and a detail study would prove it to be economically feasible.

All of us who had an opportunity to listen to Mr. Jones appreciate the helpful information provided in his presentation and hope to have him present at our future meetings.

- NEW BUSINESS -

Chairman Kempson presented a letter from Mr. "Rocky" DePrimo, DOT Assistant District IV Utility Engineer, recommending that the F.U.C.C. support the creation of a new Master Utility Agreement for Joint Use Poles. Chairman Kempson requested a letter from Mr. Salley's office in order to assign this matter to the Standing Committee for further studies and recommendations.

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- ANNOUNCEMENTS -

It was announced that both the Tampa Bay Area and Dade County One Call Systems are doing exceptionally well. The Tampa Bay System is presently logging approximately 300 calls per week and the Dade County System is averaging 280 calls per week. For more detailed information on these systems you may call in Tampa - Mr. Ray Afeld, 839-8881, and in Miami- Mr. Russ Weaver, 264-6878.

There being no further announcements, the meeting was adjourned. On behalf of the Committee we want to thank Florida Gas Company for sponsoring the meeting and lunch.

Respectfully submitted,



W. J. Hopgood
Secretary

ka
Enclosures



May 3, 1976

Mr. B. A. Kempson
 Florida Utilities Coordinating Committee
 Jack & Bore Sub-Committee
 Gulf Power Corporation
 P. O. Box 1151
 Pensacola, Florida 32520

Re: Jacking and Boring Supplement
 Sub-Committee Meeting

Dear Mr. Kempson:

The sub-committee met April 27, 1976, at Florida Power Corporation in St. Petersburg, with the following in attendance:

W. W. Vierday
 Ken Brown
 John Clark
 Walter Anderson
 Charlie Carpenter
 Ed Williams
 Paul Mundy
 Gene Gohering

Florida Power Corporation
 Tampa Electric Company
 United Telephone Company
 Florida Power & Light Company
 Southern Bell
 Southern Bell
 General Telephone Company
 Florida Gas Company

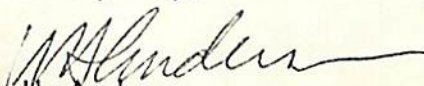
Attached is the Department of Transportation Supplement marked to show changes the sub-committee feels appropriate. It is now necessary that we meet with D.O.T. representatives to reach consensus on the format for including pipe/casing material specifications and to review the need for including detailed cutting head and auger application specifications.

Also, our feeling is that the D.O.T. guide should not include equipment operating instructions. Adherence to any such instructions could cause the very damage we and the D.O.T. are seeking to avoid.

To pursue these questions, the sub-committee will schedule a meeting with D.O.T. representatives and advise you.

Any utility wishing can review a copy of the guidelines referenced and direct its concerns to a member of the sub-committee.

Yours very truly,


 W. H. Anderson
 Division Engineering Manager

WHA:jc
 Attach: Guidelines
 Sub-Committee Membership List

JACK & BORE SUB-COMMITTEE
FLORIDA UTILITIES COORDINATING COMMITTEE

<u>Name</u>	<u>Company</u>	<u>Address</u>	<u>Phone No.</u>
Ed Williams	Southern Bell Telephone	P. O. Box 440100, Miami 33144	305/263-3108
Ken Brown	Tampa Electric	P. O. Box 111, Tampa 33601	813/876-4111
Paul Mundy	General Telephone	P. O. Box 110, Tampa 33601	813/224-4203
Walt Anderson	Florida Power & Light	P. O. Box 1119, Sarasota 33578	813/959-7424
John Clark	United Telephone	P.O.Box 1029, Avon Park 33825	813/453-3243
Gene Gohering	Florida Gas	P. O. Box 44, Winter Park 32789	305/646-1225
B. A. Kempson	Gulf Power	P. O. Box 1151, Pensacola 32520	904/434-8342
W. W. Vierday	Florida Power Corporation	P. O. Box 14042, St. Petersburg 33733	813/866-4511

I. Introduction

A. Purpose:

The purpose of this supplement is to expand and standardize the guidelines pertaining to underground utility crossings by methods other than open cutting as presently outlined in the Utility Accommodation Guide. Accordingly, the guidelines contained herein are intended solely to prevent unnecessary failures and to provide sufficient detail to insure uniform application of the guidelines statewide.

B. Scope:

The guidelines set forth in this supplement are to regulate and contract the installation of underground utility crossings by: jacking, driving, pushing, boring, tunneling, pulling or combination thereof and other methods except open cutting or trenching. The guidelines established herein to provide such regulation and control are not intended to provide complete step by step instructions for a proper underground crossing operation. These guidelines do, however, specify a wide range of instructions necessary to insure the very basic, essential aspects of a proper crossing operation. Such aspects were determined by a consensus of Department and industry input. In all cases the ultimate success or failure of a crossing will depend upon the understanding commitment, experience and skill of the permittee or his contractor.

