

APPENDIX A

SURVEYOR ASSISTANT INSTRUMENT

O*NET-SOC CODE: 17-3031.01

RAPIDS CODE: 0551

CHIEF OF PARTY

O*NET-SOC CODE: 17-3031.00

RAPIDS CODE: 0053

**WORK PROCESS SCHEDULE
SURVEYOR ASSISTANT INSTRUMENT
O*NET-SOC CODE: 17-3031.01 RAPIDS CODE: 0551**

Description: Surveyor Assistant Instrument performs the following duties to assist on a surveying crew: holds level rod or distance meter reflector at designated points to assist in determining elevation and laying out stakes for map making, construction, land and other surveys; calls out reading or writes station number and reading in notebook; marks points of measurement with elevation, station or other identifying mark; measures distance between survey points, using surveyors tapes or electronic distance measuring equipment; marks measuring points with keel (marking crayon), paint, sticks, scratches, tacks, stakes or monuments; places stakes at designated points and drives them into ground, sometimes at specific elevation, using sledge hammers; cuts and clears brush and trees from line of survey using brush hook, knife, ax or other cutting tools; obtains data pertaining to angles, elevations, control points and contours used for construction, map making, or other purposes; compiles notes, sketches and records of data obtained and work performed; directs work of subordinate members of survey crew; performs other duties relating to survey work as directed by the Chief of Party.

SURVEYOR ASSISTANT INSTRUMENT APPRENTICE	HOURS
Use and care for hand tools (other than survey equipment)	340
Use and care for survey hand tools	500
Use and care for rods, chains and related equipment	1000
Hand signals, land surveying terms and definitions	100
Hubs, reference points and monuments	400
Marker Stakes	350
Bench marks and turning points	1000
First Aid	8
Safety Measures	152
Use of Calculators	150
	Total 4000

**RELATED INSTRUCTION OUTLINE
SURVEYOR ASSISTANT INSTRUMENT
O*NET-SOC CODE: 17-3031.01 RAPIDS CODE: 0551**

First Year

**1. SURVEYING EQUIPMENT & TECHNIQUE
COURSE OUTLINE**

OVERVIEW OF THE SURVEY INDUSTRY

6 HOURS

Lesson Plan 1 History of Surveying, Duties and Basic Crew Operations, Employee Obligations

Lesson Plan 2 Safety Procedures for Tool use and Job Site Safety

BASIC FIELD OPERATIONS AND SETTING SURVEY POINTS

9 HOURS

Lesson Plan 3 Reading, Recording and Checking Angles

Lesson Plan 4 FIELD CLASS:
Stake Driving, Sight Setting, Marking of Lath, use of T-16, Safety Procedures

BASIC MEASUREMENT TECHNIQUES IN SURVEYING

12 HOURS

Lesson Plan 5 Basic Chaining Procedures, Introduction to Metric Measurements, and Safety Procedures

Lesson Plan 6 Chaining Blunders, Errors, Mistakes, and Note keeping

Lesson Plan 7 FIELD CLASS:
Pacing and Chaining, use of T-16, Note keeping, Safety Procedures

INTRODUCTION TO ANGLE MEASURING AND FIELD INSTRUMENTS

24 HOURS

Lesson Plan 8 Bearings, Azimuths, Angles, and Angular Units

Lesson Plan 9 Bearings, Azimuths, Angles, and Angular Units (continued)

Lesson Plan 10 Techniques in using Total Stations, Reflector, Prism Plumbing Poles and Stake Driving

Lesson Plan 11 FIELD CLASS:
Stake Driving, use of Total Stations, Safety Procedures

Lesson Plan 12 Use of Total Station EDM's and Data Collectors

Lesson Plan 13 FIELD CLASS:
Stake Driving, Chaining, Basic use of Total Stations, Safety Procedures

REVIEW AND MIDTERM EXAMINATION

6 HOURS

Lesson Plan 14 Review for Midterm Examination and Review of Safety Procedures

Lesson Plan 15 **MIDTERM EXAMINATION**

2. SURVEYING EQUIPMENT & TECHNIQUES
COURSE OUTLINE

INTRODUCTION TO LEVELING

24 HOURS

Lesson Plan 16 Leveling Instruments, Hand Level, Rods and Differential Leveling Principles

Lesson Plan 17 Setting Turning Points, Bench Marks, Note keeping and Grade Sheets, Introduction to Electronic and Trigonometric Leveling

