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INTRODUCTION

This job family standard (JFS) provides series definitions, titling instructions, and grading criteria for nonsupervisory technical positions in the Engineering and Architecture Group, 0800, for General Schedule (GS) and other “white collar” pay plans. In the General Schedule position classification system established under chapter 51 of title 5, United States Code, the positions addressed here would be one-grade interval positions.

This JFS is divided into three parts. Part I contains occupational information applicable to Federal work covered by the JFS without regard to pay plan or classification system. Part II provides the grading criteria for positions classified in accordance with GS grade definitions. Part III includes explanatory material about the development of this JFS.

The term “General Schedule” or “GS” denotes the major position classification system and pay structure for white collar work in the Federal government. Agencies no longer subject to chapter 51 have replaced the GS pay plan indicator with agency-unique pay plan indicators. For that reason, reference to General Schedule or GS has been omitted from much of this JFS.

Coverage

This job family standard covers the following occupational series:

Series		Series	
Engineering Technical	0802	Electronics Technical	0856
Construction Control Technical	0809	Marine Survey Technical	0873
Survey Technical	0817	Industrial Engineering Technical	0895

Modifications to or Cancellations of Other Existing Occupational Series and Standards

Issuance of this JFS renames, supersedes, or cancels occupational series and classification standards as described in the following table.

Previous Series or Guidance	Action Taken / How to Classify Work Previously Covered
Engineering Technician 0802	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in June 1969. • Renames this series, Engineering Technical, 0802.
Construction Control 0809	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in February 1969. • Renames this series, Construction Control Technical, 0809.
Surveying Technician 0817	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in October 1970. • Renames this series, Survey Technical, 0817.
Engineering Drafting 0818	<ul style="list-style-type: none"> • Cancels this series. • Cancels this classification standard, last revised in April 1971. • Classify work previously covered by this series to the Engineering Technical Series, 0802.
Electronics Technician 0856	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in August 1966. • Renames this series, Electronics Technical, 0856. • Cancels the application of the Department of Transportation (DOT) Position Classification Guide for Electronics Technician Positions, GS-0856, dated December 1972 and revised in 1984, to evaluate positions covered by the Electronics Technical Series, 0856.
Ship Surveying 0873	<ul style="list-style-type: none"> • Renames this series, Marine Survey Technical, 0873.
Industrial Engineering Technician 0895	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in April 1966. • Renames this series, Industrial Engineering Technical, 0895.

PART I – OCCUPATIONAL INFORMATION

Part I is intended for use by all agencies in evaluating technical positions in the Engineering and Architecture Group, 0800. It provides series definitions, titling instructions, and detailed occupational information for this job family.

General Series Determination Guidelines

Selection of the correct series for a position is an essential part of the entire human resources management process for a variety of reasons. For example, qualification requirements used in recruiting are based on the series of the position; career ladders are influenced by the series; and organizational structure is often designed with consideration of the series of assigned positions.

Determining the correct series for a position is usually apparent by reviewing the assigned duties and responsibilities and then comparing them to the series definitions and general occupational information the job family standard (JFS) provides. Generally, the series determination for a position is based on the primary work of the position, the highest level of work performed, and the paramount knowledge required to do the work of the position. Normally, it is fairly easy to make this decision. However, in other instances, determining the correct series may not be as obvious.

Use the following guidelines to determine the predominant series when the work of a position matches more than one job family or occupational group. Also, when the work of a position falls into more than one series within this job family, it may be difficult to determine which particular series predominates. Apply the guidelines below in the order listed to determine the correct series.

- **Paramount knowledge required.** Although there may be several different kinds of work in the position, most positions will have a paramount knowledge requirement. The paramount knowledge is the most important type of subject matter knowledge or experience required to do the work.
- **Reason for the position's existence.** The primary purpose of the position or management's intent in establishing the position is a positive indicator for determining the appropriate series.
- **Organizational mission and/or function.** Positions generally align with the mission and function of the organization to which they are assigned. The organization's function is often mirrored in the organizational title and may influence the appropriate series.
- **Recruitment source.** Supervisors and managers can help by identifying the occupational series providing the best qualified applicants to do the work. This is closely related to the paramount knowledge required.

Although the work of some positions may require applying practical engineering or related knowledge and skills, classification as technical positions in the Engineering and Architecture Group, 0800, may not be appropriate. The [Additional Classification Considerations](#) section of this JFS provides examples where the work may involve applying related knowledge and skills, but not to the extent it warrants classification to this job family.

Additional information may be found in [The Classifier's Handbook](#).

Distinguishing Between Technical and Trade, Craft, or Labor Work

Determining the appropriate occupational category is one of the first decisions to make when classifying a position. This decision is based on the position description or other official record of duties and responsibilities assigned to a position or group of positions. To fully understand the position it is important to consider such factors as the position's primary duty or responsibility, its primary purpose or reason for existence, relationship to other positions, the mission and responsibility of the organization in which it is located, and the essential, requisite qualifications required to do the work.

Technical Work Involves:

- developing and designing test and repair equipment, analyzing repair practices, or developing procedural instructions on methods and steps of equipment repairs;
- developing maintenance standards and procedures, testing and evaluating new or modified systems, or analyzing the compatibility of interlocking components and systems;
- planning and directing the installation of complex systems and associated facilities, particularly where there are problems of site selection and construction;
- designing and analyzing circuits, determining feasibility of these designs, evaluating equipment performance under varying environmental conditions, collecting data, or designing or modifying designs to achieve performance and cost objectives; and
- developing or evaluating new or modified systems or monitoring frequency emissions by licensed stations.

Trade, Craft, or Labor Work Involves:

- repairing systems and equipment to include detecting and diagnosing malfunctions, tearing down equipment, repairing or replacing parts or components, or aligning, calibrating and testing the modified or repaired equipment;
- performing preventive and corrective maintenance to keep equipment and systems in reliable condition;
- installing equipment in accordance with plans, specifications, and detailed instructions, or reinstalling repaired or modified systems;
- fabricating electronic equipment in accordance with plans, specifications, and instructions including constructing, assembling, arranging, mounting, or wiring electronic parts and components; and
- making measurements to diagnose malfunctions to ensure equipment operates within prescribed standards.

Additional information on distinguishing between technical and trade, craft, or labor work can be found in the [Introduction to the Electronic Equipment Installation and Maintenance Family, 2600.](#)

Distinguishing Between Technical and Professional Work

It is important to determine whether a position is comprised of technical or professional work. It is not always easy to differentiate between the two because some tasks are common to both. The developmental work of professional positions and the demanding work of high level technical positions are sometimes similar. Typical distinctions between technician and professional engineering and architecture work follow.

Technical Work Involves:

- using recurring methods, standardized procedures, and established processes for a specialized engineering field;
- applying knowledge acquired through practical experience and on-the-job activities in the recognized processes, standards, methods, and their corresponding engineering principles and results;
- understanding and applying predetermined procedures, methods, and standardized practices or approaches in a specialized field of engineering;
- carrying out tasks, methods, procedures, and computations based on oral instructions and/or precedents, guidelines, and standards;
- collecting, observing, testing, and recording factual engineering data within the oversight and management of professional employees;
- foreseeing the effects of procedural changes or appraising the validity of results on the basis of experience and practical reasoning; and
- staying abreast of existing and new practical methods and applications through on-the-job and classroom training.

Professional Work Involves:

- creating, exploring, evaluating, and sharing solutions for engineering or architectural problems, conditions, and issues;
- applying a range and depth of knowledge acquired specifically through an intensive learning regimen of the phenomena, theories, and assumptions of an engineering or architectural body of knowledge;
- understanding theories, concepts, and principles, and their relationships underlying the practices of engineering or architecture;
- identifying, analyzing, advising, consulting, and reporting on scientific, theoretical, and factual data, conditions, and problems;
- assessing, resolving, and predicting the relationships and interactions of data and findings under varying conditions;
- reasoning from existing knowledge and assumptions in a professional field to unexplored areas and phenomena; and
- staying abreast of and evaluating scientific subjects, analyses, and proposals in professional literature.

Official Titling Provisions

Title 5, United States Code, requires the Office of Personnel Management (OPM) to establish the authorized official position titles. These include a basic title (e.g., Industrial Engineering Technician) and may be appended with one or more prefixes and/or suffixes. Agencies must use the official position titles for human resources management, budget, and fiscal purposes. Instructions for assigning official position titles are provided in this section.

Supervisors and Leaders

- Add the prefix “Supervisory” to the basic title when the agency classifies the position as supervisory. If the position is covered by the General Schedule refer to the [General Schedule Supervisory Guide](#) for additional titling and grading information.
- Add the prefix “Lead” to the basic title when the agency classifies the position as leader. If the position is covered by the General Schedule refer to the [General Schedule Leader Grade Evaluation Guide](#) for additional titling and grading information.

Parenthetical Titles

In this JFS only one series, Engineering Technician, 0802, has a prescribed parenthetical title. For other series in this standard, agencies may supplement the titles authorized in this standard with agency-established parenthetical titles if necessary for recruitment or other human resources needs.

Organizational Titles

Organizational and functional titles do not replace, but rather complement, official position titles. Agencies may establish organizational and functional titles for internal administration, public convenience, program management, or similar purposes. Examples of organizational titles are Branch Chief and Division Chief. Examples of functional titles are Chief of Operations and Chief of Policy Development.

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INFORMATION BY SERIES IN NUMBER ORDER	
Engineering Technical, 0802	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
Construction Control Technical, 0809	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
Survey Technical, 0817	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
Electronics Technical, 0856	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
Marine Survey Technical, 0873	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
Industrial Engineering Technical, 0895	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information

Occupational Information by Series

ENGINEERING TECHNICAL, 0802		<u>Qualification Standard</u>																								
Series Definition	<p>This series covers technical positions supervising, leading, or performing work involving applying a practical knowledge of the:</p> <ul style="list-style-type: none"> • methods and techniques of engineering or architecture; and • construction, application, properties, operations, and limitations of engineering systems, processes, structures, machinery, devices, and materials. 																									
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Engineering Aid</i>.</p> <p>The basic title for other positions in this occupation is <i>Engineering Technician</i>. In addition to the basic title, the following parenthetical titles may be used:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%; vertical-align: top;">Aerospace</td> <td style="padding-left: 20px;">Work concerned with aerospace vehicles, systems, phenomena, and structures.</td> </tr> <tr> <td style="vertical-align: top;">Architecture</td> <td style="padding-left: 20px;">Work concerned with buildings or land areas and requiring practical knowledge of architecture or landscape architecture.</td> </tr> <tr> <td style="vertical-align: top;">Chemical</td> <td style="padding-left: 20px;">Work concerned with processes, plants, equipment, and methods for the production of chemical products or changes in the chemical composition or physical state of materials.</td> </tr> <tr> <td style="vertical-align: top;">Civil</td> <td style="padding-left: 20px;">Work concerned with buildings, structures, dams, soil mechanics, tunnels, highways, water resources, bridges, airports, railways, and other phases of civil engineering.</td> </tr> <tr> <td style="vertical-align: top;">Drafting</td> <td style="padding-left: 20px;">Work concerned with portraying engineering and architectural ideas and information through drawings. Drafting assignments require comprehension of the detailed characteristics of the item being designed and association with accepted design practices.</td> </tr> <tr> <td style="vertical-align: top;">Electrical</td> <td style="padding-left: 20px;">Work concerned with systems, plants, equipment, and materials for the generation, transmission, conversion, distribution, control, measurement, or utilization of electrical energy. Work involving the design of electronic installations is included when the work does not require knowledge of electronics to the extent required by the Electronics Technician Series, 0856.</td> </tr> <tr> <td style="vertical-align: top;">Materials</td> <td style="padding-left: 20px;">Work concerned with the properties, characteristics, and use of engineering materials.</td> </tr> <tr> <td style="vertical-align: top;">Mechanical</td> <td style="padding-left: 20px;">Work concerned with systems, plants, machines, equipment, and instruments for the generation, transmission, measurement, or utilization of heat or mechanical power. Included are steam and internal combustion power plants, automotive and ordnance equipment and components, heating and air conditioning, piping, machine tools, and instruments and controls.</td> </tr> <tr> <td style="vertical-align: top;">Mining</td> <td style="padding-left: 20px;">Work concerned with the discovery and extraction of solid fuels, ores, and minerals.</td> </tr> <tr> <td style="vertical-align: top;">Naval Architecture</td> <td style="padding-left: 20px;">Work concerned with the form, strength, stability, performance, and operational characteristics of ships.</td> </tr> <tr> <td style="vertical-align: top;">Nuclear</td> <td style="padding-left: 20px;">Work concerned with the design, installation, testing, and operation of nuclear reactors, nuclear power plants, and other nuclear systems.</td> </tr> <tr> <td style="vertical-align: top;">Petroleum</td> <td style="padding-left: 20px;">Work concerned with the discovery, development, production, and conservation of petroleum, natural gas, or helium.</td> </tr> </table>		Aerospace	Work concerned with aerospace vehicles, systems, phenomena, and structures.	Architecture	Work concerned with buildings or land areas and requiring practical knowledge of architecture or landscape architecture.	Chemical	Work concerned with processes, plants, equipment, and methods for the production of chemical products or changes in the chemical composition or physical state of materials.	Civil	Work concerned with buildings, structures, dams, soil mechanics, tunnels, highways, water resources, bridges, airports, railways, and other phases of civil engineering.	Drafting	Work concerned with portraying engineering and architectural ideas and information through drawings. Drafting assignments require comprehension of the detailed characteristics of the item being designed and association with accepted design practices.	Electrical	Work concerned with systems, plants, equipment, and materials for the generation, transmission, conversion, distribution, control, measurement, or utilization of electrical energy. 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ENGINEERING TECHNICAL, 0802 (continued)	
Occupational Information	<p>General Occupational Information</p> <p>Engineering technicians work in a variety of unique work situations, often aligned with professional engineering and architecture fields and each with a fairly distinct set of knowledge and skill requirements. The work involves functions such as research, development, design, evaluation, construction, inspection, production, application, standardization, testing, or operation of engineering facilities, structures, systems, processes, equipment, devices, or materials. Basic knowledge and skills are transferable from one specialization to another.</p> <p>The positions do not require professional knowledge and abilities for full performance and therefore do not require training equivalent in type and scope to that represented by completing a professional curriculum leading to a bachelor's degree in engineering or architecture.</p> <p><u>←BACK TO TABLE OF CONTENTS</u></p>

