



ONYX PLAN OF WORK FOR ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES (U3.3)

This document presents a general plan of work for Onyx Solar as PV glass supplier and BIPV consultant. Though the plan of work must be adapted for each specific contract/project, this document is a guide within the project process into the Onyx Solar Business Unit U3.3, working as PV glass supplier and BIPV consultant, providing all necessary engineering service for BIPV including supervision on-site and construction management of BIPV works. Regardless the project is within a BID process of subcontractors or another sort of selection process, the project general stages prevails as follows.

BIPV Contractor Stages: design, pre-construction, construction and hand-over.

Onyx Plan of work 2014, U3.3

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Project steps denominations and partial terminology of this document is based on Royal Institute of British Architects, Standard Agreement for the appointment of a Consultant: Schedules of Design Service (SS-DS-07) and Schedule of Role Specifications (SS-RS-07)



Design

The design stage starts with a client requirement to provide technical information for the project and ends when the client is decided to carry out the project and sign the contract or agreement of collaboration with Onyx Solar.

All the stages are obviously important, however, this stage is the key to succeed and progress during the project because the better the design step is carried out the easier development will have the following stages.

At this point is essential to listen to the client requirements and provide the solution adapted to their needs, looking for a balance between some ideal desire of the clients and Onyx professional consulting of the BIPV solution.

EXTERNAL DOCUMENTS/TASK

DESIGN

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- **Identification of client's needs and objectives**
- **Conceptual Design** of the BIPV solution (PV module functional design)
- Preparation of feasibility studies and assessment of options, making possible the client to decide the best BIPV integration and whether to proceed or not.
- Onyx scope and definition of responsibilities with the general contractor/client.
- Prepare documents required for tendering purposes
- Engineering or design added values

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- **Definition about the technical solution and budget** in order to get a final decision from the client to sign the contract
- **Functional Design:** mechanical and electrical installation
- Definition of the components
- Project organization structure: partners and suppliers research
- General schedule, transportation and logistics plan
- Additional studies: Financial analysis, shadow effects, Leed consultancy, etc.
- Administrative documents: transportation conditions, taxes, export-import expenses, financial requirements, insurance, **agreement/contract draft**, etc.
- Meeting with the general contractor and/or design team to advice about documents required tendering purposes.

COMMITMENT FROM THE CLIENT TO CARRY OUT THE BIPV PROJECT

Any further necessary design or engineer work will be part of Detail Design (E), within pre-construction stages; ideally, this stage should be after decision to the client to build the BIPV solution.

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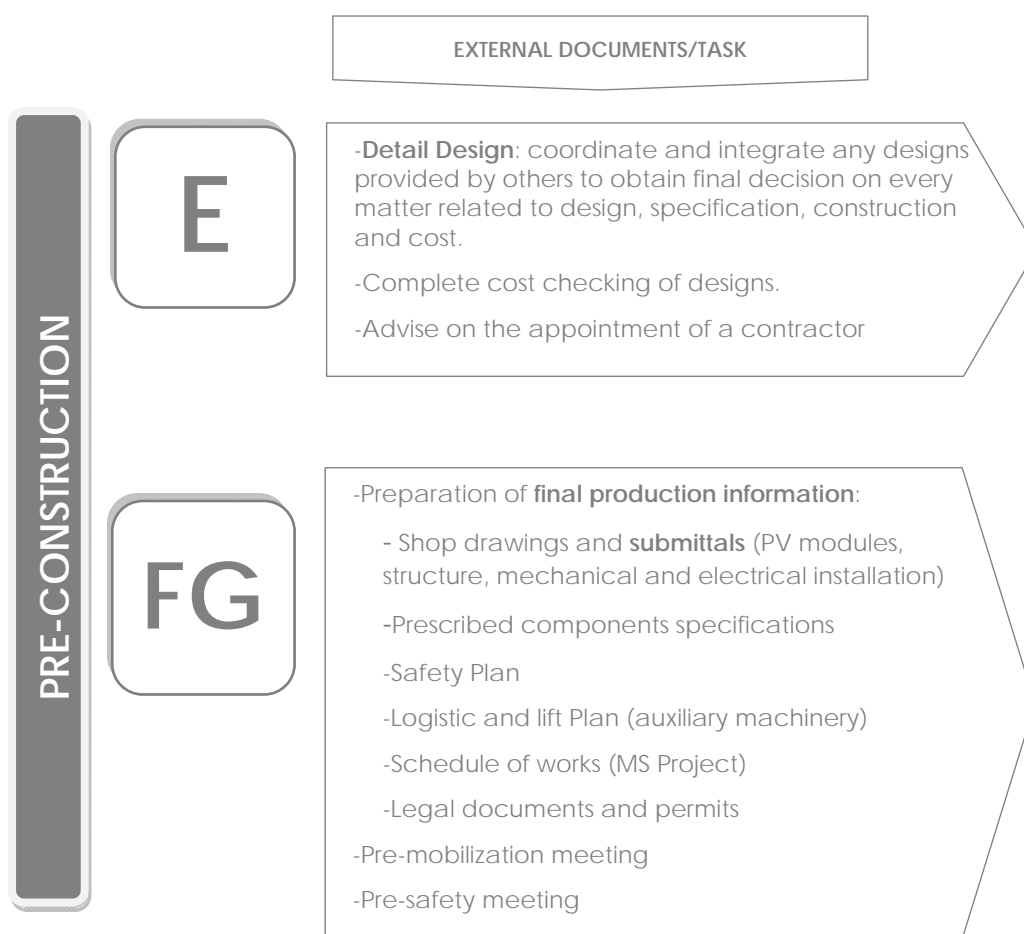
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Pre-construction

The pre-construction stage ideally starts once the contract between Onyx and the general contractor/client is signed and ends with Submittals are approved and fabrication starts. In the practice, Detail Design (E) stage would be “the bridge” in between Design stages and Pre-construction stage, so this is the time when the final design is approved.