Further, the wide range of possibilities concerning job site conditions, economics and future technological improvements, dictate that this supplement be used as a guide. Strict adherence, however, shall be required under specifically covered conditions outlined in this guide. Under conditions not specifically covered and other mitigating circumstances where a mutually agreeable solution cannot be worked out at the local or district level, questions concerning the contents of this supplement should be referred to the Tallahassee office for final resolution. Adherence to the guidelines contained herein, or the Department's approval of any aspect of the proper crossing operation covered by this supplement, shall in no way relieve the permittee of his ultimate responsibility for the satisfactory completion of the work approved by the utility

Lastly, the sections in the main body of the Utility Accommodation Guide pertaining to the drill head (Sentence 5, Section 4-B, on Page 7) and continuous operations (Item L, Section 5, Page 14) have been expanded by this supplement and are thereby superseded where appropriate according to the requirements contained herein.

C. Definitions and Terms

Wherever in this supplement or other documents pertaining to it, the following terms appear, their intent and meaning shall, unless specifically stated otherwise, be interpreted as follows:

Department -

State of Florida Department of Transportation

Maintenance Engineer -

Department of Transportation Maintenance Engineer named in paragraph six of the utility permit.

Inspector -

An authorized representative of the Maintenance Engineer.

Permittee -

The individual, firm, company, or governmental agency identified as the permittee on the utility permit.

Contractor -

The individual, firm, or company, contracting with the permittee for performance of work authorized by the utility permit.

Sub-Contractor -

The individual, firm or company contracting with the contractor, as previously defined, for performance of work authorized by the utility permit.

Major Crossings -

Crossings with casings or uncased carrier pipes greater than eight inches in outside diameter; crossings under limited access facilities; crossings requiring continuous dewatering; and other crossings of an unusual and difficult nature as determined by the Maintenance Engineer on an individual basis.

Actual Crossing Operation -

That phase of the work authorized by the utility permit. When the casing or uncased carrier pipe is being placed within the physical limits prescribed to determine the required casing length as set forth in Section II-A-2, Page 5. Specifically, not to include preliminary work such as jacking pit construction, equipment set-up, etc.

II. Material - All materials used in the execution of work authorized by the utility permit.

A. Encasement material, to include uncased carrier pipe.

1. Composition and strength

All casings shall conform to the appropriate strength and composition requirements set forth in the main body of the Utility Accommodation Guide and to the following additional requirements.

- a. Must be chemically compatible with any material it is to transport or otherwise contact.
- b. Unless otherwise tested and approved by the Department prior to beginning work, all encasement pipes or uncased carrier pipes shall be round, smooth wall plastic or steel of either; continuous butt welded, spiral welded, electric resistance welded, rolled and welded, or seamless construction.
- c. The casing shall be of leakproof construction.
- d. All steel casings shall conform to the following minimum thickness requirements:
Content to be determined after conference with D.O.T.
- e. The use of casings (not uncased carriers) with wrapped protective coverings will not be allowed.

2. Length - casings and uncased carrier pipes shall be of sufficient length to extend under all pavements and in no case shall the end of the casing be closer than 4' from the pavement edge including paved shoulders, or 2' from back of curb plus additional length as necessary to extend to the excavated slopes of the jacking and receiving pits.

Slope requirements are detailed in Section VD on Page 20. The ends of casings under limited access facilities and all casings for flammable materials shall be no closer to the pavement edge (including paved shoulders) than the toe of the front slope. Casings may be required to extend to the R/W limits or frontage roads to provide for maintenance access on limited access facilities where periodic maintenance activities on the utility are expected. This requirement is in accordance with the AASHO- A POLICY ON THE ACCOMODATION OF UTILITIES ON FREEWAY RIGHTS-OF-WAY, as adopted on February 15, 1969. Casings shall also extend beyond pavement areas that are to be widened in the near future when proposal of such widening is supported by a design study.

3. Joints and Couplings

- a. Welded Joints - Joint welds shall be made in a neat workmanlike manner, shall be air tight and continuous over the entire circumference of the pipe, and shall increase the outside diameter by no more than 1/2" total.
- b. Couplings - Couplings shall be tight, tack-welded if necessary, and sufficiently rigid (no noticeable movement in joint) to prevent misalignment during driving or pushing operation. Coupling thickness shall be such that the overall casing diameter is increased by no more than 1/2" total. All couplings shall be air tight.