CONSTRUCTION CONTROL TECHNICAL, 0809		<u>Qualification Standard</u>
Series Definition	<p>This series covers technical positions supervising, leading, or performing work involving on-site inspection of construction or monitoring and control of construction operations. Positions in this occupation require applying:</p> <ul style="list-style-type: none"> • practical knowledge of engineering methods and techniques; • knowledge of construction practices, methods, techniques, costs, materials, and equipment; and • ability to read and interpret engineering and architectural plans and specifications. 	
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Construction Aid</i>.</p> <p>The basic titles for other positions in this occupation are <i>Construction Control Inspector</i> and <i>Construction Control Representative</i>.</p> <p><i>Construction Control Inspector</i> applies to positions involving primarily on-site inspection of construction for compliance with plans and specifications.</p> <p><i>Construction Control Representative</i> applies to positions involving monitoring and control of construction operations.</p>	
Occupational Information	<p>General Occupational Information</p> <p>Construction control inspector positions deal primarily with reviewing materials, work methods, and workmanship to ensure each part of the structure is built in accordance with the plans and specifications. They:</p> <ul style="list-style-type: none"> • review and become familiar with the construction plans and specifications; • inspect all electrical, mechanical, civil, and architectural materials and equipment delivered to the construction site to ensure they meet specifications; • observe work and work methods to ensure the structure is being built in accordance with the plans and acceptable work practices; • inspect work in progress and upon completion to ensure an acceptable level of workmanship; • interview contractor employees to ensure labor laws and regulations are observed; • observe worksite and work activity to ensure safety standards are maintained; and • maintain a daily log of the project, recording facts concerning work activity, workforce, equipment in use, inspection activities, accidents, visitors, weather conditions, and unusual happenings. <p>Construction control representative positions ensure adequate inspection and also control or monitor construction operations. They:</p> <ul style="list-style-type: none"> • review project plans and specifications prior to contract advertisement to determine practicability from a construction standpoint, whether physical obstructions or other construction difficulties have been anticipated, and whether materials specified are readily available; • attend pre-bid and pre-construction conferences to inform contractor of requirements concerning construction scheduling, progress reporting, safety measures, wage and hour law observance, labor relations, and payroll records; and • supervise site surveys, set stakes to mark pertinent features, and investigate foundation and borrow pits. <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

SURVEY TECHNICAL, 0817		<u>Qualification Standard</u>
Series Definition	<p>This series covers technical positions supervising, leading, or performing work involving the application of technical knowledge in surveying methods. This includes the use of computerized and electronic equipment and systems, and techniques to measure or determine distances, elevations, areas, angles, land boundaries, and other features of the earth's surface. Specifically included are topographic, hydrographic, geodetic, land, control, and construction surveying.</p>	
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Survey Aid</i>.</p> <p>The basic title for other positions in this occupation is <i>Survey Technician</i>.</p>	
Occupational Information	<p>General Occupational Information</p> <p>Survey technicians support a variety of programs and activities, such as:</p> <ul style="list-style-type: none"> • planning, designing, and constructing dams, roads, bridges, buildings, or facilities requiring related site, route, and location surveys, construction inspection surveying, etc.; • establishing reference points (e.g., triangulation stations, benchmarks, monuments) for surveying and mapping purposes; • collecting field data for use in compiling navigational charts and topographic maps; and • land surveying to establish or locate boundaries. <p>Survey technicians select known survey reference points and determine the precise location of important features in the survey area. They:</p> <ul style="list-style-type: none"> • research legal records and previous boundaries, and analyze the data to determine official land and water boundaries or boundary line locations; • record survey results, verify data accuracy, and prepare plots, maps, and reports; • write descriptions of land for deeds, leases, and other legal documents; and • measure construction and mineral sites. <p>Survey work requires the highly proficient operation of instruments and the application of techniques to obtain the required skill and accuracy. Many of the techniques and procedures used in surveys of various types are applied almost universally. Much surveying practice is standardized as this facilitates rigid control where it is needed. However, agencies and installations may develop other survey techniques and practices for use in specialized types of surveys. In some instances, procedures must be adapted in the field to get desired results under the encountered conditions, such as difficult terrain, weather, obstructed vision, time requirements, etc.</p> <p>Often surveying projects are carried out by teams comprised of instrument personnel and helpers and are managed by a land surveyor or a senior survey technician ("Chief-of-Party"), who plans the fieldwork. These survey teams measure distances, directions, and angles between points and point elevation, lines, and contours on, above, and below the earth's surface. They provide data relevant to the shape, contour, location, elevation, or dimension of land or land features.</p> <p>For many projects, survey technicians use the Global Positioning System (GPS), a satellite system that precisely locates points on the earth by using radio signals transmitted via satellite. To use this system, a survey technician places a satellite signal receiver (a small instrument mounted on a tripod) on a desired point. The receiver simultaneously collects information from several satellites to establish a precise position. The survey technician checks and verifies the results produced by new technology against previous surveys and resolves discrepancies.</p>	

(continued)

SURVEY TECHNICAL, 0817 (continued)	
Occupational Information (continued)	<p>The surveying instruments and procedures used in each survey are selected to attain a required level of accuracy and completeness. Instrument and procedure refinement and selection are directly dependent upon this requirement, which is usually defined in terms of “order of accuracy” of the survey. There are four orders of accuracy, ranging in decreasing stringency, from the first order to the fourth.</p> <p>The order of accuracy, which defines the general accuracy of the measurements made in a survey, is a factor in evaluating positions engaged in precise construction surveys and positions engaged in geodetic or other basic control surveys. The positions require specialized knowledge and skill to make precise measurements, or to attain the required first or second order of accuracy. For other types of surveys involving highly precise electronic instruments, the order of accuracy is of limited significance.</p> <p>←BACK TO TABLE OF CONTENTS</p>

ELECTRONICS TECHNICAL, 0856		<u>Qualification Standard</u>
Series Definition	<p>This series covers technical positions supervising, leading, or performing work involving applying:</p> <ul style="list-style-type: none"> • knowledge of the techniques and theories characteristic of electronics, such as a knowledge of basic electricity and electronic theory, algebra, and elementary physics; • knowledge of electronic equipment design, development, evaluation, testing, installation, and maintenance; and • knowledge of the capabilities, limitations, operations, design, characteristics, and functional use of a variety of types and models of electronic equipment and systems related to, but less than, a full professional knowledge of electronic engineering. 	
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Electronics Aid</i>.</p> <p>The basic title for other positions in this occupation is <i>Electronics Technician</i>.</p>	
Occupational Information	<p>General Occupational Information</p> <p>Electronic equipment may be used in the fields of communication, television, telemetry, radar, radio, sonar, medical equipment, computers, and many others. The fundamental electronic components of the systems and devices used in each field are the same.</p> <p>When technicians develop, test, or perform other work on an unfamiliar piece of electronic equipment they apply their knowledge of electronic theory, circuit design, and the operating characteristics of more familiar equipment. They refer to diagrams, troubleshooting procedures, operating guides, and technical literature; seek information from other technicians and from engineers; and may take manufacturers' training courses to become more familiar with the equipment. This ability to apply general knowledge of electronics and to transfer experience and knowledge from one kind of equipment to another characterizes electronics technicians.</p> <p>Electronic equipment may work perfectly in the laboratory or under test conditions; however, external factors, such as interconnection with other devices, geographical and climatic conditions, and interference from other electronic equipment, may have an unforeseen effect on its functioning. As a result, electronics technicians develop knowledge about of how external forces affect the functioning of electronic devices and what methods may have been used successfully to correct such problems in similar circumstances.</p> <p>Electronics technicians assist in many work situations including:</p> <ul style="list-style-type: none"> • <i>Maintenance.</i> Developing maintenance standards and procedures for use by others. Analyzing repair practices and developing procedural instructions for use by others on methods and steps to repair equipment. • <i>Installation.</i> Planning and directing the installation of complex systems and associated facilities, particularly where there are site selection and construction problems, dealings with contractors and public utilities, and the possible need to modify equipment for novel site characteristics. • <i>Fabrication.</i> Designing and analyzing circuits, determining design feasibility, evaluating equipment performance under varying environmental conditions, and collecting performance data. Designing or modifying designs to achieve performance and cost objectives. Evaluating the adequacy of equipment for such purposes as repair, calibration, and testing. • <i>Testing and Evaluation/Research and Development.</i> Developing or evaluating new or modified electronic systems. Completing testing, evaluating data, and determining acceptability of equipment modifications, validity, test procedures and data, or legality of operation. Technicians support professional engineers in performing experiments, research, and developmental activities requiring an in-depth knowledge of technical engineering methods, applications, practices, and principles to work on concepts, prototypes, and experimental projects that are without precedent and support state-of-the-art research. 	

(continued)

Electronics Technical, 0856 (continued)	
Occupational Information (continued)	<ul style="list-style-type: none"> • <i>Sustainment.</i> Developing, performing, evaluating, or modifying calibration and test equipment, systems, and procedures. Reporting, analyzing, and archiving test data. Performing complex calculations and manipulations of test data to improve performance of systems, instrumentation, measurement standards, techniques, and procedures. • <i>Troubleshooting.</i> Analyzing and diagnosing faults in the operational configuration of electronic systems and equipment. Interpreting circuit wiring, logic cable diagrams, drawings, specifications, and schematics of complete systems and equipment to understand the function and interconnections of the various assemblies and troubleshoot the system. <p>←BACK TO TABLE OF CONTENTS</p>

MARINE SURVEY TECHNICAL, 0873		<u>Qualification Standard</u>
Series Definition	<p>This series covers technical positions supervising, leading, or performing work involving surveying Government-owned and/or operated vessels, or privately-owned and operated merchant vessels, to determine their condition and the extent of work necessary for the vessels and their components to meet specified requirements. The work requires applying a practical knowledge of:</p> <ul style="list-style-type: none"> • preparing specifications, including estimates of labor and material costs, to cover work determined to be necessary as a result of surveys; and • inspecting and accepting the work accomplished to place the vessel in the condition specified. 	
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Marine Survey Aid</i>.</p> <p>The basic title for other positions in this series is <i>Marine Surveyor</i>.</p>	
Occupational Information	<p>General Occupational Information</p> <p>A marine surveyor:</p> <ul style="list-style-type: none"> • surveys and inspects vessels to classify, appraise, and determine general conditions and fitness for operation; • inspects vessels to ensure vessels and components meet crew and passenger safety regulations; • assesses and approves safety reports and plans; • determines the extent of damage sustained and type and cost of repairs and reconditioning required; • inspects and accepts work accomplished to place the vessel in the specified condition; and • prepares a variety of detailed reports. <p>Marine surveyors ensure compliance with Government maritime classifications, professional society guidelines, and international maritime regulations.</p> <p>Surveys are conducted for a variety of reasons, and the procedures employed vary depending on the intent of the survey. The most common are:</p> <ul style="list-style-type: none"> • <i>Pre-purchase or acquisition surveys</i>. These are the most comprehensive inspections, and are to determine condition and overall vessel operation. This includes: <ul style="list-style-type: none"> – structural integrity and cosmetic appearance; – navigational, electrical, propulsion, and fuel systems; – electronics; – other machinery and overall maintenance; and – frequently includes an out-of-water inspection and a sea trial. • <i>Condition and value or insurance surveys</i>. These in-depth inspections are usually performed to determine whether the vessel is an acceptable risk. These surveys focus on structural integrity and safety for the vessel’s intended usage and generally include a determination of the vessel’s fair market value. • <i>Appraisal inspections</i>. These inspections are performed to gather sufficient information to justify or determine the fair market value of a vessel and are normally needed for financial or legal reasons. • <i>Damage inspections</i>. These inspections are performed to assess the extent of damage, recommend repairs, estimate repair cost, and if requested, determine possible cause. 	

INDUSTRIAL ENGINEERING TECHNICAL, 0895		<u>Qualification Standard</u>
Series Definition	<p>This series covers technical positions supervising, leading, or performing technical work related to industrial engineering. Industrial engineering technicians plan, design, analyze, improve, and install work systems comprised of employees, materials, and equipment, for use in producing products, rendering services, repairing equipment, or moving and storing supplies and equipment. The work typically involves studies of engineered time standards, methods engineering, layout designs of work centers, control systems, materials handling, or manpower utilization. The work requires knowledge of, and skill in applying, the principles and techniques of industrial engineering and practical knowledge of pertinent industrial and related work processes, facilities, methods, and equipment.</p>	
Titling	<p>The basic title for positions under the General Schedule at grade 3 and below is <i>Industrial Engineering Aid</i>.</p> <p>The basic title for other positions in this series is <i>Industrial Engineering Technician</i>.</p>	
Occupational Information	<p>General Occupational Information</p> <p>Industrial engineering technicians advise management in the areas of:</p> <ul style="list-style-type: none"> • planning and organizing – effective organizations, standards, methods, systems, procedures, work flow, materials handling, and cost and control systems; • facilities layout – arranging machines, equipment, processes, and service areas into efficient and economical operating systems; • plant design – designing new buildings or altering existing buildings to provide for new or improved processes and functions; • industrial production planning – evaluating requirements for items to be produced, advising on production capability of contractors and Government-owned facilities, and production planning, to include systems, machinery, equipment, products, work methods, procedures, and standards; or • industrial standards – evaluating systems for reliability based on statistical control charts, acceptance sampling, and process capability analysis. <p>Industrial engineering programs are found primarily in industrial establishments, such as shipyards, ordnance plants, arsenals, and aircraft overhaul and repair facilities. Programs of this type are also found in supply depots, research and development centers, and public works organizations.</p> <p>Industrial engineering involves applying scientific methods in systematic studies of the organization and the accomplishment and improvement of work efforts. Studies typically involve planning, fact-finding, analyzing and evaluating data, reaching conclusions, preparing recommendations, gaining acceptance, and installing changes. The techniques applied are based largely on the mathematical, statistical, and engineering concepts of contemporary industrial management. These studies determine more economical and efficient ways to produce products or render services. Effective utilization of available resources is a primary objective.</p> <p>Work assignments of industrial engineering technicians may range from simple data collection in a limited phase of a study to responsibility for a major phase of an overall study, such as preproduction development of work methods for the manufacturing of a prototype model. More typical are assignments in which the technician specializes in one or more phases of industrial engineering work, such as establishing engineered time standards, conducting method improvement studies, or designing work center layouts.</p> <p>A technician engaged in establishing <i>engineered time standards</i> determines the time required by a qualified worker to accomplish a given task or operation, in accordance with specified methods, when working at a normal pace, using the allowed amount of personal time, and without lost time. In undertaking such a study, the technician determines the techniques to be used to gather data and set the standard. The assignment determines essential elements in the work process and assigns time values.</p>	

(continued)

INDUSTRIAL ENGINEERING TECHNICAL, 0895 (continued)	
Occupational Information (continued)	<p>A technician engaged in <i>methods improvement</i> or <i>methods engineering</i> analyzes each element in the work process to eliminate unnecessary motions and determine the most efficient and economical method of accomplishing a given task or operation. The technician engaged in such work studies the current work processes and pertinent data and may use many time study techniques. The technician reviews or prepares layout drawings and process charts.</p> <p>A technician engaged in <i>layout studies</i> builds the work center layout around standardized work methods and the comfort and safety of the operator who will use those work methods. Implementing new methods often requires altering and redesigning equipment to facilitate easy movement and to encourage use of correct methods.</p> <p>Regardless of the functional activity, industrial engineering technicians characteristically prepare comprehensive written reports containing their recommendations and supporting data. They participate in marketing their ideas for change to management. Even those who specialize in a single phase of industrial engineering are systems-oriented. They plan, design, improve, analyze, and install integrated systems of personnel, materials, and equipment. The various parts combine to create an integrated work system.</p> <p>⇐BACK TO TABLE OF CONTENTS</p>

Impact of Automation

Automation and computer technologies affect the way work is accomplished. Technicians use computers and computer assisted equipment to perform a wide variety of tasks. Positions in the technical engineering field use specialized computer devices, such as Automated Test Equipment (ATE), the Global Positioning System (GPS), Geographic Imaging System (GIS), as well as Computer Aided Drafting and Design (CADD). They interface computer controlled machinery with equipment. The technicians use computers to initiate and track multiple projects; research and obtain up-to-date data; and generate drawings, reports, and proposals to accomplish work. Data are entered, stored, and retrieved in multiple formats. Technicians use the Internet to search for information pertaining to assignments.