Lesson Plan 18 FIELD CLASS:
Level Circuits, Marking of Lath, Safety Procedures

Lesson Plan 19 Leveling Methods and Procedures

Lesson Plan 20 Profile and X-Section Leveling, Errors in Leveling, Curvature and Refraction

Lesson Plan 21 FIELD CLASS:
Field use of Leveling, Safety Procedures

15 HOURS

INTRODUCTION TO TOPOGRAPHIC SURVEYS

Lesson Plan 22 Topo Note keeping, X-Section, Grid, Stadia, Total Stations, and Aerial Topo's

Lesson Plan 23 Location of Shots Taken in Topo's, Contour and Contour Lines

Lesson Plan 24 **FIELD CLASS:**
Level Circuit, Perform Grid and X-Section Topo, Note keeping Procedures, Safety Procedures

Lesson Plan 25 Plotting of Topo Notes and use of Scales

APPRENTICE SKILLS EVALUATION – FIELD FINAL

6 HOURS

Lesson Plan 26 **FIELD CLASS:**
SKILLS EVALUATION TEST, Safety Procedures

REVIEW AND FINAL EXAMINATION

6 HOURS

Lesson Plan 27 Review for Final Examination

Lesson Plan 28 **FINAL EXAMINATION**

SUPPLEMENTAL MATH EXAMINATION

3 HOURS

Lesson Plan 29 **SUPPLEMENTAL MATH EXAMINATION**

FIRST AID

8 HOURS

Lesson Plan 30 American Red Cross Standard First Aid and CPR

COMPUTER LITERACY EXAMINATION

3 HOURS

Lesson Plan 31 **COMPUTER LITERACY EXAMINATION**

**3. SUPPLEMENTAL MATH
COURSE OUTLINE**

BASIC MATHEMATICS RELATED TO SURVEYING 3 HOURS

Lesson Plan 1 Review of Basic Mathematics Related to Surveying

ALGEBRA AND GEOMETRY RELATED TO SURVEYING 6 HOURS

Lesson Plan 2 Review of Algebra Related to Surveying

Lesson Plan 3 Review of Geometry Related to Surveying

DIRECTION AND LOCATION MEASURING SYSTEMS 6 HOURS

Lesson Plan 4 Review of Angles, Azimuths and Bearings

Lesson Plan 5 Review of Stationing and Offsets

SUPPLEMENTAL MATH EXAMINATION 3 HOURS

Lesson Plan 6 **SUPPLEMENTAL MATH EXAMINATION**

**4. SURVEYING PROCEDURES
COURSE OUTLINE**

APPRENTICE RESPONSIBILITIES AND PUBLIC RELATIONS 3 HOURS

Lesson Plan 1 Obligations and Responsibilities to the Employer, the Industry, and the Union; Public and Client Relations; Review and Discussion of Job Site Safety

FIELD NOTES 3 HOURS

Lesson Plan 2 Review of Field Notes and Lettering

IDENTIFICATION OF MONUMENTS; REVIEW METRIC AND ENGLISH MEASURING SYSTEMS 3 HOURS

Lesson Plan 3 Identification of Monuments, Public Monuments, and Laws Pertaining to Monuments; Review of Metric and English Measuring Systems

LINEAR MEASUREMENTS

9 HOURS

- Lesson Plan 4 Scope and Variety of Chaining Procedures and Sources of Error in Chaining and Applying Chaining Corrections

- Lesson Plan 5 FIELD CLASS:
Field Chaining and Corrections

INTRODUCTION TO STATION AND LOCATION SYSTEMS

12 HOURS

- Lesson Plan 6 Review of Stationing and Location Measuring Systems

- Lesson Plan 7 Techniques of Stationing and Review of Field Problems

- Lesson Plan 8 FIELD CLASS:
Field Problems using Stationing and Location Measuring Systems, Safety Procedures

REVIEW OF ANGLES, BEARINGS, AND INSTRUMENTS

15 HOURS

- Lesson Plan 9 Review of Angles, Bearings, Azimuths, and Direction Measuring

- Lesson Plan 10 Review of Angles, Bearings, and Azimuths (continued)

- Lesson Plan 11 Review of Direction Measuring Instruments

- Lesson Plan 12 FIELD CLASS:
Field use of Angles, Bearings, Azimuths and Direction Measuring Instruments, Safety Procedures