B. Drilling fluids -

If drilling fluids are used to lubricate the auger and facilitate the removal of cuttings they shall consist of a mixture of water and a gel-forming colloidal material such as bentonite, or a polymer-surfactant mixture producing a slurry of custard-like consistence.

C. Shoring and bracing material -

Materials used for sheeting, sheet piling, cribbing, bracing, shoring and underpinning shall be in good serviceable condition, and timbers shall be sound, free from large or loose knots and of proper dimensions, as required by the Occupational Safety and Health Administration regulations.

III. Equipment - General - In keeping with the overall objective of this guide, this section is intended to set forth guidelines in the area of equipment solely to prevent unnecessary stoppages and subsequent damage to the roadway.

All equipment used in the execution of work covered under the utility permit shall have the built-in capacity, stability and necessary safety features required to fully comply with the specifications and requirements of this guide without showing evidence of undue stress or failure.

It shall be the responsibility of the permittee to assure that the equipment to be used in the crossing operation is in sound operating condition. Back-up equipment may be required where job site conditions indicate that severe damage to the roadway or a hazardous condition may result in the event of an equipment breakdown and where the condition of the equipment to be used indicates that routine component replacement or repair will likely be necessary during the crossing.

A. Auger power units - Power units providing rotational force to the cutting head and/or, the auger used to remove spoil material as the bore progresses. May also provide power for jacks used to push the casing.

1. Power units shall be in proper operating condition and shall have sufficient power to satisfactorily complete the proposed crossing according to the manufactureres recommendations.

B. Augers - Screw-type steel drive tubes or shafts with one male end and one female end for coupling and welded steel flighting (threads).

1. Auger shafts shall be straight and otherwise undamaged.

2. Flighting shall be undamaged and securely welded to the body of the auger shaft and be continuous with no gaps from end to end of each auger section.

C. Cutting Heads - Boring attachment fastened to leading end of first auger section equipped with special teeth, bits, blades, chippers or cutters used to cut or chip away rock or hard soils in advance of auger.

C. (continued)

1. Cutting heads shall be undamaged and have no missing or broken teeth or bits.
2. Pinned or hinged wing cutters must be constructed in such a manner as to insure overboring does not exceed limits specified in Section V E. 3., Page 23 of this guide.

D. Auger tracks - supports boring machine and provides line and grade control.

1. Tracks shall be straight and otherwise undamaged with no broken welds.
2. Tracks shall be constructed so as to remain rigid at joints and allow no appreciable flexing as power unit passes.

E. Jacks - Hydraulic, mechanical, or manual power units providing horizontal thrust for pushing casing or carrier pipe. Shall have sufficient power to satisfactorily complete the proposed crossing according to the manufacturers recommendations.

1. Hydraulic - Shall be in sound operating condition. Hoses shall not be cracked or split; all couplings and fittings shall be tight and entire system free from leaks. Hydraulic cylinder rods should be clean and smooth to prevent damage to cylinder seals.
2. Mechanical - includes manual and power drivers, ratchet type jacks, wench and pulley systems.

All mechanical jacking systems shall be in sound operating condition with no broken welds, excessively worn parts, broken teeth, badly bent or otherwise misaligned components. All ropes, cables, clamps and other non-mechanical but essential items shall be in first class condition and replaced immediately when the need is apparent.

3. Other: Devices or systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved for use by the Department prior to commencement of work. Consideration for approval will be made on an individual basis for each properly permitted crossing. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the crossing satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the job.

III E (continued)

Jetting or water sluicing methods shall not be allowed. Boring or tunneling devices with vibrating type heads that do not provide positive control of line and grade shall not be allowed.

- F. Anchors and Braces - Jacking base or deadman used to provide a rigid base from which the horizontal thrusting from the jacking unit is transferred to the casing.

The jacking base or deadman must be sufficiently strong to withstand the pressures generated by the jacking unit throughout the jacking operation without appreciable movement or deformation.

- G. Dewatering Equipment - Equipment used to evacuate ground and surface water from jacking and receiving pit areas and along path of proposed bore.

1. Pump - shall be in proper operating condition and of sufficient capacity to satisfactorily dewater the pit and bore areas under the conditions of the particular job.
2. Header line - Collector pipe connecting pump with individual swing joints, risers and well points in a well point dewatering system. Header line shall be straight, free from large dents, kinks, or cracks and sufficient in size to pass anticipated flow.
3. Swing joints or half swings - Hoses or pipes that connect individual well points and risers to header line. Swing joints shall be undamaged and feature a workable stop cock, or equivalent device for controlling air intrusion into the system.
4. Risers - pipes connecting well points to swing joints. Should be reasonably straight and otherwise undamaged.
5. Well points - Connect to bottom end of riser pipe. Perforated and screened to draw water from surrounding area without allowing the intrusion of soil. Well points must be undamaged and screens clear and unclogged.