Although employees in this group use computers to perform basic work processes, knowledge of the rules and processes to perform the work remains the paramount subject matter knowledge required. The kind of automation tools involved and the skill required to use them, generally replace or supplement work methods and techniques previously performed through manual or machine-enhanced processes. These positions may require knowledge of the applications of information technology (IT) to the assignment area and skill in the use of IT software and hardware systems, but the positions are not directly involved in developing, delivering, or supporting IT systems, applications, and services. In many cases, an employee with advanced knowledge and skill in the use of IT systems may be regarded as the IT “expert” in the immediate organization and relied upon by other employees for limited technical advice and assistance in applying IT systems to the assignment area. Although computers are used to facilitate work within this job family, the use of automation does not change the primary purpose of the work. Proper classification of positions within this and other technical occupations is based on the relevant knowledge and skills required to perform the primary duties of the position – in this instance, those duties related to engineering projects, facilities, structures, systems, processes, equipment, devices, or methods.

Additional Occupational Considerations

Some positions may include technical work requiring knowledge and skills typically associated with the Engineering and Architecture Group, 0800T. In some cases, a closer look at the work may reveal classification to a series in this job family may not always be appropriate. The [General Series Determination Guidelines](#) section of this JFS offers guidance on selecting the most appropriate series.

The following table provides examples of work similar to that performed in the 0800T job family, but not to the extent that the paramount knowledge required, the reason for the position’s existence, the mission and/or function of the organization, and the recruitment source for the best qualified candidates would warrant classification to a series in this JFS.

If Work Involves...	See This Standard or Series Definition:
Clerical and technical work in support of management operations including planning, coordinating, or evaluating the logistical actions required to support a specified program or mission with little or no need for knowledge of engineering principles and techniques.	0344, Management and Program Clerical and Assistance
Technical work in the methods and techniques of soil, water, and environmental conservation as related to agricultural operations and land use measures.	0458, Soil Conservation Technician
Professional work in: <ul style="list-style-type: none"> • applying the art and science of architecture; and/or • applying engineering theories, concepts, principles, standards, and methods. 	Appropriate professional series within the 0800, Engineering and Architecture Group
Applying practical knowledge of architectural design and construction practices in examining plans and specifications for standards compliance.	0828, Construction Analyst
Applying artistic ability and using conventional art media in the layout and execution of life-like illustrations or realistic representations.	1020, Illustrating
Drafting charts, diagrams, floor plans, office forms, and other graphic depictions of statistical, administrative, or related data rather than of engineering or architectural data.	1021, Office Drafting
Inspecting the construction, assembly, modification, conversion, overhaul, or repair of vessels, or inspection involved in the procurement of vessels, chiefly to assure compliance with contracts, plans, and specifications.	1101, General Business and Industry
Reviewing and controlling construction contracts primarily to protect the Government from a business, financial, or legal standpoint rather than the technical aspects of construction.	1102, Contracting
Planning, estimating, scheduling, and expediting the combined use of labor, machines, and materials in specific manufacturing operations employing mechanical or automated production systems and methods.	1152, Production Control

(continued)

If Work Involves...	See This Standard or Series Definition:
<p>Technical work in applying practical knowledge of the methods and techniques of one or more areas of physical science (e.g., chemistry, oceanography, hydrology, physics).</p>	<p><i>1311, Physical Science Technician</i> or other appropriate series within the <u>JFS for Technical Work in the Physical Sciences Group, 1300</u></p>
<p>Technical work in compiling, drafting, and editing maps and charts or representing geographic or navigational information.</p>	<p><i>1371, Cartographic Technician</i> or other appropriate series within the <u>JFS for Technical Work in the Physical Sciences Group, 1300</u></p>
<p>Professional work in applying the principles and techniques of geodesy to determine the size and shape of the earth and its gravitational field.</p>	<p><i>1372, Geodesy</i> or other appropriate series within the <u>JFS for Professional Work in the Physical Sciences Group, 1300</u></p>
<p>Professional work in establishing, investigating, and reestablishing land and property boundaries and preparing plats and legal descriptions for tracts of land.</p>	<p><i>1373, Land Surveying</i> or other appropriate series within the <u>JFS for Professional Work in the Physical Sciences Group, 1300</u></p>
<p>Reducing, computing, compiling, and presenting quantitative data requiring the use of mathematical techniques in connection with engineering work.</p>	<p><u>1521, Mathematics Technician</u></p>
<p>Operating and maintaining Federal buildings, grounds, and other facilities; or collecting, analyzing, interpreting, and developing specialized information about equipment and equipment maintenance programs and techniques.</p>	<p><i>1640, Facility Operations Services</i> or other appropriate series within the <u>JFS for Administrative Work in the Equipment, Facilities, and Services Group, 1600</u></p>
<p>Advising on, or performing, administrative or technical work concerned with the quality assurance or inspection of materials, facilities, and processes.</p>	<p>Appropriate series within the <u>Quality Assurance, Inspection, and Grading Group, 1900</u></p>
<p>Applying analytical processes to planning, designing, and implementing information systems to meet customer or organizational requirements.</p>	<p><u>JFS for Administrative Work in the Information Technology Group, 2200</u></p>

(continued)

If Work Involves...	See This Standard or Series Definition:
Federal Wage System knowledge of maintaining, repairing, calibrating, and certifying electronic test, measurement, and reference equipment used for precise measurement of a variety of electrical and electronic values, quantities, and relationships, such as voltage, resistance, capacitance, frequency, and inductance.	<u>2602, Electronic Measurement Equipment Mechanic</u>
Federal Wage System knowledge of assembling, fabricating, overhauling, installing, maintaining, and repairing various fixed, semi-fixed, ground, airborne, and marine electronic equipment.	<u>2604, Electronics Mechanic</u>
Federal Wage System knowledge of repairing, troubleshooting, calibrating, and testing of electronic digital computer systems and their components and peripheral devices when used for scientific engineering or administrative computation or recordkeeping; includes repairing and maintaining computer subsystems and/or components.	<u>2608, Electronic Digital Computer Mechanic</u>
Federal Wage System knowledge of rebuilding, overhauling, installing, troubleshooting, repairing, modifying, calibrating, aligning, and maintaining integrated systems (i.e., where the output of a number of sensor subsystems is integrated in a logic subsystem and the resultant is used to modify the operation of a total system).	<u>2610, Electronic Integrated Systems Mechanic</u>
Federal Wage System knowledge of repairing and calibrating a variety of instruments containing electric, mechanical, pneumatic, hydraulic, and/or electronic components.	<u>3359, Instrument Mechanic</u>
Federal Wage System knowledge of setting up, operating, and adjusting nondestructive test equipment, and evaluating or interpreting test readings or results.	<u>3705, Nondestructive Testing</u>
Federal Wage System knowledge of installing, maintaining, overhauling, repairing, and testing a variety of medical and dental equipment when such work requires a supplemental knowledge of basic human physiology.	<u>4805, Medical Equipment Repairing</u>

Crosswalk to the Standard Occupational Classification

The Office of Management and Budget requires all Federal agencies to use the Standard Occupational Classification (SOC) system for statistical data reporting purposes. Bureau of Labor Statistics (BLS) uses SOC for the National Compensation Survey and other statistical reporting. OPM and other Federal agencies maintain a “crosswalk” between OPM authorized occupational series and the SOC codes to serve this need. These SOC codes and this requirement have no effect on the administration of any Federal human resources management system. The information in this table is for information only and has no direct impact on classifying positions covered by this job family standard. The SOC codes shown here generally apply only to nonsupervisory positions in these occupations. As changes occur to the SOC codes, OPM will update this information. More information about SOC is available at <http://stats.bls.gov/soc>.

Federal Occupational Series and Position Titles and Their Related Standard Occupational Classification System Codes

Occupational Series	Standard Occupational Classification Code Based on Occupational Series	Position Title	Standard Occupational Classification Code Based on Position Title
Engineering Technical, 0802	17-3020	Engineering Technicians, except Drafters	17-3020 Engineering Technicians, except Drafters
		Engineering Technician (Aerospace)	17-3021 Aerospace Engineering and Operations Technicians
		Engineering Technician (Architecture)	17-3029 Engineering Technicians, except Drafters, All Other
		Engineering Technician (Chemical)	17-3029 Engineering Technicians Except Drafters, All Other
		Engineering Technician (Civil)	17-3022 Civil Engineering Technicians
		Engineering Technician (Drafting)	17-3019 Drafters, All Other
		Engineering Technician (Electrical)	17-3023 Electrical and Electronic Engineering Technicians
		Engineering Technician (Materials)	17-3029 Engineering Technicians Except Drafters, All Other

(continued)

Crosswalk to the Standard Occupational Classification (continued)					
Occupational Series	Standard Occupational Classification Code Based on Occupational Series		Position Title	Standard Occupational Classification Code Based on Position Title	
			Engineering Technician (Mechanical)	17-3027	Mechanical Engineering Technicians
			Engineering Technician (Mining)	17-3029	Engineering Technicians Except Drafters, All Other
			Engineering Technician (Naval Architecture)	17-3029	Engineering Technicians Except Drafters, All Other
			Engineering Technician (Nuclear)	17-3029	Engineering Technicians Except Drafters, All Other
			Engineering Technician (Petroleum)	17-3029	Engineering Technicians Except Drafters, All Other
Construction Control Technical, 0809	47-4011	Construction and Building Inspectors	Construction Control Technician	47-4011	Construction and Building Inspectors
Survey Technical, 0817	17-3031	Surveying and Mapping Technicians	Survey Technician	17-3031	Surveying and Mapping Technicians
Electronics Technical, 0856	17-3023	Electrical and Electronic Engineering Technicians	Electronics Technician	17-3023	Electrical and Electronic Engineering Technicians
Marine Survey Technical, 0873	53-6051	Transportation Inspectors	Marine Surveyor	53-6051	Transportation Inspectors
Industrial Engineering Technical, 0895	17-3026	Industrial Engineering Technicians	Industrial Engineering Technician	17-3026	Industrial Engineering Technicians

PART II – GRADING INFORMATION

Part II provides grading information for use in determining the appropriate grade of nonsupervisory one-grade interval technical positions in the Engineering and Architecture Group, 0800. These grading criteria are applicable to General Schedule positions classified under chapter 51 of title 5, United States Code. They may also be used as appropriate to determine work levels for other Federal position classification systems. You will find more complete instructions for evaluating positions in the following OPM publications: [Introduction to the Position Classification Standards](#) and [The Classifier’s Handbook](#).

How to Use This Grading Information

Evaluate positions on a factor-by-factor basis using the factor level descriptions (FLDs) provided in this JFS. Compare each factor in the position description to the appropriate FLDs and illustrations. If the factor information in the position description fully matches an FLD for the series and specialty, you may assign the level without reviewing the illustrations. FLDs are progressive or cumulative in nature. For example, each FLD for Factor 1 – Knowledge Required by the Position encompasses the knowledge and skills identified at the previous level. Use only designated point values.

The FLDs in this JFS cover nonsupervisory positions at grades 2 through 12. Evaluate supervisory and leader positions by applying the appropriate [functional guide](#).

Use the occupation and specialty-specific [factor illustrations](#) following the FLDs as a frame of reference for applying factor level concepts. Do not rely solely on the illustrations in evaluating positions because they reflect a limited range of actual work examples. The level of work described in some illustrations may be higher than the threshold for a particular factor level. If the factor information in the position description fails to fully match a relevant illustration, but does fully match the FLD, you may still assign the level.

For each factor, record the factor level used, the points assigned, and relevant comments on the [Position Evaluation Summary Worksheet](#). Convert the total points to a grade using the Grade Conversion Table and record the grade in the Summary section of the Worksheet. The shaded portions of the table reflect the most commonly found grades in this job family.

GRADE CONVERSION TABLE

Point Range	GS Grade
190-250	1
255-450	2
455-650	3
655-850	4
855-1100	5
1105-1350	6
1355-1600	7
1605-1850	8
1855-2100	9
2105-2350	10
2355-2750	11
2755-3150	12
3155-3600	13
3605-4050	14
4055-4480	15

Position Evaluation Summary Worksheet

Organization _____

Position # _____

Evaluation Factors	Factor Level Used (FL#, etc.)	Points Assigned	Comments
1. Knowledge Required by the Position			
2. Supervisory Controls			
3. Guidelines			
4. Complexity			
5. Scope and Effect			
6/7. Personal Contacts and Purpose of Contacts			
8. Physical Demands			
9. Work Environment			
S U M M A R Y	Total Points		
	Grade Conversion		

Additional Remarks:

Title, Series, and Grade Assigned:

Prepared by: _____ Date: _____

Agencies may copy for local use.