REVIEW AND MIDTERM EXAMINATION

6 HOURS

- Lesson Plan 13 Review for Midterm Examination

- Lesson Plan 14 **MIDTERM EXAMINATION**

5. SURVEYING PROCEDURES
COURSE OUTLINE

LEVELING METHODS

9 HOURS

Lesson Plan 15 Leveling Methods and Procedures, Note keeping and Adjustments, and Calculations and Errors

Lesson Plan 16 FIELD CLASS:
Leveling Problems, Safety Procedures

GLOBAL POSITIONING SYSTEM (GPS)

12 HOURS

Lesson Plan 17 Overview of the Basic Principles of GPS

Lesson Plan 18 Introduction to GPS Field Equipment

Lesson Plan 19 FIELD CLASS:
Operation of GPS Field Equipment, Observation Session, Safety Procedures

PLAN READING AND GRADE SHEETS

12 HOURS

Lesson Plan 20 The Topographic Map

Lesson Plan 21 Improvement Plans and Circular Curves

Lesson Plan 22 Site and Grading Plans

Lesson Plan 23 The Plan Book

INTRODUCTION TO CONSTRUCTION SURVEYS

15 HOURS

Lesson Plan 24 Construction Terminology and Coordinates

Lesson Plan 25 Building Construction Sequence

Lesson Plan 26 Construction Surveying, Staking Methods and
Procedures

TRIGONOMETRY**12 HOURS**

Lesson Plan 7	Introduction to Trigonometry
Lesson Plan 8	Trigonometric Functions
Lesson Plan 9	Trigonometric Identities and Right Triangles
Lesson Plan 10	Right Triangle Problems

REVIEW AND MIDTERM EXAMINATION**6 HOURS**

Lesson Plan 11	Review for Midterm Examination
Lesson Plan 12	MIDTERM EXAMINATION

**7. SURVEYING PRACTICES
COURSE OUTLINE****TRIGONOMETRY****15 HOURS**

Lesson Plan 13	Intermediate Right Triangle Problems
Lesson Plan 14	Intermediate Right Triangle problems (continued)
Lesson Plan 15	Advanced Right Triangle Problems
Lesson Plan 16	Introduction to Oblique Triangle Problems Solved using Right Triangles
Lesson Plan 17	Oblique Triangle Problems Solved using Right Triangles (continued)

SLOPE STAKING**18 HOURS**

Lesson Plan 18	Terminology, Geometry, and Marking of Slope Stakes, Slope Staking Procedures
Lesson Plan 19	<u>FIELD CLASS:</u> Slope Staking Procedures, Safety Procedures

Lesson Plan 20 Slope Staking Review, Reference Slope Stakes and Grade Setting

Lesson Plan 21 FIELD CLASS:
Field Practice of Slope Staking Techniques, Safety Procedures

ELECTRONIC DISTANCE MEASURING AND RECORDING

12 HOURS

Lesson Plan 22 Techniques of Operating Total Stations with Calculation for Slope Reductions and Trigonometry Leveling

Lesson Plan 23 Use of Data Collectors for Gathering Information and use for Stakeout/Other Measuring Systems

Lesson Plan 24 FIELD CLASS:
Field Problems using Total Stations, Data Collectors, and Safety Procedures

GPS BASICS AND FIELD PROCEDURES

9 HOURS

Lesson Plan 25 GPS Basics

Lesson Plan 26 FIELD CLASS:
Field Problems with GPS and Safety Procedures

REVIEW AND FINAL EXAMINATION

6 HOURS

Lesson Plan 27 Review for Final Examination

Lesson Plan 28 **FINAL EXAMINATION**

8. SURVEYING COMPUTATIONS
COURSE OUTLINE

COORDINATE GEOMETRY

12 HOURS

Lesson Plan 1 Introduction to Coordinate Principles and Rectangular Coordinate Systems

Lesson Plan 2 Coordinate Principles and Rectangular Coordinate Systems

Lesson Plan 3 Traversing and Inversing Coordinates

Lesson Plan 4 Traversing and Inversing Coordinates (continued)

GPS COORDINATE SYSTEMS

12 HOURS

Lesson Plan 5 FIELD CLASS:
GPS Coordinate Systems

Lesson Plan 6 FIELD CLASS:
Traverse and Stakeout with GPS

OBLIQUE TRIANGLE SOLUTIONS

6 HOURS

Lesson Plan 7 Oblique Triangle Solutions using the Law of Sines and the Law of Cosines