- H. Other Equipment - any equipment used on the job that has not been defined and covered previously in this Section (III) must be in proper working order and otherwise conform to the requirements as outlined under Equipment - General, at the beginning of the section.

IV. Personnel requirements

- A. A responsible representative of the permittee must be present at all times during the actual crossing operation on "Major Crossings". A responsible representative as specified herein is defined as a person experienced in the type work being performed and who has the authority to represent the permittee in a routine decision making capacity concerning the manner and method of carrying out the work authorized by the utility permit.
- B. The permittee or his contractor shall have a sufficient number of competent workers on the job at all times to insure the crossing is made in a timely and otherwise satisfactory manner. Adequate personnel for carrying out all phases of the actual crossing operation (where applicable: boring machine operator, qualified welder(s) for joining additional casing sections; crane or lift operator for removing spoil material; and laborers as necessary for various related tasks) must be on the job site at the beginning of work.

A competent and experienced supervisor representing the contractor that is thoroughly familiar with the equipment and type work to be performed, must be in direct charge and control of the operation at all times. In all cases the supervisor must be continually present at the job site during the actual crossing operation.

- C. As stated in the utility permit, the office of the Maintenance Engineer must be notified 24 hours in advance of starting work. In addition, the actual crossing operation shall not begin except as allowed by Part D of this section until the Maintenance Engineer or his representative is present at the job site and agrees that proper preparations for the crossing have been made and the operation may begin. The Maintenance Engineer's approval for beginning the crossing shall in no way relieve the permittee of the ultimate responsibility for the satisfactory completion of the work as authorized by the utility permit.

The Maintenance Engineer or his representative must be present on the job site at all times during the actual crossing operation on "Major Crossings".

D. It shall be the responsibility of the Department to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the permittee or his contractor. It is necessary that the permittee or his contractor and the Maintenance Engineer or his representative carefully select a mutually convenient time for the crossing operation to begin in order to avoid schedule conflicts.

When either of the parties involved requests a deviation from the agreed on schedule, they must be willing to make reasonable concessions in working out a revised schedule.

If the permittee or his contractor fails to begin the crossing at the agreed time, the Maintenance Engineer's prior commitments may dictate that the operation not be started at the contractor's next earliest convenience but rather at the next mutually convenient time.

On the other hand, the permittee or his contractor shall not be required to delay the operation beyond the agreed starting time if the Department fails to have its representative present at that time and has not suggested a schedule revision sufficiently in advance.

To avoid undue hardship on either party, reason and mutual cooperation should be exercised where starting times are concerned. If one party fails to meet the agreed schedule, the other party is expected to consider a delayed start so the crossing can be completed during daylight hours.

V. Procedure

A. Erection or installation of appropriate safety and warning devices in accordance with the Department of Transportation's Manual of Traffic Controls and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations shall be completed prior to beginning work.

B. Subsurface soil and drainage investigation

In general, the greatest influences on the success or failure of an underground crossing are the existing subsurface soil and water conditions. To correctly plan individual crossing procedures such as dewatering, use of cutting heads, positioning of auger within the casing, and to accurately locate potential problem areas, an adequate subsurface investigation must

must be made by the permittee of his contractor.

Prior to beginning work on "Major Crossings", the permittee or his contractor must submit to the Maintenance Engineer a report of subsurface soil and ground water conditions as they exist in the area of the jacking pits and along the path of the proposed crossing. The purpose of the report is to insure that the subsurface conditions are known to the permittee and/or his contractor and his proposed crossing procedure is based on factual information.

The report must be in writing and contain:

1. General classification of soils along path of proposed crossing.
2. Ground water elevation(s) along path of proposed crossing.
3. Location of underground utilities or obstructions discovered during the investigation that were not shown, or were shown inaccurately on the utility permit sketch.
4. Invert elevation(s) of proposed bore.
5. Jacking and receiving pit floor elevation(s).
6. Profile drawing showing roadway cross section and subsurface conditions along path of proposed bore, with pertinent information clearly labeled and dimensioned.

Where elevations are called for, vertical distances or assumed datum elevations may be used.

7. Project identification and testing log.
 - a. Utility permit no. and location of project.
 - b. Name of person collecting data, firm employed by, position with firm.
 - c. Dates and times of ground water observations including the time and date the test hole was made.
 - d. Equipment used.
 - e. Comments and pertinent information not shown in body of report, including any information concerning the subsequent design of a dewatering system that might not have any other effect on the proposed crossing procedure. For example, a

- e. thin but impervious layer of clay that would have little or no effect on the jacking procedure itself, could indicate a perched water table that would certainly have to be considered in the design of a dewatering system.