Factor Level Descriptions (FLDs)

FACTOR 1 – KNOWLEDGE REQUIRED BY THE POSITION

Factor 1 measures the nature and extent of information or facts an employee must understand to do acceptable work (e.g., steps, procedures, practices, rules, policies, theories, principles, and concepts) and the nature and extent of the skills necessary to apply that knowledge. You should only select a factor level under this factor when the knowledge described is required and applied.

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 1-2		200 Points												
Series	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Engineering Technical 0802</td> <td style="width: 10%; text-align: center;"><u>Illustration(s)</u></td> <td style="width: 30%;">Electronics Technical 0856</td> <td style="width: 10%; text-align: center;"><u>Illustration(s)</u></td> </tr> <tr> <td>Construction Control Technical 0809</td> <td></td> <td>Marine Survey Technical 0873</td> <td></td> </tr> <tr> <td>Survey Technical 0817</td> <td style="text-align: center;"><u>Illustration(s)</u></td> <td>Industrial Engineering Technical 0895</td> <td></td> </tr> </table>	Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>	Construction Control Technical 0809		Marine Survey Technical 0873		Survey Technical 0817	<u>Illustration(s)</u>	Industrial Engineering Technical 0895		
Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>											
Construction Control Technical 0809		Marine Survey Technical 0873												
Survey Technical 0817	<u>Illustration(s)</u>	Industrial Engineering Technical 0895												
FLD	<p>Knowledge of, and skill in applying, basic or commonly used rules, procedures, or operations acquired through classroom or on-the-job training in the field sufficient to:</p> <ul style="list-style-type: none"> use simple hand instruments, such as levels and compasses; draw simple curves and lines, make tracings, or take measurements; take test readings and record findings; perform basic mathematics using standard formulas; conduct basic field observations and obtain, identify, handle, and store material samples; and assist higher-graded technicians by preparing graphs, charts, diagrams, and visual presentations. 													

Level 1-3		350 Points												
Series	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Engineering Technical 0802</td> <td style="width: 10%; text-align: center;"><u>Illustration(s)</u></td> <td style="width: 30%;">Electronics Technical 0856</td> <td style="width: 10%; text-align: center;"><u>Illustration(s)</u></td> </tr> <tr> <td>Construction Control Technical 0809</td> <td style="text-align: center;"><u>Illustration(s)</u></td> <td>Marine Survey Technical 0873</td> <td></td> </tr> <tr> <td>Survey Technical 0817</td> <td style="text-align: center;"><u>Illustration(s)</u></td> <td>Industrial Engineering Technical 0895</td> <td style="text-align: center;"><u>Illustration(s)</u></td> </tr> </table>	Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>	Construction Control Technical 0809	<u>Illustration(s)</u>	Marine Survey Technical 0873		Survey Technical 0817	<u>Illustration(s)</u>	Industrial Engineering Technical 0895	<u>Illustration(s)</u>	
Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>											
Construction Control Technical 0809	<u>Illustration(s)</u>	Marine Survey Technical 0873												
Survey Technical 0817	<u>Illustration(s)</u>	Industrial Engineering Technical 0895	<u>Illustration(s)</u>											
FLD	<p>Knowledge of, and skill in applying, standardized rules, procedures, or operations requiring considerable training and experience in methods and practices of the field sufficient to:</p> <ul style="list-style-type: none"> operate and make operational adjustments to a variety of instruments and equipment; extract data and measurements from a variety of prescribed but non-standardized sources; recognize and resolve errors that are readily apparent but require a limited knowledge of the subject matter; process data according to well-defined methods and established formulas using mathematics, elementary algebra and geometry, and standard formulas; prepare notes for descriptions and revisions, selecting standard abbreviations and legends common to the field or specialty; prepare information by several graphical means; keep appropriate records; and assist higher-graded technicians and engineers who work in a variety of engineering specializations, with a variety of equipment, or laboratory tests having various complexity levels. 													

Level 1-4						550 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817	<u>Illustration(s)</u>	Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	<p>Practical knowledge of, and skill in applying, an extensive body of standard procedures or operations requiring extended training or experience in technical engineering methods and practices within the area of specialization sufficient to:</p> <ul style="list-style-type: none"> • select the most efficient methods and procedures; • carry out standard procedures based on assignments; • use, adapt, or adjust equipment for optimum operation; • interpret plans and specifications; • apply and use data with consideration of the source characteristics; • inspect and test a variety of equipment and materials; • extract data from a variety of sources; • complete very exact measurements using standard formulas; • determine results not susceptible to precise, quantitative measures but instead requiring subjective determinations; • recognize and report errors, inconsistencies, and other deficiencies in technical data; • select the method for presenting data for internal use to include such forms as drawings, models, or tables; • keep records and prepare reports; and • review findings and make recommendations to colleagues and supervisors. 					

Level 1-5						750 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817		Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	<p>Practical knowledge of, and skill in applying, standardized rules or operations requiring substantial training or experience in methods and practices sufficient to:</p> <ul style="list-style-type: none"> • perform limited projects involving specialized or complicated procedures; • apply a wide variety of test and inspection techniques to various engineering aspects to make on-site determinations; • interpret drawings, plans, and specifications; • identify and correct deficiencies; • resolve operational problems not fully covered by precedents; • ensure appropriate interaction between components; • recommend improved procedures; • modify parts, instruments, and equipment; • employ a variety of complex precision instruments, gauges, and methods; • perform work on critical units or multiple subunits of a system or device; • take actions or make recommendations based on preliminary data interpretation or analysis; • prepare and present inspection and testing reports and documentation requiring a high degree of precision and using a variety of projection techniques to portray unusual or complex designs; • develop and initiate changes in prescribed procedures to expedite corrective action, and provide continuous operation when required; and • work primarily with subsystems that are notably complex by reason of miniature size, density of circuitry, lack of available documentation, etc. 					

Level 1-6						950 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817		Industrial Engineering Technical	0895	
FLD	<p>Practical knowledge of a wide range of technical engineering methods, principles, requirements, work techniques, and practices of an area of specialization, and skill in applying standardized, analytical, and evaluative methods and techniques sufficient to:</p> <ul style="list-style-type: none"> • advise on and/or resolve difficult but well-precedented, factual, procedural, and/or recurring issues; • make informed decisions on problems and issues; • analyze segments of broader issues or problems (e.g., the impact of a change in one area on the entire system); • perform installation, maintenance, operation, and testing duties; • employ unique and specially designed precision instruments; • maintain one-of-a-kind equipment, custom equipment, developmental equipment, or equipment which is continually being modified and adapted and does not usually have adequate documentation; and • complete moderately difficult and complex survey work. 					

Level 1-7		1250 Points		
Series	Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>
	Construction Control Technical 0809		Marine Survey Technical 0873	<u>Illustration(s)</u>
	Survey Technical 0817		Industrial Engineering Technical 0895	<u>Illustration(s)</u>
FLD	A comprehensive, intensive, and practical knowledge of, and extensive experience and skill in applying:			
	<ul style="list-style-type: none"> • a wide range of concepts, practices, regulations, policies, and precedents; • analytical and diagnostic techniques; • qualitative and quantitative techniques; • techniques for developing new or modified work methods, approaches, or procedures; and • related emerging practices and methods <p>sufficient to:</p> <ul style="list-style-type: none"> • provide comprehensive management advisory and technical services on substantive functions and practices; • develop innovative methods, approaches, or procedures; • identify, evaluate, and recommend appropriate solutions to resolve complex interrelated problems and issues; and • formulate and present findings, briefings, project papers, status reports, and correspondence to foster understanding and acceptance of findings and recommendations. 			

FACTOR 2 – SUPERVISORY CONTROLS

This factor covers the nature and extent of direct or indirect controls exercised by the supervisor or another individual over the work performed, the employee’s responsibility, and the review of completed work. The controls apply to both how supervisors assign and review work. The supervisor determines what information the employee needs to perform the assignments (e.g., instructions, priorities, deadlines, objectives, and boundaries). The employee’s responsibility depends on the extent to which the supervisor expects the employee to develop the sequence and timing of the various aspects of the work, to modify or recommend modifying instructions, and to participate in establishing priorities and defining objectives. The primary components of this factor are: **How Work Is Assigned, Employee Responsibility, and How Work Is Reviewed.**

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 2-1		25 Points
FLD	<p>How Work Is Assigned – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • instructs the employee on what to do, the methods to use, what to look for, and what to bring to the attention of the supervisor or other designated employee; and • provides detailed and specific instructions for developmental tasks and tasks involving the use of unfamiliar formats, methods, and procedures. <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • performs work as instructed; • consults with the supervisor or designated employee when clarification of instructions is needed; and • receives guidance on problems and work methods not specifically covered by the original instructions. <p>How Work Is Reviewed – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • reviews work while in progress and upon completion; • reviews work for compliance with directions; and • verifies work is complete and accurate. 	

Level 2-2		125 Points
FLD	<p>How Work Is Assigned – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • instructs the employee on the purpose of the assignment and its scope, limitations, expected deadlines, and priorities; and • advises the employee on peculiarities of new assignments. <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • works independently, but within the framework of established practices and prescribed procedures; and • refers problems not covered by the supervisor’s instructions or guides to the supervisor for help or a decision. <p>How Work Is Reviewed – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • reviews completed work to verify accuracy and conformance to required procedures, including special instructions; • reviews findings and conclusions to ensure they are supported by facts; and • typically reviews in detail the more difficult work the employee has not previously performed. 	

Level 2-3		275 Points
FLD	<p>How Work Is Assigned – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • outlines or discusses possible problem areas and defines objectives, plans, priorities, and deadlines; and • provides assistance on controversial or unusual situations with no clear precedents. <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • independently plans and carries out assignments in conformance with accepted policies and practices; • resolves commonly encountered work problems and deviations by exercising judgment in selecting appropriate instructions, policies, guidelines, or accepted practices; and • brings controversial information and findings to the supervisor’s attention for direction. <p>How Work Is Reviewed – The supervisor or designated employee reviews completed work for conformity with policy, the appropriateness of the employee’s approach, technical soundness, and adherence to deadlines.</p>	

Level 2-4		450 Points
FLD	<p>How Work Is Assigned – The supervisor:</p> <ul style="list-style-type: none"> • outlines overall objectives and available resources; • discusses the projects and timeframes with the employee; and • determines the parameters of the employee’s responsibilities. <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • determines the most appropriate avenues to pursue; • decides the practices and methods to apply in all phases of assignments including the approach to take and the depth and intensity needed; • interprets regulations or policy frequently on own initiative; • applies new methods to solve complex, intricate, sensitive, and/or unprecedented problems and resolves most conflicts as they arise; • coordinates projects or cases across units, organizations, or agencies; and • keeps the supervisor informed of progress and of potentially controversial matters. <p>How Work Is Reviewed – The supervisor reviews completed work for:</p> <ul style="list-style-type: none"> • soundness of overall approach; • effectiveness in producing results; • feasibility of recommendations; and • adherence to requirements. 	

FACTOR 3 – GUIDELINES

This factor covers the nature of guidelines and the judgment employees need to apply them. Individual assignments may vary in the specificity, applicability, and availability of guidelines; thus, the judgment employees use similarly varies. The existence of detailed plans and other instructions may make innovation in planning and conducting work unnecessary or undesirable. However, in the absence of guidance provided by prior agency experience with the task at hand or when objectives are broadly stated, the employee may use considerable judgment in developing an approach or planning the work. Examples of guidelines used in technical work in the Engineering and Architectural Group, 0800, are:

- Federal, state, and local laws;
- governing regulations, legislation, and requirements covering program requirements and operations (e.g., Americans with Disabilities Act, environmental and historical conservation, preservation requirements, patents, etc.);
- occupational safety and health laws and regulations;
- industry standards and established technical procedures;
- manufacturers’ catalogs, instruction manuals, and handbooks;
- technical data in publications, building and industrial codes, and standards recognized by professional societies and organizations and/or regulatory and enforcement agencies as well as state and local government;
- files and records of previous or precedent projects or studies undertaken by the agency or office; and
- computer hardware and software manuals.

Do not confuse guidelines with the knowledge described under Factor 1 – Knowledge Required by the Position. Guidelines either provide reference data or impose certain constraints on applications. For example, there may be several generally accepted methods of accomplishing work, perhaps set forth in an agency operating manual; however, in a particular office, the policy may be to use only one of those methods, or the policy may state specifically under what conditions the office uses each method. The primary components of this factor are: **Guidelines Used** and **Judgment Needed**.

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 3-1		25 Points
FLD	<p>Guidelines Used – The employee uses specific and detailed guidelines covering all aspects of the work.</p> <p>Judgment Needed – The employee works in strict adherence to available guidelines requiring little or no judgment. The supervisor or designated employee must authorize any deviations from the guidelines.</p>	

Level 3-2		125 Points
FLD	<p>Guidelines Used – The employee uses a number of established procedures and guidelines directly applicable to assignments. Guidelines prescribe established procedures and provide clear precedents.</p> <p>Judgment Needed – The employee is familiar with many written guidelines, oral instructions, and other reference material and is expected to exercise judgment in selecting and applying the most appropriate. The employee is expected to be able to determine when minor deviations from the existing guidelines are appropriate.</p>	

Level 3-3		275 Points
FLD	<p>Guidelines Used – The employee uses a variety of guidelines, manuals, and standard reference materials; however, they are not completely applicable to the work or have gaps in specificity.</p> <p>Judgment Needed – The employee uses judgment and initiative in interpreting and adapting guidelines, such as agency policies, regulations, precedents, and work directions for application to specific cases or problems. The employee analyzes results and recommends changes.</p>	

Level 3-4		450 Points
FLD	<p>Guidelines Used – The employee uses guidelines, manuals, and standard reference materials that are stated in general terms. Guidance for performing the work is scarce or of limited use.</p> <p>Judgment Needed – The employee uses judgment, initiative, and resourcefulness in deviating from established methods to:</p> <ul style="list-style-type: none"> • modify, adapt, and/or refine broader guidelines to resolve complex and/or intricate issues and problems; • treat specific issues or problems; • research trends and patterns; • develop new methods and criteria; and/or • propose new policies and practices. 	

