INTRODUCTION

The researchers at the University of Florida would like to thank John Shriner of the Florida Department of Transportation for allowing them to work on this project. It is hoped that this manual will be a helpful guide to professionals who are interested in the duration of utility relocation and installation operations. Although this manual is not the final word in utilities scheduling it is hoped that you will find it useful and that it will provide you with a better understanding of the time requirements for utilities operations.

Respectfully:

Ralph D. Ellis Jr. P.E.
Jennifer W. Shannon, E.I.
Michael Shane Johnson
Benjamin Yang, E.I.
Barry D. Guertin, E.I.
BACKGROUND

FDOT scheduling engineers need a reliable reference for estimating the duration of different utility relocations encountered on FDOT construction projects. The type of utility work involved on a project may vary considerably. FDOT projects can involve everything from fiber optic systems to conventional storm drainage, often with many different utility systems involved in a single project. This manual is intended to be the beginning of a comprehensive information base for estimating utility production rates and activity duration.

The University of Florida was under contract with the FDOT to create this Utility Production Rate Scheduling Reference for FDOT Construction Projects. The research team used the following research approach:

- Approached members of the utility industry to develop a list of common utility activities.
- Developed list of common utility activities from FDOT utility relocation schedules.
- Verified the list of common utility activities with FDOT district utility engineers.
- Obtained low, average, and high durations and influencing factors for items on the list of common utility activities from different utility companies and means manuals.
- Compared the information from the utility companies with the data from the utility relocation schedules and means manuals.

For more information on the research process, please see the document Development of a Utility Production Rate Scheduling Reference for FDOT Construction Projects.

This estimating reference presents production rates for utility work activities within the context of FDOT projects. The range of times and influencing factors for the activities can serve as adjustment factors for a scheduling engineer. However, anyone who uses this manual must note that the durations for the activities included in this manual are on-site construction times only! The time necessary to acquire permits and to design a utility relocation is not included in this manual. The focus of this research was to find construction times and that is what is included in this manual.
# Table of Contents

**CABLE**
- Activity CA01 Adjust or replace one fiber optic aerial cable ........................................ 1
- Activity CA02 Place and pull new coaxial cable through a four-inch duct ............................ 1
- Activity CA03 Splice and activate new coaxial cable. ...................................................... 1
- Activity CA04 Directional bore 100 feet for a four-inch duct ............................................ 2
- Activity CA05 Relocate three fiber overhead cables to new poles ..................................... 2
- Activity CA06 Remove one existing underground amplifier and power supply .................. 2
- Activity CA07 Remove existing overhead cable per 100-feet .......................................... 3
- Activity CA08 Remove existing cable crossing per span ................................................. 3

**ELECTRIC**
- Activity OE01 Relocate per span one 13kV line ............................................................... 4
- Activity OE02 Relocate one pole for 12.47 kV line ............................................................ 4
- Activity OE03 Remove one overhead electric crossing for a 13.2 kV line ....................... 5
- Activity OE04 Remove fifty feet of aerial cable ............................................................... 5
- Activity OE05 Provide service for street light load center (480 V) ..................................... 5
- Activity OE06 Remove poles for an aerial crossing ........................................................... 6
- Activity OE07 Provide service for traffic signal (120 V) ................................................... 6
- Activity UE01 Remove three buried cables per fifty feet .............................................. 6
- Activity UE02 Place duct bank X by Y of Z-inch conduit per fifty feet ............................ 7
- Activity UE03 Remove 3-100 mm conduits for fifty feet .............................................. 7
- Activity UE04 Adjust existing electric conduits ............................................................. 8
- Activity UE05 Place pre-cast manhole ......................................................................... 8

**GAS**
- Activity GA01 Protect and support ten linear feet of one low-pressure gas line ................ 9
- Activity GA02 Adjust one two-inch steel pipe ................................................................. 9
- Activity GA03 Lower one ¾” service line in place ......................................................... 9
- Activity GA04 Install one new two-inch gas line per fifty linear feet ............................... 10
- Activity GA05 Install one bottom-out connection for one four-inch gas main ............... 10
- Activity GA06 Place out of service one four-inch gas line per fifty linear feet ............... 10
- Activity GA07 Lower one high-pressure gas line ......................................................... 11
- Activity GA08 Encase one high-pressure gas line ......................................................... 11