The purpose of the subsurface investigation report must be considered foremost in collecting the required data. The detailed classification of soils necessary for most engineering purposes would be difficult to interpret and relate to the job at hand from a boring contractor's viewpoint. Therefore, rather than utilizing one of the several formal soil classification systems currently in use, the data should be separated into broad categories of materials that have a direct and clear bearing on what procedure should be followed on an individual crossing.

In general, the subsurface materials should be separated into the following categories:

1. Rock
2. Hard-pan, clays, hard sand-clays
3. Stable, cohesive soils
4. Loose, unstable soils

Any soil not falling clearly into one of the preceding categories should be described in sufficient detail to indicate its possible influence on the proposed crossing.

Of primary importance in a subsurface investigation, is the often variable ground water level as the most difficult areas to achieve satisfactory crossings in are locations where the material along the path of the proposed crossing is saturated and likely to flow into the casing in excessive quantities if not properly controlled. Some soils even when dry are likely to cause the same problem. The existence of such conditions would dictate a crossing procedure quite different from that of a crossing through hard sand-clay for instance.

The method of obtaining the required data will vary depending upon the type of highway facility and the nature of the utility involved. For example, on small diameter crossings under rural two lane roads where soil conditions are not subject to great variation, a test hole on either side of the pavement made with a post hole digger or hand auger might be

sufficient. The other extreme would be a large diameter bore under a multilane facility in an urbanized curb and gutter section where the possibility of a damaging and possibly hazardous failure due to unknown subsurface problems requires that considerably more effort be made in the subsurface investigation. Core borings through the pavement slightly offset from the proposed bore might be in order. The borings would be spaced at intervals dictated by sound local practice that will produce an accurate profile of subsurface conditions.

Borings through pavement would be unnecessary in areas known to have no significant soil variations, however, when pavement coring is in order it shall be done by qualified persons with appropriate equipment with the test holes properly refilled and patched at the end of each days operation. If dewatering is required, (see following section) one test hole on either side of the pavement and in median areas where applicable, shall be cased for use as piezometers to monitor ground water levels during the actual crossing. The casings will be allowed to protrude above ground only when adequately delineated and while work is in progress.

Prior to conducting a subsurface investigation, the proposed means of obtaining the required data on limited access facilities and borings through any paved area must be approved in advance by the Maintenance Engineer or his designated representative.

If the subsurface conditions are known to the permittee or his contractor by previous work done in the immediate area, the information can be recorded in the subsurface investigation report with no physical testing required.

If the permittee or his contractor is not adequately equipped or experienced to satisfactorily meet the requirements of this section, or if preceding subsurface investigation reports as submitted for previous jobs proved to be significantly inaccurate, the Maintenance Engineer may require that the subsurface investigation and report be done by the permittee's choice of certified soils engineering firms experienced in the type work herein required.

- C. Dewatering - evacuation of ground and surface water from jacking and receiving pits and from path of proposed crossing.

Where the ground water level is above the invert of the proposed crossing or above the floor level of the jacking pits, some means of reducing the water level to below the jacking pit floors and the invert of the proposed crossing must be designed, installed and in operation prior to beginning the crossing as follows:

1. On all "Major Crossings" except where rock is present throughout the length of the bore and no likelihood of sand pockets exists.
2. On a crossing not otherwise classified as major, where the existing ground water level and particular soil type involved indicates that dewatering is necessary to prevent excessive flowback of spoil material as the jacking progresses.

Dewatering may not be necessary in an area where the soil involved has a very high clay content and exhibits stable cohesive characteristics even when saturated. The jacking and receiving pits, however, must be kept dry except in special cases where dewatering is not reasonably possible and remote powered hydraulic equipment is used to make the crossing under water.

When dewatering is necessary a plan showing the proposed method must be submitted to the Maintenance Engineer prior to beginning work. It must be in writing and should be included with the subsurface investigation report.

The dewatering report shall contain where appropriate:

1. Type of proposed dewatering system
 - a. Well point system
 1. Pump size and capacity
 2. Header size
 3. Riser lengths
 4. Well point installation method, jetting or driving
 5. Discharge point, route and destination of discharge

Example: Ground water to be pumped into storm sewer system on east side of SR 99, discharging into outfall ditch 300' south.

b. Trash pump

1. Pump size
2. Proposed location
3. Sump hole design

Example: 2' x 2' x 1' deep, gravel filled

4. Discharge point, route and destination of discharge

c. Berms for surface run-off protection

1. Type construction - sand bags, earth, other
2. Location and dimensions.
3. Anticipated effects of run-off diversion

Example: Ditch block with water to run-off on adjoining property.