FACTOR 4 – COMPLEXITY

This factor covers the nature, number, variety, and intricacy of tasks, steps, processes, or methods in the work performed; the difficulty in identifying what needs to be done; and the difficulty and originality involved in performing the work. The primary components of this factor are: **Nature of Assignment, What Needs To Be Done, and Difficulty and Originality Involved.**

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 4-2						75 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817	<u>Illustration(s)</u>	Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	Nature of Assignment – Work consists of related steps, processes, and methods in completing assignments.					
	What Needs To Be Done – The employee chooses the appropriate approach from among established methods and procedures to complete recurring assignments.					
	Difficulty and Originality Involved – The employee follows prescribed processes and methods as assignments increase in difficulty and recognizes the different actions to be taken depending on the source of information or any factual differences.					

Level 4-3						150 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817	<u>Illustration(s)</u>	Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	Nature of Assignment – Work consists of a number of different and unrelated processes in completing assignments or projects.					
	What Needs To Be Done – The employee analyzes the subject, phase, or issues involved in each assignment to: <ul style="list-style-type: none"> • adjust or deviate from standard work methods based on situations and conditions at a field or work site; and • coordinate and plan phases of the assignment. 					
	Difficulty and Originality Involved – The employee exercises independent judgment and skill to interpret and analyze considerable data, plan work, or refine methods and techniques to determine the best course of action for problem resolution.					

Level 4-4		225 Points		
Series	Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>
	Construction Control Technical 0809	<u>Illustration(s)</u>	Marine Survey Technical 0873	<u>Illustration(s)</u>
	Survey Technical 0817		Industrial Engineering Technical 0895	<u>Illustration(s)</u>
FLD	<p>Nature of Assignment – Work consists of many different and unrelated processes and methods requiring ingenuity and skill to resolve a broad range of problems.</p>			
	<p>What Needs To Be Done – The employee analyzes, selects, and adapts appropriate methods from a wide range of alternatives to:</p> <ul style="list-style-type: none"> • assess unusual circumstances; • evaluate operations, equipment, and activities; and • apply qualitative and quantitative analytical techniques. 			
	<p>Difficulty and Originality Involved – The employee exercises seasoned judgment and skill to interpret considerable, incomplete, or conflicting data.</p>			

FACTOR 5 – SCOPE AND EFFECT

This factor covers the relationships between the nature of work (i.e., the purpose, breadth, and depth of the assignment) and the effect of work products or services both within and outside the organization. Effect measures such things as whether the work output facilitates the work of others, provides timely services of a personal nature, or impacts on the adequacy of research conclusions. The concept of effect alone does not provide sufficient information to properly understand and evaluate the impact of the position. The scope of the work completes the picture to allow consistent evaluations. Consider only the effect of properly performed work. The primary components of this factor are: **Scope of the Work** and **Effect of the Work**.

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 5-2						75 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817	<u>Illustration(s)</u>	Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	Scope of the Work – Work involves applying specific rules, regulations, and procedures related to engineering and performing clearly defined assignments.					
	Effect of the Work – Work affects the accuracy, quality, and timeliness of the processes or services of the unit.					

Level 5-3						150 Points
Series	Engineering Technical	0802	<u>Illustration(s)</u>	Electronics Technical	0856	<u>Illustration(s)</u>
	Construction Control Technical	0809	<u>Illustration(s)</u>	Marine Survey Technical	0873	<u>Illustration(s)</u>
	Survey Technical	0817	<u>Illustration(s)</u>	Industrial Engineering Technical	0895	<u>Illustration(s)</u>
FLD	Scope of the Work – Work requires applying a considerable number of different basic but established methods, procedures, and techniques.					
	Effect of the Work – Work affects: <ul style="list-style-type: none"> • the design or operation of systems, programs, processes, or equipment; and • the timeliness and economy of operations, services, or equipment. 					

Level 5-4		225 Points		
Series	Engineering Technical 0802	<u>Illustration(s)</u>	Electronics Technical 0856	<u>Illustration(s)</u>
	Construction Control Technical 0809	<u>Illustration(s)</u>	Marine Survey Technical 0873	<u>Illustration(s)</u>
	Survey Technical 0817		Industrial Engineering Technical 0895	<u>Illustration(s)</u>
FLD	Scope of the Work – The work involves establishing criteria, formulating projects, assessing program effectiveness, or analyzing a variety of unusual conditions, problems, or questions.			
	Effect of the Work – Work affects a wide range of agency activities, industrial concerns, or the operation of other agencies.			

**FACTOR 6 – PERSONAL CONTACTS
AND
FACTOR 7 – PURPOSE OF CONTACTS**

These factors include face-to-face and remote dialogue (e.g., telephone, e-mail, and video conferences) with persons not in the supervisory chain. (Personal contacts with supervisors are covered under Factor 2 – Supervisory Controls.) Levels described under these factors consider what is required to make the initial contact, the difficulty of communicating with those contacted, the setting in which the contact takes place, and the nature of the discourse. The setting describes how well the employee and those contacted recognize their relative roles and authorities. The nature of the discourse defines the reason for the communication and the context or environment in which the communication takes place. For example, the reason for communicating may be to exchange factual information or to negotiate. The communication may take place in an environment of significant controversy and/or with people of differing viewpoints, goals, and objectives.

Only credit points under Factors 6 and 7 for contacts essential for successfully performing the work and with a demonstrable impact on its difficulty and responsibility. Factors 6 and 7 are interdependent, so use the same personal contacts to evaluate both factors.

Determine the appropriate level for Personal Contacts and the corresponding level for Purpose of Contacts. Obtain the point value for these factors from the intersection of the two levels as shown on the [Point Assignment Chart](#) at the end of this section.

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

PERSONAL CONTACTS	
Level 1	Other employees within the immediate office or related units within the agency. Contacts at this level are routine and recurring. Contacts are limited outside of the office or facility.
Level 2	Employees and managers in the same agency, both inside and outside of the immediate office or related units, as well as members of the general public, in a moderately structured setting. Contacts with employees and managers may be from various levels within the agency, such as: <ul style="list-style-type: none"> • headquarters; • regions; • districts; • field offices; or • other operating offices at the same location.
Level 3	Individuals or groups from outside the agency, including consultants, contractors, vendors, or representatives of professional associations, in moderately unstructured settings. The purpose and extent of each is different. This level may also include contacts with agency officials who are several managerial levels removed from the employee when such contacts occur on an ad hoc basis. The employee must recognize or learn the role and authority of each party during the course of the meeting.

PURPOSE OF CONTACTS	
Level A	To acquire or exchange information or facts needed to complete an assignment. The information exchanged or acquired is typically basic or related to general policy. Contacts at this level are directly related to recurring functions.
Level B	To plan, coordinate, or advise on work efforts or to resolve operating problems by influencing or motivating individuals or groups who are working toward mutual goals and who have basically cooperative attitudes.
Level C	To influence, persuade, or control people or groups. Contacts require skill in dealing with fearful, skeptical, or uncooperative people to obtain the desired results. Often the employee must persuade, influence, or gain compliance from others in performing tasks.

POINT ASSIGNMENT CHART				
		Purpose of Contacts		
Level		A	B	C
Personal Contacts	1	30	60	130*
	2	45	75	145
	3	80	110	180

***THIS COMBINATION IS UNLIKELY**

FACTOR 8 – PHYSICAL DEMANDS

This factor covers the requirements and physical demands placed on the employee by the work assignment. This includes physical characteristics and abilities (e.g., agility or dexterity requirements) and the physical exertion involved in the work (e.g., climbing, lifting, pushing, balancing, stooping, kneeling, crouching, crawling or reaching). The frequency or intensity of physical exertion must also be considered. For example, positions requiring prolonged standing involve more physical exertion than a job requiring intermittent standing.

NOTE: Laws and regulations governing pay for irregular or intermittent duty involving unusual physical hardship or hazard are in *section 5545(d), title 5, United States Code, and Subpart I of Part 550, title 5, Code of Federal Regulations.*

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series.

Level 8-1		5 Points
FLD	The work is primarily sedentary, although there is some walking in offices, production areas, utility plants, maintenance, and work areas. Work may involve carrying lightweight items, such as briefcases, notebooks, test equipment, and work papers, or operating a motor vehicle. The work does not require any special physical effort or ability.	

Level 8-2		20 Points
FLD	<p>The work requires some physical exertion, such as:</p> <ul style="list-style-type: none"> • long periods of standing; • walking over rough, uneven, rocky, or slippery surfaces; • recurring bending, crouching, stooping, stretching, climbing, or similar activities; • recurring lifting of light to moderately heavy items weighing less than 50 pounds (i.e., 23 kilograms), such as testing or measuring equipment; and/or • regular visits to construction, industrial, marine, or other outdoor sites. 	

Level 8-3		50 Points
FLD	<p>The work requires considerable and strenuous physical exertion, such as:</p> <ul style="list-style-type: none"> • frequent climbing of tall ladders, staging, or scaffolding in dry-dock and vessel areas; • working in areas where footing can be treacherous (e.g., on rocky banks of bodies of fast-water, slippery docks, or steep hillsides); • lifting heavy objects weighing 50 pounds (i.e., 23 kilograms) or more; and • frequent crouching or crawling in restricted areas. 	

FACTOR 9 – WORK ENVIRONMENT

This factor considers the discomfort and risk of danger in the employee’s physical surroundings and the safety precautions required. Although safety regulations and techniques can reduce or eliminate some discomfort and dangers, they typically place additional demands upon the employee.

NOTE: Laws and regulations governing pay for irregular or intermittent duty involving unusual physical hardship or hazard are in *section 5545(d), title 5, United States Code, and Subpart I of Part 550, title 5, Code of Federal Regulations.*

NOTE: These factor level descriptions (FLDs) apply to all 0800T occupational series in this JFS.

Level 9-1		5 Points
FLD	The work area is usually an office setting adequately lighted, heated, and ventilated. The work environment involves everyday risks or discomforts requiring normal safety precautions.	

Level 9-2		20 Points
FLD	<p>Work involves regular and recurring exposure to moderate risks and discomforts, such as the following:</p> <ul style="list-style-type: none"> • dust, strong odors, or fumes from fuels, chemicals, or engine exhaust; • high levels of noise and vibration, dust, grease, electrical hazards, uncovered moving parts of machinery, moving machinery; or • outdoor conditions involving moderate exposure to rain, cold/hot weather, icy streams, and rivers. <p>The work environment requires the employee to stay alert continually and to take special safety precautions including wearing special protective items of clothing.</p>	

Level 9-3		50 Points
FLD	The work environment involves high risks of exposure to potentially dangerous situations or unusual environmental stress requiring a range of safety and other precautions where conditions cannot be controlled (e.g., working at great heights under extreme outdoor weather conditions).	

Factor Illustrations

Illustrations are provided in this part as a tool to give insight into the meaning of the FLDs for Factors 1, 4, and 5. Consider each illustration in its entirety and in conjunction with the FLDs. Do not rely solely on these illustrations in evaluating positions.

For additional information about the proper use of illustrations, see the [How To Use This Grading Information](#) section of this JFS.

FACTOR 1 ILLUSTRATIONS

LEVEL 1-2: ENGINEERING AID, 0802

Knowledge of, and skill in performing, a limited variety of simple, repetitive tasks sufficient to:

- measure items of regular shape with a caliper and compute cross-sectional areas;
- identify, weigh, and mark a limited variety of easy-to-identify items and record the information;
- assist in the assembly, installation, or operation of equipment, instruments, or facilities by performing specified manual tasks; and
- record instrument readings at specified intervals.

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LEVEL 1-2: SURVEY AID, 0817

Knowledge of, and skill in applying, basic principles, concepts, and practices sufficient to:

- perform recording assignments;
- use the data to obtain adequate survey detail;
- estimate distances;
- sketch; and
- compose brief notes.

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LEVEL 1-2: ELECTRONICS AID, 0856

Knowledge of, and skill in applying, basic principles, concepts, and practices sufficient to assist a senior technician in constructing simple components to meet specific frequency requirements, certain voltage ratings, etc.

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LEVEL 1-3: ENGINEERING TECHNICIAN, 0802

Knowledge of, and skill in applying, standardized rules, procedures, or operations requiring considerable training and experience in engineering methods and practices sufficient to:

- compute findings from test firing data on small ammunition to determine:
 - the center of impact;
 - frequency distribution; and
 - standard deviation and probable error;
- present information by several graphical means; and
- use designated criteria to compare data with results obtained from other firings to determine if there are significant differences in distribution patterns.

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LEVEL 1-3: ENGINEERING TECHNICIAN (DRAFTING), 0802

Knowledge of, and skill in applying, standardized rules, procedures, or operations requiring considerable training and experience in drafting methods and practices sufficient to:

- make rough sketches and/or a model of the actual item; and
- view the process and prepare a step-by-step diagram for manufacturing emergency arresting gear.

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LEVEL 1-3: CONSTRUCTION CONTROL TECHNICIAN, 0809

Knowledge of, and skill in applying, standardized construction principles, concepts, methods, and equipment sufficient to:

- serve as the junior technician on a two-person team by checking line and grade of access roads;
- check the excavation and concrete footings for steel structures; and
- confirm placement of members and hardware for the erection of steel structures.

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LEVEL 1-3: SURVEY TECHNICIAN, 0817

Knowledge of, and skill in applying, standardized surveying principles, concepts, methods, and equipment sufficient to:

- operate a transit on hydrographic surveys involving shore-to-ship triangulation; and
- sight a specific point on a ship – simultaneously with other observers – at specified time intervals, and as determined by radio contact by the party chief.

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LEVEL 1-3: ELECTRONICS TECHNICIAN, 0856

Knowledge of, and skill in applying, standardized rules, procedures, or operations that require training and experience in electronics theory, methods, and equipment sufficient to follow specific layout and schematic drawings to construct and package simple devices and subunits of equipment, such as power supplies, amplifiers, and oscillators.

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LEVEL 1-3: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Knowledge of, and skill in applying, standardized rules, procedures, or operations requiring considerable training or experience in industrial engineering principles, concepts, methods, and equipment sufficient to study time standards. The employee:

- uses predetermined work sequences, methods, and techniques to collect data;
- observes work operations;
- records test and observation data;
- applies standard formulas to perform calculations; and
- makes recommendations to supervisor.

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LEVEL 1-4: ENGINEERING TECHNICIAN, 0802

Knowledge of, and skill in applying, standard procedures or operations requiring extended training or experience in engineering methods and practices sufficient to perform shock and vibration tests in accordance with test plans and test equipment specified by the supervisor. The employee:

- mounts the test items and sets up sensors and recording devices;
- modifies test procedures and equipment as required;
- observes recorded test data for unusual responses indicating failure or malfunctions of the test equipment;
- visually examines the test item to determine apparent damage or change; and
- reports findings.