SUBMITTALS APPROVED BY THE GENERAL CONTRATOR/DESIGN TEAM AND FABRICATION OF THE PV GLASS STARTS

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Construction stage (SUPERVISION ON SITE)

Construction stages start with the procurement, once all submittals of detail designs are approved by the client, so the fabrication of the PV modules and structure can be released. This stage ends when most of the works are done (partial delivery of the project) and all the payments but the retainage are received.

During the construction stage, Onyx will have permanent contact on-site with the General Contractor (GC) which is in charge of assure the project complies with the designer and owner requirements, as it was defined during the design stage. GC typical roles are the overall planning, coordination, and control of a project from beginning to completion.

At this point, Onyx acts as coordinator of works, providing all the optimum conditions for its subcontractors so they can carry out the works with the maximum diligence. In other words, they can complete the work without excuses. That said all contacts should cordially keep a balance between the leadership and partnership, achieving common agreements to solve daily issues.

EXTERNAL DOCUMENTS/TASK

CONSTRUCTION

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- Procurement of components: mechanical and electrical.
- Manufacturing of PV modules and structure
- Certification process if required (ie: UL Field Evaluation Test)
- Fabrication and raw material quality control: QA/QC documents.
- Fabrication schedule control: proof of fabrication (ie: document of receiving raw material).
- Transportation control: proof of deliveries (ie: bill of landing)
- Visit to manufacturers and suppliers with the GC.
- Components lead time checking.
- Certify payments for material delivered.

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- Advice in gathering of the material of work, safety equipment and tools.
- Advice in **mobilization** of auxiliary machines as crane, forklift, scissor lifts or any equipment according to logistics plan.
- Control of deliveries on-site

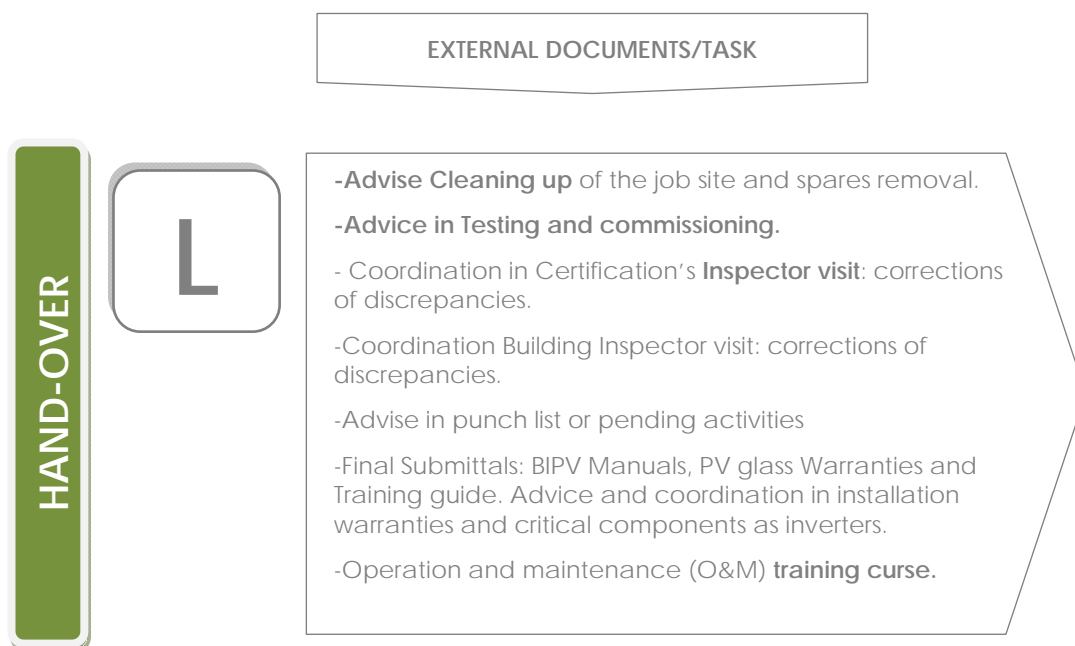
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- **Supervicion on-site to practical completion**
- Planning according to schedule of works
- Construction management according to design.
- Installation quality control: installation QA/QC
- Control of deliveries on-site

PARTIAL DELIVERY OF THE PROJECT. ALL PHISICAL WORKS COMPLETED: MECHANICAL AND ELECTRICAL.

Hand-over stage

This stage involves carrying out all necessary task and submittals to hand over the project to the client



FINAL DELIVERY OF THE PROJECT. ALL WORKS COMPLETED AND FINAL SUBMITTALS DELIVERED