Anticipated flow should be light--no erosion damage likely.

2. Plan and profile drawing of area to be dewatered, showing:

- a. Location on plan view of pumps, headers, well points, berms, sump holes, discharge points and their relationship to the roadway, jacking pits and path of proposed crossing.
- b. Elevations or depths on profile view of same features and equipment as above.

3. Project identification and system design information.

- a. Utility permit no. and location of project.
- b. Name of person who designed the proposed dewatering system, firm employed by, position with firm.
- c. Data upon which design was based.
 1. Subsurface investigation as previously required.
 2. Previous experience in same area.
 3. Other, describe

d. Party responsible for operation and maintaining the proposed system.

e. Comments and pertinent information not otherwise given.

The importance of a properly functioning dewatering system cannot be over emphasized. The permittee or his contractor must possess the experience and expertise necessary to properly design, operate and maintain a dewatering system as dictated by individual project conditions.

Dewatering systems shall be in conformance with all applicable Federal, State, County and local pollution control and environmental protection regulations.

D. Jacking Pits - excavated area from which jacking operation is accomplished.

1. Jacking pit excavation.

Pit excavation shall be no closer than four feet from the roadway or shoulder pavement edge, or two feet from back of curb, whichever is applicable. Pits on limited access facilities shall be no closer to the pavement edge than the toe of the front slope.

The pit dimensions shall be large enough to provide a safe, adequate working area with slopes no steeper than:

1/2:1 in hard pan, clay or hard sand-clays

1:1 in stable cohesive soils

2:1 in loose unstable soils

Slopes shall extend from proposed casing invert elevation to existing ground level.

Slopes are not required in solid rock.

In lieu of constructing slopes as above, the pit walls may be shored, sheeted, braced or otherwise supported by means of sufficient strength to protect the employees and inspectors working within them. Any such shoring, sheeting, or bracing shall conform to construction requirements as set forth by the Federal Department of Labor, Occupational Safety and Health Administration.

2. Pit floor stabilization

Where necessary to insure a solid, stable base for boring machinery, some means of stabilizing the pit floor must be provided. Stabilizing may vary depending upon job site conditions, from timber supports under tracks, addition of clean sand or gravel to

pit floor, or in some cases the construction of concrete slabs on the pit floor. All stabilizing materials other than sand, gravel and like materials must be removed upon completion of the project.

E. Equipment Set-Up

1. Aligning and leveling of auger tracks

To properly control line and grade during the crossing operation, it is imperative that the jacking unit tracks be rigidly set to the predetermined level and alignment requirements of the job. Control shall be insured by the use of appropriate engineering instruments.

2. Prior to beginning the crossing operation, each auger and casing section shall be accurately measured. The length and the order in which the section is to be used shall then be clearly marked at the trailing end of the section. Any increase in length anticipated due to joint construction must be included in the marked length.

On all crossings by open end jacking with auger used to removed spoil, the pre-measured and marked casings and augers shall be used in the predetermined order marked on the sections to insure that the leading end of the first casing section will not be under, or within three feet of, any road pavement when the crossing operation is halted to join new auger and casing sections.

As an exception, in areas where jacking pit space is restricted to a length that will not allow continuous operations under paved areas as stipulated in this section, all preparations for adding additional casing and augers must be made prior to stopping under the pavement and the joint made as quickly as possible.

Under conditions where standard lengths used in an unbroken sequence will not allow crossing under the pavement in a continuous uninterrupted manner, a shorter than standard section will be required to push the casing within 3 feet of the road pavement edge where another casing section can be added that will reach beyond 3 feet of the opposite edge during the next uninterrupted push. Additional casing shall then be added as necessary to conform with section II-A-2, Page 5. If the standard auger sections being used do not

correspond in length with the casing sections being used, the augers must be modified to maintain the pre-set distance (See Section V E 5) between the leading end of the first casing section and the first auger section. If the augers are not modified, the space between the leading casing end and the first auger section must be increased, rather than decreased, as necessary.

The lengths of each push necessary to meet this requirement must be predetermined and non-standard casing and auger sections shall be properly sequenced and numbered accordingly as previously specified.

Crossings made by closed end jacking method or crossings made in solid rock where there is no likelihood of sand pockets being encountered, are not subject to the requirements of this section concerning stopping under the pavement.