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LEVEL 1-4: ENGINEERING TECHNICIAN (DRAFTING), 0802

Knowledge of, and skill in applying, standard procedures or operations requiring extended training or experience in engineering drafting sufficient to prepare complete sets of shop drawings from layouts or sketches of test equipment to be manufactured locally. Shop drawings include:

- several cross-sectional and subassembly drawings;
- dimensions, tolerances, fits, and fabrication techniques;
- standard parts identification; and
- information from the design originator, technical handbooks, manuals, and manufacturers' publications.

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LEVEL 1-4: ENGINEERING TECHNICIAN (CIVIL), 0802

Knowledge of, and skill in applying, standard procedures or operations requiring extended training or experience in technical civil engineering methods and practices sufficient to:

- compute and tabulate quantities for road projects including structures, such as box culverts and retaining walls;
- compute vertical and horizontal curves and rough earthwork balance by using earthwork charts and diagrams;
- check preliminary and final estimates of quantities prepared by others; and
- use field notes and information from other sources to plot roadway alignments, grade lines, cross sections and culvert locations.

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LEVEL 1-4: CONSTRUCTION CONTROL INSPECTOR, 0809 (ILLUSTRATION 1)

Knowledge of, and skill in applying, standard construction principles, concepts, methods, and equipment requiring extended training or experience sufficient to inspect an entire project of limited size or complexity, such as:

- relatively small 1- and 2-story concrete or steel buildings not including any major mechanical installation or other complicating feature; and
- forest road construction projects involving only clearing, grading, and drainage structures.

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LEVEL 1-4: CONSTRUCTION CONTROL INSPECTOR, 0809 (ILLUSTRATION 2)

Knowledge of, and skill in applying, standard construction principles, concepts, methods, and equipment requiring extended training or experience sufficient to inspect a phase or segment of a large project, such as one or more parts of a hydroelectric dam requiring:

- clearing the reservoir site;
- preparing the foundation; and/or
- placing the concrete.

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LEVEL 1-4: SURVEY TECHNICIAN, 0817

Knowledge of, and skill in applying, standard rules, procedures, or operations requiring extended training or experience in instrumental techniques sufficient to serve as “chief of party” on hydrographic survey involving investigation of sunken objects sufficient to:

- locate objects by sounding with the fathometer, lead-line, or similar devices;
- coordinate work of crew members in locating objects on charts;
- determine size, shape, and nature of objects or materials;
- determine depth of water over and around items; and
- determine need and develop cost estimates for hazard removal and disposal.

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LEVEL 1-4: ELECTRONICS TECHNICIAN, 0856

Knowledge of, and skill in applying, standard rules, procedures, or operations requiring extended training or experience in standard electronics, methods, and equipment sufficient to:

- devise means of arranging, mounting, and wiring components in a chassis to ensure:
 - possible sources of electrical interference are physically isolated or shielded;
 - length of leads are kept at a minimum to reduce the possibility of regenerative feedback;
 - high voltage leads are adequately insulated; and
 - circuit components are securely mounted on the chassis to avoid malfunctioning under extreme temperature, shock, and vibration conditions;
- determine assembly techniques;
- construct a working model of the equipment to meet specific shape, space, and weight requirements; and
- construct nonstandard components.

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LEVEL 1-4: MARINE SURVEYOR, 0873

Knowledge of, and skill in applying, standard rules, procedures, or operations requiring extended training or experience in marine maintenance and repair practices sufficient to complete damage inspection by determining:

- the extent of damage;
- repairability; and
- estimated cost and duration of repair.

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LEVEL 1-4: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Knowledge of, and skill in applying, standard rules, procedures, or operations requiring extended training or experience in industrial engineering sufficient to study and design a layout for a specific production work center. The employee:

- plans and draws layouts for the assigned phases of the study;
- studies equipment needs for efficiency, safety, and economy of time, effort, and materials;
- recommends the type and quantity of equipment needed;
- prepares drawings of electrical and plumbing systems; and
- discusses ideas, cost data, and recommendations with the supervisor.

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LEVEL 1-5: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 1)

Knowledge of, and skill in applying, specialized rules, procedures, or operations requiring extensive training or experience in engineering methods and practices sufficient to perform tests on electrical insulating materials to determine the effect of heat, high voltage, and other ambient conditions. The employee:

- determines conditioning cycle to which the test specimens will be subjected (e.g., temperature range and length of time at each temperature range);
- modifies test equipment to permit automatic cycling at preset rates to resolve operational problems not fully covered by precedents; and
- makes recommendations based on preliminary data interpretation and test results.

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LEVEL 1-5: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 2)

Knowledge of, and skill in applying, specialized rules, procedures, or operations requiring extensive training or experience in engineering methods and practices sufficient to perform technical research and development work. The employee:

- assembles and installs complex precision instruments and devices;
- modifies or adapts instruments and equipment to obtain desired performance characteristics;
- devises experimental techniques; and
- observes significant trends in experimental data.

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LEVEL 1-5: ENGINEERING TECHNICIAN (CIVIL), 0802

Knowledge of, and skill in applying, specialized rules, procedures, or operations requiring extensive training or experience in engineering methods and practices sufficient to plan and implement ground operations for road management. The employee:

- develops and submits maintenance proposals for construction or repair of ground facilities, such as road surfaces and bridges;
- maintains records and monitors project construction;
- performs technical review of contract designs to avoid or correct errors of nonconformance with construction specifications; and
- ensures work meets contract standards.

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LEVEL 1-5: CONSTRUCTION CONTROL INSPECTOR, 0809

Knowledge of, and skill in applying, specialized construction principles, concepts, methods, and equipment requiring extensive training or experience sufficient to:

- analyze data from a variety of sources (e.g., manufacturer’s drawings, specifications, and maintenance records);
- prepare report of findings and recommendations (e.g., change in design or specifications);
- prepare designs using AutoCAD or other specialized software;
- write construction specifications which accurately define project requirements;
- establish and determine deficiencies in structures and costs; and
- survey layouts and test throughout the duration of construction work.

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LEVEL 1-5: ELECTRONICS TECHNICIAN, 0856

Knowledge of, and skill in applying, specialized electronics principles, concepts, methods, and equipment requiring extensive training or experience sufficient to:

- gather research, technical data, and information on unusual design characteristics;
- analyze technical data to determine applicability to design problems;
- determine and advise engineers on relative practicality of developing new or adapting existing equipment; and
- test and evaluate for electromagnetic characteristics and performance in a varied spectrum environment.

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LEVEL 1-5: MARINE SURVEYOR, 0873

Knowledge of, and skill in applying, specialized procedures in marine maintenance and repair practices, requiring extensive training or experience sufficient to complete a condition survey. The employee:

- examines the structural integrity, appearance, and overall maintenance;
- examines equipment, including the electrical, propulsion, fuel, and navigational systems; and
- uses a variety of precision measurement instruments and equipment to test moisture, analyze oil, etc.

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LEVEL 1-5: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Knowledge of, and skill in applying, specialized procedures in industrial engineering, requiring extensive training or experience sufficient to perform design and layout duties for a new sheet metal shop. The employee:

- plans and draws layouts for assigned phases of the study;
- studies equipment needs to recommend type and quantity;
- prepares drawings of electrical and plumbing systems;
- discusses ideas, cost data, and recommendations with supervisor;
- observes work operations, records data, and breaks the work process down into individual elements;
- prepares study reports; and
- revises drawings and plans as necessary.

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LEVEL 1-6: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 1)

Knowledge of, and skill in applying, a wide range of specialized methods, principles, and techniques sufficient to investigate reasons for failure of engine components in service. The employee:

- investigates reasons for the failure of engine components and examines failed parts;
- analyzes data from a variety of sources (e.g., manufacturer’s drawings, specifications, and maintenance records);
- determines information needed concerning characteristics, capabilities, and limitations of the test items;
- selects and devises laboratory tests to simulate operating conditions;
- arranges for laboratory analyses (e.g., metallurgical and chemical);
- reviews laboratory reports for possible causes of engine failure (e.g., improper heat treatment of the metal or lubricant breakdown); and
- prepares report of findings and recommendations (e.g., change in design or specifications).

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LEVEL 1-6: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 2)

Knowledge of, and skill in applying, a wide range of specialized methods, techniques, procedures, and/or policies to test and evaluate items, systems, and equipment associated with automotive and ordnance material. The employee:

- consults with and advises project engineers and others as to the availability of equipment and facilities to support test projects;
- determines feasibility and method of modifying automotive and other test equipment to meet special test requirements;
- assesses the capability and reliability of equipment in relation to new commercial developments;
- conducts performance evaluations of automotive equipment;
- analyzes test results to define:
 - specific performance characteristics;
 - failures in materials; and
 - equipment deficiencies; and
- prepares reports to present conclusions and recommendations.

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LEVEL 1-6: ENGINEERING TECHNICIAN (CIVIL), 0802

Knowledge of, and skill in applying, a wide range of specialized methods, principles, and techniques sufficient to:

- interpret sophisticated and complex testing results;
- develop and/or review plans, specifications, and estimates for proposed projects;
- make recommendations concerning adequacy of specified highway construction materials;
- evaluate proposed material mix designs;
- review and report on pay quantity documentation and compare test quantities to paid quantities; and
- verify project pay factors.

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LEVEL 1-6: ENGINEERING TECHNICIAN (ELECTRICAL), 0802

Knowledge of, and skill in applying, a wide range of specialized methods, principles, and techniques sufficient to plan and conduct various experimental projects to develop electrical circuits, equipment, or breadboards for systems characterized by:

- performance requirements which are difficult to achieve because of combinations of conflicting characteristics, such as versatility, reliability, size, ease of operation, and maintenance;
- required use of techniques or components in combinations or applications differing from previous usage; and
- development of new equipment or systems, simplification and improvement of present equipment, standardization of equipment, or development of new design techniques or methods.

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LEVEL 1-6: CONSTRUCTION CONTROL INSPECTOR, 0809

Knowledge of, and skill in applying, a wide range of specialized methods, techniques, procedures, policies, costs, materials, and equipment relating to construction sufficient to:

- plan and accomplish complete projects or studies;
- resolve a variety of complex problems;
- ensure adherence to safety standards and environmental regulations;
- observe and investigate all construction phases to ensure compliance with contract schedules, specifications and shop drawings;
- identify actual or potential problems and determine necessity for changes or remedial action;
- investigate need for contract change orders or deviations requiring engineering determination and other matters;
- make recommendations for changes in construction to meet field conditions;
- review and certify contractor's partial payment estimates for items of work claimed, verifying lump-sum and unit price items for units of accomplishment; and
- record changes and modifications to contract drawings and specifications.

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LEVEL 1-6: ELECTRONICS TECHNICIAN, 0856 (ILLUSTRATION 1)

Knowledge of, and skill in applying, a wide range of specialized methods, techniques, and principles of electronics and equipment sufficient to work with complex systems and/or subsystems that:

- greatly vary in size (i.e., extremely small to large);
- are composed of combinations of components assembled into a configuration designed to accomplish a specific function (e.g., a radio communication system or a weather radar system);
- possess circuitry density;
- lack available documentation;
- test and evaluate performance in the presence of electromagnetic energy phenomena;
- emit, receive, or are susceptible to high energy waves including electromagnetic signals; and
- accomplish specified testing and evaluation functions of electromagnetic phenomena.

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LEVEL 1-6: ELECTRONICS TECHNICIAN, 0856 (ILLUSTRATION 2)

Knowledge of, and skill in applying, a wide range of specialized methods, techniques, and principles of electronics and equipment sufficient to design, redesign, fabricate, and modify electronic systems and equipment. The employee:

- selects circuit configuration and determines equipment placement, cable routing, and integrating for various equipment or systems;
- maintains on-line operational reliability of a variety of complex electronic equipment and systems used in radio, telephone, carrier, microwave, satellite, graphics, public address, and data processing;
- tests, aligns, and repairs a wide variety of specialized test equipment;
- fabricates and constructs new test equipment;
- performs preventative and nonscheduled corrective maintenance by diagnosing malfunctions and operating difficulties;
- develops methods and procedures for maintenance and testing of systems and subsystem components; and
- maintains modification records for associated systems and equipment.

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LEVEL 1-6: MARINE SURVEYOR, 0873

Knowledge of, and skill in applying, a wide range of specialized methods and principles of marine maintenance and repair sufficient to complete pre-purchase or acquisition surveys. The employee:

- examines structural integrity, overall maintenance, and appearance;
- examines navigational, electrical, propulsion, and fuel systems;
- examines electronics systems and other machinery;
- uses more sophisticated or specialized testing equipment; and
- completes an out-of-the-water inspection and/or a sea trial.

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LEVEL 1-7: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 1)

A comprehensive, intensive, practical knowledge of, and skill in applying, technical engineering design and geometric principles related to complex design and construction sufficient to:

- monitor the work for compliance with contract requirements;
- review designs for conformance with current highway industry practices;
- ensure designs fit field conditions and comply with performance based contract requirements; and
- use a variety of contracting processes to provide oversight for construction, architecture, and engineering contracts.

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LEVEL 1-7: ENGINEERING TECHNICIAN, 0802 (ILLUSTRATION 2)

A comprehensive, intensive, practical knowledge of, and skill in applying, technical engineering methods, techniques, procedures, and/or practices related to the test and evaluation of items, systems, and equipment associated with aerospace and/or other research and development projects. The employee:

- interprets requirements, defines procedures, and validates methods for planning, delivery, and execution of unique experiments to meet research project requirements;
- teams with a professional engineer to analyze evolutionary research and testing requirements and objectives to plan, implement, and configure experiments;
- assesses test results and requirements, and troubleshoots, fabricates, adjusts, modifies, and improves test systems, test articles, and materials;
- advises on capabilities, and selects, calibrates, and fabricates highly sophisticated laboratory systems; and
- recognizes data anomalies and determines if they are due to equipment or experimental errors, and takes action to make changes to experimental design to resolve problems.

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LEVEL 1-7: ENGINEERING TECHNICIAN (CIVIL), 0802

A comprehensive, intensive, practical knowledge of, and skill in applying, technical engineering methods and principles sufficient to verify compliance within the contract requirements, determine layout amid volumes of complex geometric alignments and shapes, and develop performance based requirements for contracts. The employee:

- uses a variety of contracting processes to provide oversight for construction and/or architect/engineering contracts;
- applies knowledge of surveying, hydraulics, highway design, specification writing, and topography;
- tracks materials, laboratory income, expenses, and revenues;
- ensures laboratory accreditation is maintained;
- reviews and approves test results;
- recommends special contract requirements related to engineering services;
- disseminates new material technology and highly sophisticated and complex materials; and
- prepares right-of-way and utility agreements.