Lesson Plan 8 Oblique Triangle Solutions using the Law of Sines and the Law of Cosines (continued)

HORIZONTAL AND VERTICAL CURVES

36 HOURS

Lesson Plan 9 Introduction to Horizontal Curves

Lesson Plan 10 Horizontal Curves (continued)

Lesson Plan 11 Introduction to Field Staking Procedures for Horizontal Curves

Lesson Plan 12 FIELD CLASS:
Field Staking of Horizontal Curves, Safety Procedures

Lesson Plan 13	Introduction to Compound, Reverse and Spiral Curves
Lesson Plan 14	Compound, Reverse and Spiral Curves (continued)
Lesson Plan 15	Introduction to Vertical Curves
Lesson Plan 16	Vertical Curves (continued)
Lesson Plan 17	Introduction to Field Staking Procedures for Compound and Reverse Horizontal Curves and Vertical Curves
Lesson Plan 18	<u>FIELD CLASS:</u> Field Staking of Horizontal and Vertical Curves, Safety Procedures

REVIEW AND MIDTERM EXAMINATION

6 HOURS

Lesson Plan 19	Review for Midterm Examination
Lesson Plan 20	MIDTERM EXAMINATION

9. SURVEYING COMPUTATIONS
COURSE OUTLINE

TRAVERSE SURVEYS

24 HOURS

Lesson Plan 21	Traversing Mathematically Closed Figures
Lesson Plan 22	Traversing Mathematically Closed Figures (continued)
Lesson Plan 23	Field Loop Traverses
Lesson Plan 24	Field Loop Traverses (continued)
Lesson Plan 25	Connecting Traverses
Lesson Plan 26	Deflection Angle Traverses
Lesson Plan 27	<u>FIELD CLASS:</u> Field Procedures for Traverse Surveys, Safety Procedures

REVIEW AND FINAL EXAMINATION

6 HOURS

Lesson Plan 28 Review for Final Examination

Lesson Plan 29 **FINAL EXAMINATION**

10. SURVEYING PROJECTS
COURSE OUTLINE

FIELD NOTE PREPARATION

12 HOURS

Lesson Plan 1 Field Note Preparation

Lesson Plan 2 Field Note Preparation

Lesson Plan 3 Field Note Preparation

Lesson Plan 4 Field Note Preparation

U.S. PUBLIC LAND SURVEYS

6 HOURS

Lesson Plan 5 Development of Public Land Surveys

Lesson Plan 6 Parallels, Meridians, Townships and Sections

PROPERTY SURVEYS

15 HOURS

Lesson Plan 7 Legal Descriptions and Research

Lesson Plan 8 Boundary Surveys

Lesson Plan 9 Total Job Research

Lesson Plan 10 FIELD CLASS:
Perform Property Survey, Safety Procedures

SUBDIVISION SURVEYS

9 HOURS

Lesson Plan 11 Construction Drawing

Lesson Plan 12 Subdivision Approval Process

Lesson Plan 13 Overview of Subdivision Map Act

TOPOGRAPHIC AND PHOTOGRAMMETRY SURVEYS

18 HOURS

Lesson Plan 14 Map Making and Items to Locate

Lesson Plan 15 Grid and Cross-Section Topo's, and Plotting Topo's

Lesson Plan 16 FIELD CLASS:
Topographic Survey

Lesson Plan 17 Overview of Photogrammetry

Lesson Plan 18 **VISIT TO PHOTOGRAMMETRY COMPANY**

REVIEW AND MIDTERM EXAMINATION

6 HOURS

Lesson Plan 19 Review for Midterm Examination

Lesson Plan 20 **MIDTERM EXAMINATION**

11. SURVEYING PROJECTS
COURSE OUTLINE

HEAVY CONSTRUCTION SURVEYS

6 HOURS

Lesson Plan 21 Construction Site Control and Recovery of Control and Structural Steel Buildings

Lesson Plan 22 Highways, Bridges, Railroads, Tunnels, Mines, Dams, Refineries, Power Plants, Hydrographic Surveys

ALTA SURVEYS; TOTAL STATIONS

9 HOURS

Lesson Plan 23 ALTA and Similar Surveys; Types of Total Station and Data Collector Surveys; Digital Mapping

Lesson Plan 24 FIELD CLASS:
Total Station Survey, Safety Procedures

PUBLIC RELATIONS; SCOPE OF PROFESSION; CHIEF OF PARTY PROGRAM **3 HOURS**

Lesson Plan 25 Relations with the Public and Clients, and Professional Liability; Professional Status, Ethics, Chief of Party Program