3. Methods of reducing skin friction

Friction between the outer surface of the casing and the surrounding soil may be reduced by increasing the diameter of the casing hole by no more than 3/4 inch greater than outside diameter of the casing itself. This may be accomplished as follows:

- a. Overboring - Use of a cutting head with an overall diameter of no more than 3/4 inch greater than the casing diameter. Maximum diameter includes wing cutters which must be securely blocked to limit the overall diameter in order to meet this requirement.
- b. Use of bands, couplings, collars or welds will be allowed, providing the casing diameter is increased by no more than 3/4 inch. Any such device or method used shall be rigidly affixed and shall in no way weaken the leading edge of the casing. Collars and couplings, used to reduce skin friction, must be welded in place when cutting heads are used, eliminating the possibility of the cutting head unscrewing or dislodging the collar or coupling during the operation.
- c. The use of grease on the outer surface of the casing to reduce skin friction is also acceptable.

The practice of flaring the casing or allowing a misaligned, undersized auger to cut an oversized hole will not be allowed.

4. Application of cutting heads and augers.

The proper application of cutting heads and augers is essential to a successful crossing operation. Proper equipment and experienced operators must be used in every case so that unnecessary voids are not created under the roadway.

Damage resulting from any crossing operation will be corrected at the sole expense of the permittee to the complete satisfaction of the Department.

- a. Hard pan, clay and hard sand-clay - as in rock, the cutting head should normally precede the casing but the type cutting head used must allow no more than 2 inches between the back of the head and the leading end of the casing. Cutting heads with cylindrical, pointed chippers designed for use in solid rock shall not be used.
- b. Stable cohesive soils - forward progress of the casing must depend entirely on jacking pressure with minimum overboring. If reduction of skin friction on the outside of the casing is desired, collars, couplings or welding as previously outlined must be used. Except as follows, cutting heads will not be allowed and the leading end of the first auger section must remain inside the casing at all times at a distance from the leading end of the casing of no less than the casing diameter. The exception to this requirement allows the use of a cutting head where the subsurface investigation report or other reliable information indicates the likelihood of encountering a very hard soil strata, rock, or foreign materials such as tree stumps. If it is determined prior to beginning work that the area of difficulty may be passed by the use of an appropriate cutting head, a cutting head with wing cutters designed to open when the auger is reversed from the normal clean-out direction may be used.
- c. Loose unstable soil - the same requirements as for stable soil conditions apply here except for the required space between auger and casing ends. The distance between the

leading end of the first auger section and the leading end of the casing shall be as necessary to maintain a solid plug of spoil material inside the forward portion of the casing. The minimum space between the leading end of the auger, or cutting head where allowed, and the leading end of the casing shall be pre-set and maintained as follows:

Galvanized iron, steel or PVC

Casing Diameter	Minimum Distance Between Leading Auger and Casing Ends
Less than 12"	Diameter
12"	Diameter plus 6"
24"	Diameter plus 12"
36"	Diameter plus 24"
48" and greater	Diameter plus 36"

Minimum distance for casing diameters not shown shall be the same as for the next larger size listed above.

The space requirements above may be adjusted during the crossing operation as outlined in Section VH, Page 23 if necessary.

On large diameter jacked crossings where cleanout of the bore is accomplished by special digging machinery or by hand, the distance between the leading end of the casing and the actual cleanout operation shall be no less than the distance previously specified as minimum for the space between the auger end or cutting head and the leading end of the casing. The use of tunnel liners will be allowed only where the installation method and soil conditions insure that voids will not be formed around the outside of the liner during installation.

6. Auger size and spacing

The leading auger section used in conjunction with a cutting head must be full sized having an outside diameter not less than the inside diameter of the casing less the

amount needed to provide the minimum working clearance necessary. In no case shall the auger diameter be less than 1/2 inch smaller than the inside casing diameter unless some other positive means of restricting the movement of the cutting head as previously required is assured.

Less than full sized augers that are large enough to remove spoil satisfactorily will be allowed when the auger is not used in conjunction with a cutting head and is to remain within the casing at all times, except as follows:

Full Sized Augers Required

Crossing Conditions	Minimum Length in Feet of Full Sized Auger from Leading End of Casing
Rock	*0
Hard-pan, clay, hard sand-clay (dry)	*0
(wet)	20
Stable cohesive soils (dry)	0
(wet)	20
Loose unstable soils (dry)	20
(wet)	40

Crossings requiring dewatering are to be considered as wet in the above table.

*Full sized augers are not required if lateral movement of the cutting head has been otherwise restricted in a satisfactory manner.

7. Steel Shelving

On crossings through dry, running sand, steel plates as shelving may be welded inside the casing at the leading end. The horizontal plates spaced at vertical intervals equal to their widths will reduce the volume of material that will spill into the casing if the solid plug being maintained to prevent such spillage fails. The number of shelves and their widths will determine the effectiveness of this precaution.

Caution should be exercised in welding plates or stops to the insides of the casing,

however, as the ability to cut through obstructions such as tree stumps would thereby be eliminated.