**PHONE**
- Activity PA01 Install and splice 100 linear feet of buried copper cable .......................... 12
- Activity PA02 Install and splice 100 linear feet of buried fiber cable .............................. 12
- Activity PA03 Install and splice 100 linear feet of aerial copper cable ............................ 12
- Activity PA04 Install and splice 100 linear feet of aerial fiber cable ............................... 13
- Activity PA05 Install and splice 100 linear feet of copper cable in conduit ..................... 13
- Activity PA06 Install and splice 100 linear feet of fiber cable in conduit ......................... 13
- Activity PA07 Place fifty feet of X-pair cable out of service ......................................... 14
- Activity PA08 Place (1) 4” sched. 40 PVC conduit out of service .................................. 14
- Activity PA09 Place (1) 4” sched. 40 PVC conduit in service ......................................... 15
- Activity PA10 Lower fifty linear feet of X-pair cable ..................................................... 15
- Activity PA11 Install and connect one handhole and duct system .................................. 15
- Activity PA12 Adjust one telephone handhole to final grade ....................................... 16
- Activity PA13 Adjust frame and cover for one manhole .............................................. 16
Activity PA14 Splice one 900-pair cable ................................................................. 16

SEWER .................................................................................................................... 17
Activity SA01 Furnish, install, and connect fifty linear feet of X-inch PVC SDR. ........ 17
Activity SA02 Furnish, install, and connect fifty linear feet of X-inch PVC FM ........... 17
Activity SA03 Remove and replace fifty linear feet of X-inch PVC FM ...................... 18
Activity SA04 Plug and place out of service one eight-inch sanitary sewer main ...... 18
Activity SA05 Re-route fifty linear feet of X-inch PVC FM ......................................... 19
Activity SA06 Grout fill one X-inch sanitary sewer lateral for fifty linear feet .............. 19
Activity SA07 Furnish and install one manhole .......................................................... 20
Activity SA08 Adjust ring and cover to grade for one manhole ................................. 20

WATER ..................................................................................................................... 21
Activity WA01 Furnish, install, and connect fifty linear feet of Type K copper pipe .... 21
Activity WA02 Cut and plug one X-inch pipe ......................................................... 21
Activity WA03 Adjust one water valve box to grade ............................................... 22
Activity WA04 Adjust one X-inch WM ..................................................................... 22
Activity WA05 Remove and replace fifty linear feet of X-inch WM ......................... 23
Activity WA06 Furnish and install one fire hydrant assembly .................................... 23
Activity WA07 Remove and replace one fire hydrant assembly .................................. 24
Activity WA08 Remove and replace one water meter ............................................... 24
Activity WA09 Relocate one water meter ............................................................... 25
Activity CA01 Adjust or replace one fiber optic aerial cable.

Lowest Duration: 4 hours  
Average Duration: 5 hours  
Highest Duration: 6 hours

Influencing Factors:
- type of pole
- energized or de-energized cable
- drilling time

Activity CA02 Place and pull new coaxial cable through a four-inch duct.

Lowest Duration: 5 days  
Average Duration: 6 days  
Highest Duration: 10 days

Influencing Factors:
- Soil conditions
- Location of other utilities

Activity CA03 Splice and activate new coaxial cable.

Lowest Duration: 5 days  
Average Duration: 6 days  
Highest Duration: 10 days

Influencing Factors:
- Location of coaxial cable
- Location of other utilities
- Number of people on crew
- Available equipment
Activity CA04 Directional bore 100 feet for a four-inch duct.

Lowest Duration: 1 day  
Average Duration: 2 days  
Highest Duration: 4 days  

Influencing Factors:  
• Soil conditions  
• Known or unknown utility locations  
• Any failed attempts for a successful directional bore

Activity CA05 Relocate three fiber optic aerial cables to new poles.