REVIEW AND FINAL EXAMINATION **6 HOURS**

Lesson Plan 26 Review for Final Examination

Lesson Plan 27 **FINAL EXAMINATION**

TOTAL HOURS **291**

**WORK PROCESS SCHEDULE
CHIEF OF PARTY
O*NET-SOC CODE: 17-3031.00 RAPIDS CODE: 0053**

Description: The Chief of Party is responsible for coordinating and supervising all survey tasks until finished. Chief of Party performs difficult technical and skilled work in leading an engineering survey party. Supervises all activities of an engineering survey party; personally uses a theodolite, EDM, transit or level on more difficult surveying work and supervises employees in the use of instruments in less exacting work; supervises the staking and grading of construction projects for roads, culverts, bridges, sewers or other improvements; researches property to be surveyed; surveys property to be acquired to determine metes and bounds descriptions; draws profiles and sketches and makes cost estimates for smaller construction projects.

CHIEF OF PARTY APPRENTICE

Completion of Surveyor Assistant Instrument work processes and	4000
Use and care of survey instruments	1000
Use and care of levels	500
Use and care of survey instruments and other special equipment	200
Notes and sketches	200
Calculations	250
Reductions	200
Conversions	200
Maps	250
Plans	250
Record keeping	250
Job analysis for efficient field procedures	440
First Aid	8
Safety measures	120
Public relations and client diplomacy; professional status and ethics	132
Total	8000

*Party Chief Requirement 1000

1000 of the 8000 hours must be worked at Party Chief classification.

**RELATED INSTRUCTION OUTLINE
CHIEF OF PARTY
O*NET-SOC CODE: 17-3031.00 RAPIDS CODE: 0053**

First Year

**1. PLANE SURVEYING & COORDINATE GEOMETRY
COURSE OUTLINE**

PRINCIPLES OF COORDINATE GEOMETRY

24 HOURS

Lesson Plan 1	Introduction to the Chief of Party Program; Review of Trigonometry and Right Triangles
Lesson Plan 2	Local Rectangular Coordinate Systems
Lesson Plan 3	Circular Curve Geometry
Lesson Plan 4	Coordinating Mathematically Closed Figures
Lesson Plan 5	Review and Adjustment of Field Traverses – Coordinate Adjustment
Lesson Plan 6	How to Locate Busts in Traverses
Lesson Plan 7	Oblique Triangle Formulas
Lesson Plan 8	Practice with Oblique Triangles; Review for the Midterm Examination

Lesson Plan 9 MIDTERM EXAMINATION

3 HOURS

SURVEY MEASURING SYSTEMS, RESEARCH AND NOTE KEEPING

24 HOURS

Lesson Plan 10	Historical and Contemporary Measuring Systems; How Techniques have Changed; Stadia Principles
Lesson Plan 11	Proper Methods of Horizontal and Angular Measurements and Note keeping
Lesson Plan 12	Differential Leveling Principles; Digital Level
Lesson Plan 13	Advanced Note keeping and Sketches
Lesson Plan 14	Control Research and Reconnaissance
Lesson Plan 15	Overview of the Basic Principles of GPS/RTK
Lesson Plan 16	Robotic and Other Modern Measuring and Recording Systems

Lesson Plan 17	Review for Final Examination	
Lesson Plan 18	FINAL EXAMINATION	3 HOURS

2. ADVANCED COORDINATE GEOMETRY
COURSE OUTLINE

ADVANCED COORDINATE GEOMETRY AND CURVE CALCULATIONS **24 HOURS**

Lesson Plan 1	Principles of Coordinate Intersection Problems	
Lesson Plan 2	Recognizing and Solving Coordinate Intersection Problems	
Lesson Plan 3	Omitted Measurement and Coordinate Intersection Problems	
Lesson Plan 4	Area Calculation Principles and Areas Involving Curves	
Lesson Plan 5	Principles of Three Point Resection Problems with Measuring and Calculating Techniques	
Lesson Plan 6	Simple, Compound, and Reverse Horizontal Curve Geometry and Field Staking Procedures	
Lesson Plan 7	Simple, Compound, and Reverse Horizontal Curve Geometry and Field Staking Procedures (continued)	
Lesson Plan 8	Review for Midterm Examination	
Lesson Plan 9	MIDTERM EXAMINATION	3 HOURS