The casing, auger and cutting head requirements specified for the most restrictive condition to be encountered shall govern the set-up procedure for a particular crossing. For example, a crossing made through solid rock where there is a likely possibility of encountering a saturated sand pocket must be set up to allow withdrawal of the cutting head into the casing when the sand is reached, as outlined in Section V F, 2, Page 31.

A minimum of 40 feet of full sized auger at the leading end would also be required.

F. Crossing Operation

The actual crossing operation shall be accomplished during daylight hours and shall not begin after the hour pre-established as the latest starting time that will allow completion during daylight hours.

Night time work is expressly prohibited and will not be allowed except in emergency situations or as allowed in the special conditions of the utility permit for other extenuating circumstances.

Crossing operation requirements under the appropriate method used and subsurface conditions are as follows:

1. Driving or jacking, without auger

For casings with outside diameters of 3 inches or less at minimum depth and up to 5 inches outside diameter for depths of cover exceeding 6 feet, closed end jacking or driving is permitted.

The use of small diameter, relatively flexible casings requires that the utmost care be taken to insure adequate line and grade control. Closed end driving should not be used in areas where the subsurface report indicates an extremely hard soil strata, rock or other condition that may cause the casing to be deflected from its intended course.

2. Hydraulic or mechanical jacking, with auger

Except in rock or other conditions requiring the use of a cutting head, the intended purpose of the auger, or other cleanout means, must dictate the manner in which the

crossing is made. The use of an auger is required by the Department on all crossings using casings greater than 5 inches O.D. (greater than 3 inches O.D. if less than 6 feet deep) and is intended to prevent a rigid plug of spoil material from forming at the head of the casing. A solid plug of material inside the casing that will allow the casing to slide around it as the casing moves forward may be necessary to prevent excessive material from falling into the casing. A rigid plug wedged into the casing on the other hand, would force the material subsequently displaced by the casing into the surrounding area thereby causing the pavement to bulge.

G. Equipment Breakdowns or other unforeseen Stoppages

If forward motion of the casing is halted at any time other than for reasons planned for in advance (addition of casing and auger sections, etc.), the cause of the stoppage must be determined as quickly as possible. The prevention of damaging voids at the leading end of the casing is of primary concern and shall be assured by whatever means is necessary. If the auger is operational and a solid plug can be maintained at the head of the casing, the cause of the stoppage may then be corrected, if possible in a timely manner, and the job can proceed. If prevention of voids under paved areas cannot be assured, the casing must be filled with concrete by pressure grouting as soon as possible and abandoned. If removal of the augers from a casing to be abandoned will allow voids to form under paved areas at the casing head, the augers must be abandoned also. If the stoppage occurs because of underpowered equipment, the casing and auger if necessary, shall be abandoned as above unless the prevention of voids can be assured until adequately powered equipment can be installed to complete the crossing.

When an obstruction is encountered that cannot be passed or an existing utility is damaged, cutting of the pavement for inspection may be allowed if approved by the Maintenance Engineer or his representative, when consideration of all pertinent facts indicate that such action would offer the most practical solution to the problem for all parties concerned.

Any such authorized pavement opening shall be repaired according to the appropriate

specifications in the Utility Accommodation Guide. No cutting of the pavement will be allowed on Interstate or other limited access facilities.

- H. The requirements and recommendations contained in this guide are appropriate for the most common crossing situations. Under unusual conditions, not adequately covered herein, these requirements may be altered or waived when their strict adherence would increase the likelihood of a crossing failure. Any such alteration or waiver shall be based on sound judgement and must be submitted in writing as outlined in Section VI. Any alteration or waiver must be approved by the District Maintenance Engineer or his designated representative.
- I. A copy of the approved Utility Permit and plan sheet(s) shall be kept by the permittee or his contractor at the job site at all times. If a subsurface investigation report and/or a dewatering plan is required, they too shall be kept at the job site and along with the Utility Permit, shall be shown to the Department's representative upon request.

VI. Reporting Procedures

An accurate log shall be kept by the Maintenance Engineer or his representative on all major crossings. The purpose of this log is to record and report the data necessary to isolate and identify all common factors associated with underground crossing failures. The log is also for the inspector's use as a check list of essential items pertaining to the crossing.

The log shall be filed with the Maintenance Engineer's copy of the utility permit, investigation report, dewatering plan (if applicable), completion notice, and related correspondence. A copy of the above information must be submitted to the Central Office on all crossings resulting in failures as defined herein, and on other crossings where such information would also be of value in determining future guidelines and regulations.

The data shall be recorded on the job site during the actual crossing operation, where appropriate, on the following form with additional sheets as necessary.