Lowest Duration: 6 hours  
Average Duration: 12 hours  
Highest Duration: 18 hours  

Influencing Factors:  
• Type of pole  
• Number of attachments per pole  
• Energized or de-energized cable

Activity CA06 Remove one existing underground amplifier and power supply.

Lowest Duration: NA  
Average Duration: 1 day  
Highest Duration: NA  

Influencing Factors:  
• Soil conditions  
• Location of other utilities
Activity CA07 Remove existing overhead cable per 100-feet.

Lowest Duration: 0.4 hours  
Average Duration: 0.5 hours  
Highest Duration: 0.7 hours

Influencing Factors:
- Traffic  
- Energized or de-energized cable  
- Location of other utilities  
- Street crossings

Activity CA08 Remove existing cable crossing per span.

Lowest Duration: 0.8 hours  
Average Duration: 1.0 hour  
Highest Duration: 1.4 hours

Influencing Factors:
- Traffic  
- Energized or de-energized cable  
- Location of other utilities  
- Street crossings
Relocate per span one 13 kV line.

Activity OE01 Relocate per span one 13kV line.
Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 10 days
Influencing Factors:
- Crew availability
- Truck access
- Type of pole
- Pole mounted equipment
- Outage coordination required
- MOT coordination

Activity OE02 Relocate one pole for 12.47 kV line.
Lowest Duration: 0.5 days
Average Duration: 2 days
Highest Duration: 5 days
Influencing Factors:
- Crew availability
- Truck access
- Type of pole
- Pole mounted equipment
- Outage coordination required
- MOT coordination
Activity OE03 Remove one overhead electric crossing for a 13.2 kV line.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 4 days

Influencing Factors:
- Crew availability
- Truck access
- Type of pole
- Pole mounted equipment
- Outage coordination required
- MOT coordination

Activity OE04 Remove fifty feet of aerial cable.

Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Crew availability
- Truck access
- Outage coordination required
- MOT coordination

Activity OE05 Provide service for street light load center (480 V).

Lowest Duration: 1 day
Average Duration: 3 days
Highest Duration: 10 days

Influencing Factors:
- Crew availability
- Truck access
- Type of line work required
- MOT coordination
Activity OE06 Remove poles for an aerial crossing.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 4 days

Influencing Factors:
- Crew availability
- Truck access
- MOT coordination
- Type of pole
- Disposal of pole

Activity OE07 Provide service for traffic signal (120 V).

Lowest Duration: 1 day
Average Duration: 3 days
Highest Duration: 10 days

Influencing Factors:
- Crew availability
- Truck access
- Line work required
- MOT coordination

Activity UE01 Remove three buried cables per fifty feet.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 5 days

Influencing Factors:
- Crew availability
- Site conditions
- Ground water level
- Quality of soil
- Outage or MOT coordination required
Activity UE02 Place duct bank X by Y of Z-inch conduit per fifty feet.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 5 days

Influencing Factors:
- Crew availability
- Site conditions
- Ground water level
- Quality of soil
- Outage or MOT coordination required

Activity UE03 Remove 3-100 mm conduits for fifty feet.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 5 days

Influencing Factors:
- Crew availability
- Site conditions
- Ground water level
- Quality of soil
- Outage or MOT coordination required
Activity UE04 Adjust existing electric conduits.

Lowest Duration: 1 day  
Average Duration: 2 days  
Highest Duration: 5 days  

Influencing Factors:  
- Crew availability  
- Site conditions  
- Ground water level  
- Quality of soil  
- Outage or MOT coordination required  
- Ability to switch cable  

Activity UE05 Place pre-cast manhole.

Lowest Duration: 2 days  
Average Duration: 5 days  
Highest Duration: 10 days  

Influencing Factors:  
- Crew availability  
- Site conditions  
- Ground water level  
- Quality of soil  
- Outage or MOT coordination required  
- Location of manhole  
- Number of surrounding utilities  
- Placement into pavement or grass
Activity GA01 Protect and support ten linear feet of one low-pressure gas line.

Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Open excavation
- Providing temporary support
- Site conditions
- Weather conditions
- Type of material
- Shoring equipment

Activity GA02 Adjust one two-inch steel pipe.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 4 days

Influencing Factors:
- Length to move
- Pressure
- Need to make stops and cuts in pipe

Activity GA03 Lower one ¾” service line in place.

Lowest Duration: 1 day
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Site conditions
- Restoration of service
- Involvement of road crossing
Activity GA04 Install one new two-inch gas line per fifty linear feet.

Lowest Duration: 0.5 days  
Average Duration: 1 day  
Highest Duration: 2 days

Influencing Factors:
- Open trench
- Site conditions
- Type of pipe

Activity GA05 Install one bottom-out connection for one four-inch gas main.

Lowest Duration: 0.5 days  
Average Duration: 2 days  
Highest Duration: 4 days

Influencing Factors:
- Site conditions
- Weather
- Welding
- Material and supplies

Activity GA06 Place out of service one four-inch gas line per fifty linear feet.

Lowest Duration: 0.5 days  
Average Duration: 2 days  
Highest Duration: 4 days

Influencing Factors:
- Length of main to purge
- Type of material for main
- Involvement of customers
- Installation of stoppers on each end
Activity GA07 Lower one high-pressure gas line.

Lowest Duration: 1 day  
Average Duration: 3 days  
Highest Duration: 6 days  

Influencing Factors:  
- Type of material for line  
- Open excavation  
- Location of other utilities

Activity GA08 Encase one high-pressure gas line.

Lowest Duration: 6 days  
Average Duration: 8 days  
Highest Duration: 10 days  

Influencing Factors:  
- Open excavation  
- Installation of casing
Activity PA01 Install and splice 100 linear feet of buried copper cable.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions

Activity PA02 Install and splice 100 linear feet of buried fiber cable.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions

Activity PA03 Install and splice 100 linear feet of aerial copper cable.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions
Activity PA04 Install and splice 100 linear feet of aerial fiber cable.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions

Activity PA05 Install and splice 100 linear feet of copper cable in conduit.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions
- Manhole access
- Traffic

Activity PA06 Install and splice 100 linear feet of fiber cable in conduit.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Special conduit cut-over
- Ground conditions
- Manhole access
- Traffic
Activity PA07 Place fifty feet of X-pair cable out of service.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

NOTE: The time for this activity is included in the splicing work.

Influencing Factors:
- Special conduit cut-over
- Ground conditions
- Manhole access
- Traffic

Activity PA08 Place (1) 4” sched. 40 PVC conduit out of service.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

NOTE: The time for this activity is included in the splicing work.

Influencing Factors:
- Special conduit cut-over
- Ground conditions
- Manhole access
- Traffic
Place (1) 4” schedule 40 PVC conduit in service.

Lowest Duration: 0.8 days
Average Duration: 1 day
Highest Duration: 1.2 days
Influencing Factors:
- Rocks

Lower 50 L.F. of X-pair cable.

Lowest Duration: 1 day
Average Duration: 2 days
Highest Duration: 8 days
Influencing Factors:
- Rocks
- Must expose 150’ of cable to lower 50’

Install & connect one handhole & duct system.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: NA
Influencing Factors:
- Availability of labor and equipment
Activity PA12 Adjust one telephone handhole to final grade.

Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Need road surveyor to shoot grade

Activity PA13 Adjust frame and cover for one manhole.

Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Need road surveyor to shoot grade

Activity PA14 Splice one 900-pair cable.

Lowest Duration: 2 days
Average Duration: 3 days
Highest Duration: 5 days

Influencing Factors:
- Need two people for this activity
- Special cut-over
Activity SA01 Furnish, install, and connect fifty linear feet of X-inch PVC SDR.

Lowest Duration: 1 day
Average Duration: 14 days
Highest Duration: 20 days

Influencing Factors:
- Clearing and grubbing
- Ordering the material/Fabrication
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather

Activity SA02 Furnish, install, and connect fifty linear feet of X-inch PVC FM.