COMPLEX FIELD PROBLEMS AND ACCURACY REQUIREMENTS **18 HOURS**

Lesson Plan 10	Simple and Compound Vertical Curve Geometry	
Lesson Plan 11	Advanced Horizontal (Circular) Curves	
Lesson Plan 12	Advanced Vertical Curves	
Lesson Plan 13	Advanced Vertical Curves and Field Staking Methods	
Lesson Plan 14	Accuracy and Precision Requirements	
Lesson Plan 15	Theory of Errors/Accuracy and Precision	

FIELD AND OFFICE CALCULATING TECHNIQUES **6 HOURS**

Lesson Plan 16 Office Calculating and Plotting Systems

Lesson Plan 17 Review for Final Examination

Lesson Plan 18 **FINAL EXAMINATION** **3 HOURS**

3. LAPTOP SURVEYING/AERIAL PHOTOGRAMMETRY
COURSE OUTLINE

LAPTOP SURVEYING **SATURDAY CLASSES** **24 HOURS**

Lesson Plan 1 Introduction to Laptop Surveying; System Configuration; Learning the Basics; Creating Objects

Lesson Plan 2 Labeling and Editing Points; Listing and Inversing Point Information

Lesson Plan 3 Create Sets; Working With Sets as Horizontal Alignments

Lesson Plan 4 Import/Export Files, Traverse and Side Shots, Traverse Report, Stakeout Report

Lesson Plan 5 **REVIEW AND MIDTERM EXAMINATION** **6 HOURS**

PHOTOGRAMMETRY **12 HOURS**

Lesson Plan 6 Aerial Photogrammetry – Reading and Interpreting Aerial Photos

Lesson Plan 7 Control Extension and Topographic Mapping by Photogrammetry

Lesson Plan 8 Ground Control for Aerial Surveys

Lesson Plan 9 Field Trip to Photogrammetry Company

TOPOGRAPHIC SURVEYING: ANALYSIS AND REVIEW **9 HOURS**

Lesson Plan 10 American Land Title Association (ALTA) and Extended Coverage Surveys

Lesson Plan 11 As-Built Surveys

Lesson Plan 12 Topo Surveying – Analysis and Review

Lesson Plan 13 **FINAL EXAMINATION** **3 HOURS**

4. PLAN READING AND SUBDIVISION SURVEYING
COURSE OUTLINE

INTRODUCTION TO PLAN READING **12 HOURS**

Lesson Plan 1	Reading Typical Survey and Improvement Plans
Lesson Plan 2	Using Tract Maps and other Record Maps
Lesson Plan 3	Drawings, Plans, and the "Fine Print"
Lesson Plan 4	Locating Errors on Drawing and Plans

GRADING PLANS FOR SUBDIVISION/CONSTRUCTION PROJECTS **12 HOURS**

Lesson Plan	Typical Subdivision and Other Grading Plans
Lesson Plan 6	From Preliminary Survey Control to "Rough-Graded" Project
Lesson Plan 7	From "Rough-Graded" to "Finish-Graded" Project
Lesson Plan 8	Buttresses and Other Specialized Grading Situations; Safe Working Procedures on a Grading Project

Lesson Plan 9 **MIDTERM EXAMINATION** **3 HOURS**

SUBDIVISION IMPROVEMENT PLANS **24 HOURS**

Lesson Plan 10	Survey and Improvement Plan Languages
Lesson Plan 11	Survey Control During Construction of Site Improvements
Lesson Plan 12	Sewer and Storm Drain Improvement
Lesson Plan 13	Sewer and Storm Drain Improvement (continued)
Lesson Plan 14	Street Improvement Plans
Lesson Plan 15	Utility Plans and Miscellaneous Site Improvement Plans
Lesson Plan 16	Survey Control After Construction of Site Improvements
Lesson Plan 17	Review for Final Examination

Lesson Plan 18 **FINAL EXAMINATION** **3 HOURS**

TOTAL **216 HOURS**

Second Year

**5. MAJOR PROJECT PLANS AND SURVEY LAYOUT
COURSE OUTLINE**

CONSTRUCTION PLAN READING, SURVEY CONTROL AND LAYOUT **12 HOURS**

Lesson Plan 1	Introduction to Construction Plans
Lesson Plan 2	Schedules, Legends, General Notes, and Specifications
Lesson Plan 3	Details
Lesson Plan 4	Elevator Dimensions