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LEVEL 1-7: ELECTRONICS TECHNICIAN, 0856 (ILLUSTRATION 1)

A comprehensive, intensive, practical knowledge of, and skill in applying, technical electronics methods, techniques, procedures, and/or policies sufficient to:

- develop new components for the external and internal development of general purpose transmitters for fixed plant installation with a wide range of power output and accessory equipment, such as power supplies, receiver-converters, exciters, antennas, terminal, and special test equipment; and
- plan, organize, and execute limited projects involved in the development of a system and requiring the solution of both design and operations problems.

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LEVEL 1-7: ELECTRONICS TECHNICIAN, 0856 (ILLUSTRATION 2)

A comprehensive, intensive, practical knowledge of, and skill in applying, technical electronic engineering principles, practices, techniques, procedures, and policies sufficient to:

- design, construct, and test one-of-a-kind electronic aerospace and/or other research systems, experiments, and equipment using emerging technology and off-the-shelf materials;
- plan, develop, modify, troubleshoot, and maintain one-of-a-kind research systems and upgrade their capabilities based on application of emerging technology;
- plan, design, develop, or construct electronics sensing and measurement devices and applications using newer technology found in aerospace and earth science research and development;
- control electronic data collection systems and understand their capabilities; and
- plan, develop, construct, and integrate new devices into the system to perform multiple tasks not previously associated with aerospace and/or other research system capabilities.

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LEVEL 1-7: MARINE SURVEYOR, 0873

A comprehensive, intensive, practical knowledge of, and skill in applying, technical marine maintenance and repair principles and techniques on projects for large, complex vessels sufficient to:

- conduct material condition surveys and inspections on ships to determine the actual condition of a ship's hull, machinery, and electrical components;
- evaluate skill requirements for shipboard personnel to operate, maintain, and repair the ship; and
- determine the need for, and nature and extent of, repair, replacement, alteration, or other work required to place the ship in a safe and efficient operating condition.

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LEVEL 1-7: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

A comprehensive, intensive, practical knowledge of, and skill in applying, a wide range of industrial engineering techniques coupled with an in-depth knowledge of production operations, process methods, and management systems used in establishing depot aircraft repair and overhaul capability sufficient to:

- develop detailed work methods and processes;
- identify repair, calibration, and test requirements to develop work sequences;
- identify required skills, processing shops, and elapsed processing time; and
- define work centers and materials.

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FACTOR 4 ILLUSTRATIONS

LEVEL 4-2: ENGINEERING TECHNICIAN, 0802

Nature of Assignment – Work consists of a variety of tests involving related steps, processes, and methods.

What Needs To Be Done – The employee chooses the appropriate approach to complete recurring testing assignments.

Difficulty and Originality Involved – Exercises limited judgment in:

- examining test specimens for faults or defects that may affect the data;
- determining whether test data falls within normal limits; and
- determining the apparent causes of deviations in the test data resulting from equipment malfunctions, observational errors, and other causes.

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LEVEL 4-2: ENGINEERING TECHNICIAN (DRAFTING), 0802

Nature of Assignment – Work consists of a variety of related drafting assignments on clearly defined projects, such as drawings of equipment, by applying established methods and procedures.

What Needs To Be Done – The employee chooses from several standardized approaches to:

- determine needed views, sections, stage of assembly, detail drawings, and supplementary design information; and
- prepare complete sets of drawings of equipment or facilities from incomplete sketches, layouts, or models, and supplementary verbal information.

Difficulty and Originality Involved – Exercises limited judgment to carry out routine functions and independently resolve problems previously encountered.

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LEVEL 4-2: CONSTRUCTION CONTROL INSPECTOR, 0809

Nature of Assignment – Work consists of related steps, processes, and methods involved in assisting with the inspection of a road or small earthfill dam and related structures with a standard foundation.

What Needs To Be Done – The employee chooses the appropriate approach to complete recurring inspection of:

- slopes, embankments, grading, moisture content, and earthwork compaction;
- excavation and backfill for culverts and siphons and placement of concrete pipe;
- simple batching and concrete placement; and
- concrete forms for contour of line, grade, bracing, tightness, placement of steel reinforcements, and embedded materials.

Difficulty and Originality Involved – Exercises limited judgment to make decisions on prescribed processes and methods used in performing work.

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LEVEL 4-2: SURVEY TECHNICIAN, 0817

Nature of Assignment – Work consists of serving as an observer on a geodetic triangulation party.

What Needs To Be Done – The employee chooses the appropriate approach to complete assignments, such as:

- making local measurements of azimuth, reference, and station marks;
- testing observing tower or stand for eccentricity and collimation; and
- observing horizontal and as necessary vertical angles to targets.

Difficulty and Originality Involved – Exercises limited judgment in determining if the abstracts of observations meet specifications and, if not, observes angles a second time to obtain desired order of accuracy.

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LEVEL 4-2: ELECTRONICS TECHNICIAN, 0856

Nature of Assignment – Work consists of related steps, processes, and methods to assist in prototyping and testing items, such as interface test adapters, weapons systems, operating software support devices, or other similar tasks required to support automatic test equipment (ATE) projects.

What Needs To Be Done – The employee chooses the appropriate approach to complete recurring assignments to:

- prototype various assigned electronic items, such as interface test adapters, using sketches and drawings;
- develop component layouts consistent with electrical noise and interactive constraints;
- operate software support devices, as required, to accomplish assignments; and
- verify item performance using standard instruments, such as power supplies, meters, and bridges.

Difficulty and Originality Involved – Exercises limited judgment in:

- applying initiative and resourcefulness in planning and execution;
- recognizing the differences among situations; and
- selecting and applying pertinent basic electronics engineering techniques.

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LEVEL 4-2: MARINE SURVEYOR, 0873

Nature of Assignment – Work consists of related steps, processes, and methods in conducting ship checks of maintenance and repair on vessels of limited complexity performed by contract operators.

What Needs To Be Done – The employee chooses the appropriate approach to complete recurring assignments to determine status of equipment, identify deficiencies, and prepare necessary reports and recommendations.

Difficulty and Originality Involved – Exercises limited judgment to carry out prescribed processes and methods.

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LEVEL 4-2: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Nature of Assignment – Work consists of performing related steps, processes, and methods to develop, implement, and maintain engineering time standards for a specific shop or work center.

What Needs To Be Done – The employee chooses the appropriate approach to complete recurring assignments in work simplification and methods, and engineering studies of limited difficulty designed to locate and correct deficiencies. The employee:

- meets with the shop supervisor;
- observes work operations;
- records data and breaks work processes into individual elements;
- researches and reviews a wide variety of basic documents to collect quantitative internal data to analyze overall operation and identify trends;
- evaluates data and sets standards; and
- assists with determining material requirements, projected workload, shift determination, vendor schedules, etc.

Difficulty and Originality Involved – Exercises limited judgment to decide what needs to be done by recognizing the differences across easily identifiable situations.

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LEVEL 4-3: ENGINEERING TECHNICIAN, 0802

Nature of Assignment – Work consists of a number of unrelated steps or tasks requiring accuracy or attention to detail in preparing original drawings for inventions or construction and equipment designs.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to:

- review drawings, the basis for the design, and the design analysis for conformance to established engineering standards and criteria set forth in manuals, codes, other guides, and the project requirements;
- check accuracy of calculations for loads, illumination, conductor sizes, and contractor-selected equipment;
- call supervisor's attention to major deficiencies and items not covered by guides; and
- review revised plans to assure deficiency correction.

Difficulty and Originality Involved – Exercises independent judgment to adjust the methods and to resolve problems.

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LEVEL 4-3: ENGINEERING TECHNICIAN (DRAFTING), 0802

Nature of Assignment – Work consists of a number of unrelated steps or tasks requiring accuracy or attention to detail in preparing original drawings of new inventions.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to:

- plan independently the method to portray effectively information contained in patent specifications or descriptions;
- obtain independently needed information from the designer;
- make drawings from specifications and, in some cases, make photographs, sketches, or models;
- use three-dimensional projections to portray the design in a simple drawing of limited size, with crosshatching and shading to show materials and contours.

Difficulty and Originality Involved – Exercises independent judgment to resolve problems and select, reject, and interpret data based upon:

- knowledge of the design intent;
- experience in the area of specialization; and
- the various uses of the completed drawings.

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LEVEL 4-3: CONSTRUCTION CONTROL INSPECTOR, 0809

Nature of Assignment – Work consists of a number of different processes related to inspecting the electrical, mechanical, and structural aspects of construction of multi-story office or residential buildings of moderate size and conventional design.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to:

- schedule work;
- interpret plans and specifications;
- select work methods; and
- ensure the acceptability of materials and workmanship.

Difficulty and Originality Involved – Exercises independent judgment to resolve problems resulting from different and unrelated construction processes and methods employed by multiple contractors.

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LEVEL 4-3: SURVEY TECHNICIAN, 0817

Nature of Assignment – Work consists of a number of unrelated processes related to serving as the instrument person on precise construction or installation surveys.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to:

- revise standard work methods and procedures;
- adapt complex surveying techniques to field situations;
- select the most efficient surveying approach from several alternatives; and
- redirect team efforts, as needed, in response to field conditions.

Difficulty and Originality Involved – Exercises independent judgment to resolve problems caused by:

- crowded and confined work locations;
- rugged terrain; and/or
- interference with contractor operations.

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LEVEL 4-3: ELECTRONICS TECHNICIAN, 0856

Nature of Assignment – Work consists of a number of different and unrelated processes related to operating, maintaining, prototyping, modifying, testing, and evaluating portions of projects of limited complexity. Such work may involve communications or weapons systems. Equipment is well-documented and has schematic diagrams, maintenance schedules, troubleshooting procedures, etc.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to validate and devise technical fixes to operation, safety, and reliability problems within the system. The employee:

- applies fixes to the assigned weapons system and subsystems to duplicate the desired environment or condition to be evaluated;
- coordinates closely with site technicians, organization engineering personnel, and contract engineers to ensure the adequacy of test parameters and the equipment used for data collection; and
- assists higher-graded technicians or engineers in operating, troubleshooting, and isolating faults of various system control units that have developed unusual problems in an operational weapons system in the field.

Difficulty and Originality Involved – Exercises independent judgment in following well-established work methods, but typically makes decisions on problems not specifically covered in technical data by using knowledge of functional parameters. Identifies and analyzes the conditions affecting problems with designing, testing, modifying, troubleshooting, or maintaining electronic systems. Determines the interrelationships among electronic components.

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LEVEL 4-3: MARINE SURVEYOR, 0873

Nature of Assignment – Work consists of a number of different and unrelated processes in conducting material condition surveys and inspections to determine the actual present condition of assigned ships’ hull, machinery, and electrical components.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to determine the need for, and the nature and extent of, repair, replacement, alteration, or other work required to place the ship in a safe and efficient operating condition.

Difficulty and Originality Involved – Exercises independent judgment in following well-prescribed procedures but may adjust the methods to resolve problems.

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LEVEL 4-3: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Nature of Assignment – Work consists of independently conducting methods engineering studies of work processes relatively complete within themselves or conducting segments of larger studies coordinated by higher-graded employees.

What Needs To Be Done – The employee selects the appropriate process from many alternatives to:

- analyze material flow, operational sequence, work environment, facilities and equipment utilization, manual motions, and machine operations;
- research and review a wide variety of documents to collect quantitative internal information to analyze overall operations and identify trends;
- conduct work measurement studies to determine bottlenecks in material flow, unnecessary activity, duplicated processes, and workforce and equipment utilization; and
- develop standard time data and reports in support of conclusions and recommendations.

Difficulty and Originality Involved – Exercises independent judgment in following well-established work methods, but typically uses independent judgment to adjust the methods and to resolve problems.

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LEVEL 4-4: ENGINEERING TECHNICIAN, 0802

Nature of Assignment – Work consists of many different and unrelated processes and methods used to interpret, select, adapt, and apply many guidelines, precedents, and engineering principles and practices related to utility systems. Utility systems include office buildings, technical laboratories, experimental buildings, pumping stations, and flood control facilities.

What Needs to Be Done – The employee analyzes, selects, and adopts appropriate methods from a wide range of alternatives to:

- prepare designs and specifications for various utility systems, such as heating, plumbing, air conditioning, ventilating, pumping, gas supply, and pneumatic control systems;
- adapt design features for buildings and facilities of a complex or nonconventional nature for which precedents are not directly applicable; and
- perform technical reviews of contractor-prepared designs and specifications for utility systems.

Difficulty and Originality Involved – Exercises seasoned judgment and originality to:

- resolve problems in adapting designs that are often new, unique, or offer significant technical challenges because the details are not addressed by known precedents;
- adapt methods in innovative ways then closely monitor to ensure problems are immediately identified; and
- suggest modifications to achieve desired results.

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LEVEL 4-4: CONSTRUCTION CONTROL INSPECTOR, 0809

Nature of Assignment – Work consists of many different and unrelated processes and methods used to resolve a broad range of problems related to inspecting the construction of Federally insured residential buildings.

What Needs to Be Done – The employee selects and adapts appropriate methods from a wide range of alternatives to:

- work with different builders to identify and correct deficiencies;
- interpret and explain agency requirements;
- suggest and advise on the acceptability of alternative construction methods; and
- resolve problems, such as unauthorized deviations from approved plans and specifications.

Difficulty and Originality Involved – Exercises seasoned judgment and skill to interpret considerable, incomplete, or conflicting data resulting from marked variations in:

- plans and specifications;
- builder capabilities; and
- site and construction conditions.

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LEVEL 4-4: ELECTRONICS TECHNICIAN, 0856

Nature of Assignment – Work consists of many different and unrelated processes and methods used to resolve a broad range of problems. It includes research and development work to modify or improve assigned electronic or electrical systems or procedures. Such work may involve communications or weapons systems.

What Needs to Be Done – The employee selects and adapts appropriate methods from a wide range of alternatives to:

- solve design and operational problems;
- plan and schedule communication system upgrades and modifications, new equipment acquisition, and installation;
- serve as a technical advisor to engineers and technicians on the functional requirements, costs, and logistical and operational data related to the assigned systems; and
- plan and schedule complex electrical, electronic, or electromagnetic systems upgrades and modifications, new equipment acquisition, and installation.

Difficulty and Originality Involved – Exercises seasoned judgment, initiative, and originality in adapting practical methods and techniques to solve design and operational problems because established criteria and technical precedents are not always available.