Lowest Duration: 1 day
Average Duration: 14 days
Highest Duration: 20 days

Influencing Factors:
- Clearing and grubbing
- Ordering the material/Fabrication
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather
Activity SA03 Remove and replace fifty linear feet of X-inch PVC FM.

Lowest Duration: 3 days  
Average Duration: 28 days  
Highest Duration: 40 days

Influencing Factors:
- Clearing and grubbing
- Ordering the material/Fabrication
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather
- Preparation of trench for new installation
- Disposal point for old materials
- Sometimes removal can take more time than installation

Activity SA04 Plug and place out of service one eight-inch sanitary sewer main.

Lowest Duration: 2 days  
Average Duration: 4 days  
Highest Duration: 30 days

Influencing Factors:
- Depth of pipe
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment
Activity SA05 Re-route fifty linear feet of X-inch PVC FM.

Lowest Duration: 1 day
Average Duration: 14 days
Highest Duration: 20 days

Influencing Factors:
- Clearing and grubbing
- Ordering the material/Fabrication
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather

Activity SA06 Grout fill one X-inch sanitary sewer lateral for fifty linear feet.

Lowest Duration: 3 days
Average Duration: 4 days
Highest Duration: 6 days

Influencing Factors:
- Depth of pipe
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment
- Contractor availability
Activity SA07 Furnish and install one manhole.

Lowest Duration: 1 day
Average Duration: 4 days
Highest Duration: 8 days

Influencing Factors:
- Clearing and grubbing
- Ordering the material/Fabrication
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather

Activity SA08 Adjust ring and cover to grade for one manhole.

Lowest Duration: 0.5 days
Average Duration: 1 day
Highest Duration: 2 days

Influencing Factors:
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment
Activity WA01 Furnish, install, and connect fifty linear feet of Type K copper pipe.

Lowest Duration: 1 day  
Average Duration: 5 days  
Highest Duration: 20 days

Influencing Factors:
- Clearing and grubbing  
- Ordering the material/Fabrication  
- Availability of labor and equipment  
- Soil conditions  
- DOT permits  
- Weather

Activity WA02 Cut and plug one X-inch pipe.

Lowest Duration: 0.5 days  
Average Duration: 2 days  
Highest Duration: 8 days

Influencing Factors:
- Depth of pipe  
- Soil conditions  
- Permitting  
- Weather  
- Availability of labor and equipment
Activity WA03 Adjust one water valve box to grade.

Lowest Duration: 0.25 days
Average Duration: 0.5 days
Highest Duration: 2 days

Influencing Factors:
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment

Activity WA04 Adjust one X-inch WM.

Lowest Duration: 0.25 days
Average Duration: 1 day
Highest Duration: 4 days

Influencing Factors:
- Clearing and grubbing
- Availability of labor and equipment
- Soil conditions
- DOT permits
- Weather
- Length of adjustment
- Vertical or horizontal adjustment
Activity WA05 Remove and replace fifty linear feet of X-inch WM.

Lowest Duration: 0.5 days  
Average Duration: 1 day  
Highest Duration: 5 days

Influencing Factors:
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment

Activity WA06 Furnish and install one fire hydrant assembly.

Lowest Duration: 0.5 days  
Average Duration: 3 days  
Highest Duration: 10 days

Influencing Factors:
- Availability of assemblies
- Perpendicular or parallel to water main
- Permitting
- Weather
Availability of labor and equipment
Activity WA07 Remove and replace one fire hydrant assembly.

Lowest Duration: 1 day
Average Duration: 6 days
Highest Duration: 16 days

Influencing Factors:
- Availability of assemblies
- Perpendicular or parallel to water main
- Permitting
- Weather
- Availability of labor and equipment
- Removal time
- Removal of concrete block at the elbow

Activity WA08 Remove and replace one water meter.

Lowest Duration: 1 day
Average Duration: 3 days
Highest Duration: 4 days

Influencing Factors:
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment
Activity WA09 Relocate one water meter.

Lowest Duration: 1 day
Average Duration: 3 days
Highest Duration: 4 days

Influencing Factors:
- Soil conditions
- Permitting
- Weather
- Availability of labor and equipment