CASE STUDY OF MULTI-STORY BUILDING – STRUCTURAL **15 HOURS**

Lesson Plan 5	Columns-Layout for Second Floor/Ductile Frame
Lesson Plan 6	Plan Reading
Lesson Plan 7	Columns-Layout for Penthouse
Lesson Plan 8	Layout for Upper Floors, Roof, Core Area
Lesson Plan 9	Penthouse Plan

Lesson Plan 10 **MIDTERM EXAMINATION** **3 HOURS**

PLANS AND LAYOUT FOR OTHER MAJOR CONSTRUCTION PROJECTS **21 HOURS**

Lesson Plan 11	Freeway Ramps
Lesson Plan 12	Box Girder Bridges
Lesson Plan 13	Freeway Plan reading
Lesson Plan 14	Highways
Lesson Plan 15	Highways (continued)
Lesson Plan 16	Eastside Reservoir Project
Lesson Plan 17	Review for Final Examination
Lesson Plan 18	FINAL EXAMINATION

3 HOURS

6. CONTROL AND GEODETIC SURVEYING
COURSE OUTLINE

TRIANGULATION AND TRILATERATION

3 HOURS

Lesson Plan 1 Standards of Accuracy for Geodetic Control, Measuring and Adjusting Baselines and Angles, Calculating and Adjusting Triangulation Figures; Introduction of Least Squares Adjustment Procedure

STATE PLANE COORDINATE SYSTEM

30 HOURS

Lesson Plan 2 State Plane/Latitude and Longitude

Lesson Plan 3 State Plane/Convergence Angle

Lesson Plan 4 State Plane/Latitude and Longitude to Plane Coordinates

Lesson Plan 5 State Plane/Converting Plane Coordinates Latitude and Longitude

Lesson Plan 6 Geodetic Azimuth/Grid Azimuth and Second Term

Lesson Plan 7 Reduction of Ground Distance to Geodetic Distance/Corrections

Lesson Plan 8 Geodetic Distance to Grid Distance/Scale Factor

Lesson Plan 9 Grid Distance to Ground Distance

Lesson Plan 10 Traversing

Lesson Plan 11 Traversing From One Zone to Another

Lesson Plan 12 **MIDTERM EXAMINATION**

3 HOURS

ASTRONOMY FOR SURVEYORS

3 HOURS

Lesson Plan 13 The Celestial Sphere/Time and Longitude, Determining Latitude/True Meridian from Star and Sun Shots

MODERN POSITIONING SYSTEMS

6 HOURS

Lesson Plan 14 Basic Theory of GPS; Glossary; Mission Planning; Care and Operation of Equipment

Lesson Plan 15 FIELD CLASS:
Data Collection of GPS Observation and Computer Processing of GPS Observation Data

DREDGING AND HYDROGRAPHIC SURVEYS **6 HOURS**

Lesson Plan 16 Principles of Hydrographic Surveys and Dredging Surveys and Soundings/Datum Control, Electronic Locations, Interpreting Data and Required Accuracy

Lesson Plan 17 Review for Final Examination

Lesson Plan 18 **FINAL EXAMINATION** **3 HOURS**

7. U. S. PUBLIC LAND SURVEYS

U. S. PUBLIC LAND SURVEYS **24 HOURS**

Lesson Plan 1 Development of Public Land Surveys

Lesson Plan 2 Townships and Township Subdivisions

Lesson Plan 3 Monuments and Accessories

Lesson Plan 4 Subdivision of Sections

Lesson Plan 5 Restoration of Corners

Lesson Plan 6 Retracement of Original Surveys

Lesson Plan 7 Public Land Records for California (Job Research)

Lesson Plan 8 Glossary, review for Midterm Examination

Lesson Plan 9 **MIDTERM EXAMINATION** **3 HOURS**

PROPERTY SURVEYS **24 HOURS**

Lesson Plan 10 Systems of Property Description

Lesson Plan 11 Transfer of Real Property

Lesson Plan 12 Ownership and Land Location

Lesson Plan 13 Procedure for Surveying Sequential Conveyance

Lesson Plan 14 Simultaneous Conveyances

Lesson Plan 15 Priority of Conflicting Elements of a Survey

Lesson Plan 16 Principles of Riparian and Littoral Surveys, Reversion and Apportionment Rights

Lesson Plan 17 Review for Final Examination