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LEVEL 4-4: MARINE SURVEYOR, 0873

Nature of Assignment – Work consists of many different and unrelated processes and methods for modifying existing and new equipment from commercial manufacturers and suppliers. Assignments involve not only the usual shipboard systems, but also the systems and equipment required for special and unusual mission requirements and for scientific purposes.

What Needs to Be Done – The employee selects and adapts appropriate methods from a wide range of alternatives to:

- identify necessary and possible modifications; and
- obtain technical information required for installing, operating, and maintaining equipment.

Difficulty and Originality Involved – Exercises seasoned judgment, skill, and ingenuity to interpret mission needs and keep pace with the latest scientific and technical data and technological advances.

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LEVEL 4-4: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Nature of Assignment – Work involves a variety of complex assignments and requires gathering facts, identifying issues, and developing recommendations to resolve complex problems involving interrelated industrial systems.

What Needs to Be Done – The employee independently plans and executes studies to improve methods of operations, resolve production problems, and reduce cost of operations through work standardization and simplification, engineered standards, facilities and equipment, and manpower utilization.

Difficulty and Originality Involved – Exercises seasoned judgment and originality to refine existing work processes, products, and equipment or to resolve problems and analyze unusual situations.

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FACTOR 5 ILLUSTRATIONS

LEVEL 5-2: ENGINEERING TECHNICIAN, 0802

Scope of the Work – Work involves completing a variety of standardized tests by preparing test specimens, adjusting and operating equipment, and recording instrumental readings.

Effect of the Work – Work affects the accuracy, quality, and timeliness of further processes or services of the unit.

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LEVEL 5-2: ENGINEERING TECHNICIAN (DRAFTING), 0802

Scope of the Work – Work involves preparing complete sets of shop drawings, including cross-sectional and subassembly drawings, from layouts or sketches of test equipment to be locally manufactured.

Effect of the Work – Work affects the overall accuracy, quality, and timeliness of the manufactured test equipment.

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LEVEL 5-2: CONSTRUCTION CONTROL INSPECTOR, 0809

Scope of the Work – Work involves inspecting the quantity, quality, and placement of gravel for roadway construction. The inspector conducts sieve analysis of the gravel and identifies deficiencies.

Effect of the Work – Work affects the quality and timeliness of the construction.

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LEVEL 5-2: SURVEY TECHNICIAN, 0817

Scope of the Work – Work involves clearly defined surveying assignments including:

- operating survey total stations, GPS equipment, and digital levels along clearly accessible routes;
- running short traverse lines from known points along unobstructed routes;
- running level circuits between benchmarks of known elevation following clearly designated routes; and
- measuring angles, distances, and differences in elevation between stations.

Effect of the Work – Work affects the assignments of higher-level employees.

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LEVEL 5-2: ELECTRONICS TECHNICIAN, 0856

Scope of the Work – Work involves adjusting a variety of electronic communications equipment in accordance with manufacturers’ specifications. Electronic devices support a complex electrical or electronic system involving such functions as air navigation, weapons systems, or digital automated controls.

Effect of the Work – Work affects the accuracy and successful operation of the equipment.

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LEVEL 5-2: MARINE SURVEYOR, 0873

Scope of the Work – Work involves determining the need to amend basic ship maintenance contracts and certifying completion when work is satisfactory.

Effect of the Work – Work affects the overall accuracy, quality, and timeliness of the processes or equipment of the unit.

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LEVEL 5-2: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Scope of the Work – Work involves planning and drawing layouts for assigned phases of a production shop study and evaluating equipment needs to recommend the type and quantity required.

Effect of the Work – Work affects the accuracy, reliability, or acceptability of the processes or services of the production shop.

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LEVEL 5-3: ENGINEERING TECHNICIAN, 0802

Scope of the Work – Work involves preparing plans, specifications, and cost estimates in conformance with established procedures for new construction or major modification of existing electrical exterior distribution systems, and interior wiring for light and power in a variety of small conventional buildings, such as residences, barracks, bakeries, small shops, and offices.

Effect of the Work – Work affects the adequacy of field investigations, testing operations, or research conclusions, and safety of personnel through proper construction methods or equipment operations.

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LEVEL 5-3: ENGINEERING TECHNICIAN (DRAFTING), 0802

Scope of the Work – Work involves drawing preliminary layouts for renovating a school building by adapting existing building drawings, and considering drawings of existing schools with similar facilities and necessary educational specifications.

Effect of the Work – Work affects the timeliness and economy of operations and services.

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LEVEL 5-3: CONSTRUCTION CONTROL INSPECTOR, 0809

Scope of the Work – Work involves inspecting and interpreting specifications for a wide variety of standardized residential construction procedures, items, or operations, such as:

- excavating;
- placing and compacting concrete;
- installing standard electrical wiring; and
- installing mechanical equipment.

Effect of the Work – Work affects the quality and timeliness of services provided by a contractor.

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LEVEL 5-3: SURVEY TECHNICIAN, 0817

Scope of the Work – Work involves:

- serving as chief-of-party of a survey crew conducting control, topographic, construction, and hydrographic surveys;
- making on-site determinations as to the surveys required to meet design and construction schedules;
- planning survey work to follow several phases of construction; and
- adapting to unanticipated changes in contractor’s plans.

Effect of the Work – Work affects the success and timeliness of the project design and construction.

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LEVEL 5-3: ELECTRONICS TECHNICIAN, 0856

Scope of the Work – Work involves converting theoretical ideas of engineers into practical units or electronic devices in support of a complex electrical or electronic system involving such functions as air navigation, weapons systems, or digital automated controls.

Effect of the Work – Work affects the design or operation of the electronic or electrical systems and equipment.

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LEVEL 5-3: MARINE SURVEYOR, 0873

Scope of the Work – Work involves boarding ships to troubleshoot old and newly installed systems, instructing ships’ crews on operating and maintaining both old and new systems, and advising them on the latest field changes.

Effect of the Work – Work affects ship safety and ensures new or smoother operations.

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LEVEL 5-3: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Scope of the Work – Work involves identifying and specifying functional design requirements for minor new construction or alterations of existing buildings, under the guidance of an engineer.

Effect of the Work – Work affects the planning, designing, improving, analysis, and use of materials, equipment, and other resources.

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LEVEL 5-4: ENGINEERING TECHNICIAN, 0802

Scope of the Work – Work involves preparing designs and specifications for various utility systems, such as heating, plumbing, air conditioning, ventilating, pumping, gas, supply, and pneumatic control systems in support of a variety of complex buildings, such as technical laboratories, experimental buildings, and pumping stations.

Effect of the Work – Work affects the development or effective operation of entire processes at the research facility.

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LEVEL 5-4: CONSTRUCTION CONTROL INSPECTOR, 0809

Scope of the Work – Work involves inspecting and testing the materials, installation, and operation of complex and sophisticated electrical or mechanical systems in a large multi-story laboratory.

Effect of the Work – Work affects developing or effectively operating systems, and ultimately the facility, as well as the work of other individuals.

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LEVEL 5-4: ELECTRONICS TECHNICIAN, 0856

Scope of the Work – Work involves planning and executing the internal and external development of general purpose transmitters for fixed plant installation with a range of power outputs and related accessory equipment.

Effect of the Work – Work affects modifying and developing maintenance processes and the work of suppliers, contractors, other Federal agencies, or private organizations.

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LEVEL 5-4: MARINE SURVEYOR, 0873

Scope of the Work – Work involves assessing technical specifications, voyage repairs, and work requests from assigned special mission ships to determine the practicality and cost of repairs.

Effect of the Work – Work affects the safety, economy, and efficiency of the ships and their missions.

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LEVEL 5-4: INDUSTRIAL ENGINEERING TECHNICIAN, 0895

Scope of the Work – Work involves developing detailed work methods and processes to maintain and update the capability of the repair and/or overhaul of assigned aircraft, engines, or components.

Effect of the Work – Work affects future operations and the ability of the depot to plan and accomplish workloads economically and efficiently.

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PART III – EXPLANATORY MATERIAL

KEY DATES AND MILESTONES

During the 1990s, the Office of Personnel Management (OPM) issued several classification appeal decisions clarifying the distinction between engineering technical work and trades work performed in Federal Wage System (FWS) positions. As a result of these appeal decisions, agencies conducted consistency reviews and ultimately reclassified positions into the FWS.

In 1997, OPM notified agencies we were conducting a study to develop a job family standard (JFS) for Technical Work in the Engineering and Architecture Group, 0800. Between 1997 and 2002, we collected critical occupational information from several installations. In September 2005, OPM released the Draft JFS for Technical Work in the Engineering and Architecture Group, 0800.

The Department of the Interior and the Department of Transportation took the lead in reviewing and testing the draft JFS. OPM calls this arrangement the “lead agency” approach. In addition to the lead agencies, we invited and encouraged all agencies to comment on the draft. This part addresses concerns expressed by reviewing agencies and describes our responses to them. It also provides information to help agencies manage the transition from cancelled occupational standards to this JFS.

The format of this standard supports all Federal agencies in classifying positions regardless of the pay plan. OPM now defines classification series without a GS prefix (e.g., series GS-0802 is now shown as 0802). We have also divided this standard into three parts. Part I contains occupational information applicable to Federal work in the covered occupations without regard to pay plan or classification system. Part II provides grading information for positions classified according to the General Schedule grade definitions in chapter 51 of title 5, United States Code. Part III explains the development of this standard.

RESULTS OF AGENCY REVIEW, COMMENT, AND TEST APPLICATION

Agency test application of the draft JFS resulted in significant grade impact. Agencies expressed concerns about the substantial changes proposed in the draft as well as its clarity and applicability. As a result of the comments received, OPM made editorial, formatting, and substantive changes to the JFS.

A. JOB FAMILY STANDARDS – GENERAL INFORMATION. During the development of this JFS, we strived to simplify and streamline its content. We relied heavily on agency subject matter experts and human resources management officials. We also incorporated changes into this JFS based on lessons learned from our work on other standards. We combined position classification standards for six technical engineering and architecture series into a single JFS. In addition, we changed the 0873 series from an *administrative* to a *technical* occupation to more accurately reflect the nature of this work.

1. Name Changes. We changed the name of each series in this JFS. Our policy is to prescribe functional names for occupational series and position titles for positions performing work in that series. For example, “engineering” is a function and is the name we use for the engineering occupation (i.e., Technical Engineering Series, 0802). *Engineering Technician* is the title we prescribe for positions that involve doing work predominantly in the technical engineering series. Consistent with this policy, we changed the names of six technical occupational series in the Engineering and Architecture Group as shown below.

Series	Former Series Name	New Series Name
0802	Engineering Technician	Engineering Technical
0809	Construction Control	Construction Control Technical
0817	Surveying Technician	Survey Technical
0856	Electronics Technician	Electronics Technical
0873	Ship Surveying	Marine Survey Technical
0895	Industrial Engineering Technician	Industrial Engineering Technical

2. Distinguishing Between Technical and Professional Work. We have included in this JFS guidance to determine whether work is technical or professional in nature. The guidance is also available in [The Classifier’s Handbook](#). We have added the material to this JFS in recognition of the fact that line managers and others who use it may do so infrequently. By placing this guidance in this JFS, we eliminate the need for them to reference another document. We believe this change in a small way contributes to the efficiency and convenience of the classification process.

3. Distinguishing Between Technical and Trades, Crafts, or Labor Work. This JFS provides guidance on whether work is technical or trade, craft, or labor in nature. Additional guidance is available in the [Introduction to the Electronic Equipment Installation and Maintenance Family, 2600](#).

B. TECHNICAL WORK IN THE ENGINEERING AND ARCHITECTURE GROUP – SPECIFIC ISSUES. This section summarizes the comments and recommendations from the draft standard and describes the action taken by OPM.

1. Proposed Removal of Specialty Areas (represented by parenthetical titles) in the Engineering Technical Series, 0802.

Agency Comments: Most agencies commented that the existing parenthetical titles facilitate recruitment efforts and should be retained.

Our Response: We retained all existing 0802 parenthetical titles except *Biomedical*. Both its current definition and our extensive fact-finding indicate this specialty is more related to trade, craft, and labor work. Work involving routine maintenance of biomedical equipment is not technical work.

2. Proposal to Move Control Inspection Work.

Agency Comments: Some agencies opposed OPM's proposal to move the 0809, Construction Representative, work to the 0828, Construction Analyst, series. They noted the current 0828 standard specifically excludes coverage of construction representative work. Some agencies also reported a large number of potential downgrades.

Our Response: We decided to maintain the current structure of the 0809 series, which includes both Inspector and Representative work.

3. Higher Factor Level Descriptions for Complex Technician Work.

Agency Comments: An agency stated many of their technicians perform complex work requiring knowledge and experience exceeding the levels described by the draft standard. They requested the addition of factor level descriptions for 1-8, 4-5, and 5-5 to evaluate this work.

Our Response: Job family position classification standards must be consistent with the Primary Standard to ensure compliance with the grade level criteria set forth in title 5, United States Code. We have not provided for factor levels 1-8, 4-5, and 5-5 because positions at these levels are defined as *experts*. Technical positions support professional scientists and engineers who are the experts. Additionally, these are not typical levels for the occupations covered by this JFS. For those exceptionally rare research and development technician positions that exceed the criteria in this JFS, agencies are encouraged to develop internal guidance consistent with OPM's classification policy.

4. Illustrations for the 0802, 0809, and 0856 Series.

Agency Comments: Agencies requested additional illustrations for the 0802, 0809, and 0856 series.

Our Response: We added illustrations at the higher factor levels and illustrations to cover the specialty areas retained for the 0802 series.

5. Complexity of Equipment Used in the 0856 Series.

Agency Comments: The previous standard for this series was divided into two sections – *Developmental Functions* and *Other Functions*. Many agencies felt the other functions section provided important information pertaining to complexity of equipment and requested it be retained.

Our Response: We incorporated much of this complexity information in the Factor Level Descriptions (FLDs).

6. Cancellation of the Department of Transportation (DOT) Position Classification Guide for Electronics Technician Positions, GS-0856.

Agency Comments: Some agencies stated the factor level descriptions did not reflect the type of work and skills previously evaluated using the DOT Classification Guide for Electronic Technician Positions, GS-0856. They stated the complexity information contained in the guide was critical and requested guidance on complex air traffic control systems for grading purposes.

Our Response: We believe this JFS provides extensive information for use across the job family. Additionally, we recommend that agencies affected by the cancellation of the guide develop agency-specific supplementary guidance consistent with this JFS.