

| ATLAS Upgrade Phase II - LAr                               |   |          |            | AP2 Detailed Schedule |           |           |           |             | 25-Oct-19 13:57 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|--|---|----------|------------|-----------------------|-----------|-----------|-----------|-------------|-----------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID  | Activity Name   | Duration | % Complete | BL Start              | BL Finish | WS Start  | WS Finish | Total Float | 2016            |   | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|  |   |          |            |                       |           |           |           |             | Q               | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q |
| <b>6.04 ATLAS Upgrade Phase II - LAr</b>                   |   | 2527     | 0%         | 03-Oct-16             | 30-Sep-26 | 03-Oct-16 | 30-Sep-26 | 507         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.01 FE Electronics</b>                              |   | 2275     | 0%         | 03-Oct-16             | 30-Sep-25 | 03-Oct-16 | 30-Sep-25 | 4           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.01.01 FE Electronics-Columbia</b>                  |   | 1825     | 0%         | 03-Oct-16             | 20-Dec-23 | 03-Oct-16 | 20-Dec-23 | 455         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.01.01.01 LAr FE ADC Pre-Prototype 1 Cycle</b>      |   | 216      | 0%         | 03-Oct-16             | 09-Aug-17 | 03-Oct-16 | 09-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>01 Pre-prototype 1 Cycle</b>                            |   | 216      | 0%         | 03-Oct-16             | 09-Aug-17 | 03-Oct-16 | 09-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10010   | Pre-Prototype 1 ADC Schematics Design                       | 43       | 0%         | 03-Oct-16             | 02-Dec-16 | 03-Oct-16 | 02-Dec-16 | 130         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10010M  | Material for Pre-Prototype 1 ADC Design                     | 43       | 0%         | 03-Oct-16             | 02-Dec-16 | 03-Oct-16 | 02-Dec-16 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10020T  | Travel for Pre-Prototype 1 ADC Physical Layout Design       | 42       | 0%         | 05-Dec-16             | 02-Feb-17 | 05-Dec-16 | 02-Feb-17 | 264         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10020   | Pre-Prototype 1 ADC Physical Layout Design                  | 44       | 0%         | 05-Dec-16             | 06-Feb-17 | 05-Dec-16 | 06-Feb-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10030   | Pre-Prototype 1 ADC Post Layout Simulation                  | 43       | 0%         | 06-Feb-17             | 07-Apr-17 | 06-Feb-17 | 07-Apr-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10040   | Pre-Prototype 1 ADC Submission                              | 20       | 0%         | 07-Apr-17             | 05-May-17 | 07-Apr-17 | 05-May-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10040M  | Material for Pre-Prototype 1 ADC Submission                 | 20       | 0%         | 07-Apr-17             | 05-May-17 | 07-Apr-17 | 05-May-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10050   | Pre-Prototype 1 ADC Fabrication                             | 45       | 0%         | 05-May-17             | 11-Jul-17 | 05-May-17 | 11-Jul-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10060   | Pre-Prototype 1 ADC Packaging                               | 21       | 0%         | 11-Jul-17             | 09-Aug-17 | 11-Jul-17 | 09-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10060M  | Material for Pre-Prototype 1 ADC Packaging                  | 21       | 0%         | 11-Jul-17             | 09-Aug-17 | 11-Jul-17 | 09-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10065   | Milestone: Ship to UT Austin - Packaged ADC Pre-Prototype 1 | 0        | 0%         |                       | 09-Aug-17 |           | 09-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.01.01.02 LAr FE ADC Pre-Prototype 1 Cycle Test</b> |   | 169      | 0%         | 06-Feb-17             | 05-Oct-17 | 06-Feb-17 | 05-Oct-17 | 261         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>02 Pre-prototype 1 Cycle Test</b>                       |   | 169      | 0%         | 06-Feb-17             | 05-Oct-17 | 06-Feb-17 | 05-Oct-17 | 261         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10070   | Pre-Prototype 1 Irradiation Board Schematics Design         | 42       | 0%         | 06-Feb-17             | 06-Apr-17 | 06-Feb-17 | 06-Apr-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10080   | Pre-Prototype 1 Board Schematics Design                     | 42       | 0%         | 06-Feb-17             | 06-Apr-17 | 06-Feb-17 | 06-Apr-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10090   | Pre-Prototype 1 Irradiation Board Layout Design             | 42       | 0%         | 06-Apr-17             | 06-Jun-17 | 06-Apr-17 | 06-Jun-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10100   | Pre-Prototype 1 Board Layout Design                         | 42       | 0%         | 06-Apr-17             | 06-Jun-17 | 06-Apr-17 | 06-Jun-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10110   | Pre-Prototype 1 Irradiation Board Fabrication               | 42       | 0%         | 06-Jun-17             | 04-Aug-17 | 06-Jun-17 | 04-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10110M  | Material for Pre-Prototype 1 Irradiation Board Fabrication  | 42       | 0%         | 06-Jun-17             | 04-Aug-17 | 06-Jun-17 | 04-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10120   | Pre-Prototype 1 Board Fabrication                           | 42       | 0%         | 06-Jun-17             | 04-Aug-17 | 06-Jun-17 | 04-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10120M  | Material for Pre-Prototype 1 Board Fabrication              | 42       | 0%         | 06-Jun-17             | 04-Aug-17 | 06-Jun-17 | 04-Aug-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10130M  | Material for Pre-Prototype 1 ADC Evaluation Test            | 41       | 0%         | 04-Aug-17             | 03-Oct-17 | 04-Aug-17 | 03-Oct-17 | 263         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10130T  | Travel for Pre-Prototype 1 ADC Evaluation Test              | 41       | 0%         | 04-Aug-17             | 03-Oct-17 | 04-Aug-17 | 03-Oct-17 | 263         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10140M  | Material for Pre-Prototype 1 ADC Irradiation Test           | 41       | 0%         | 04-Aug-17             | 03-Oct-17 | 04-Aug-17 | 03-Oct-17 | 263         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10140T  | Travel for Pre-Prototype 1 ADC Irradiation Test             | 41       | 0%         | 04-Aug-17             | 03-Oct-17 | 04-Aug-17 | 03-Oct-17 | 263         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10130   | Pre-Prototype 1 ADC Evaluation Test                         | 42       | 0%         | 04-Aug-17             | 04-Oct-17 | 04-Aug-17 | 04-Oct-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE10140   | Pre-Prototype 1 ADC Irradiation Test                        | 42       | 0%         | 04-Aug-17             | 04-Oct-17 | 04-Aug-17 | 04-Oct-17 | 262         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary



















| ATLAS Upgrade Phase II - LAr                                  |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             | 25-Oct-19 13:57 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|---|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|-----------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID   | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016            |   | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|   |   |            |            |                       |                  |                  |                  |             | Q               | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q   |
| FEE20570  | Milestone: Ship Prototype ADC Chips                                 | 0          | 0%         |                       | 29-Jan-21        |                  | 29-Jan-21        | 316         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: Ship Prototype ADC Chips                                 |
| FEE20550R   | REDQ: From Nevis - Packaged ADC Prototype                           | 0          | 0%         | 05-Feb-21             |                  | 05-Feb-21        |                  | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ REDQ: From Nevis - Packaged ADC Prototype                           |
| FEE20580  | Prototype Irradiation ADC Evaluation Test                           | 43         | 0%         | 05-Feb-21             | 08-Apr-21        | 05-Feb-21        | 08-Apr-21        | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Prototype Irradiation ADC Evaluation Test                           |
| FEE20580M   | Material for Prototype Irradiation ADC Evaluation Test              | 43         | 0%         | 05-Feb-21             | 08-Apr-21        | 05-Feb-21        | 08-Apr-21        | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Prototype Irradiation ADC Evaluation Test              |
| FEE20580T   | Travel for Prototype Irradiation ADC Evaluation Test                | 43         | 0%         | 05-Feb-21             | 08-Apr-21        | 05-Feb-21        | 08-Apr-21        | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Prototype Irradiation ADC Evaluation Test                |
| FEE20590  | Milestone: Completion of Prototype                                  | 0          | 0%         |                       | 08-Apr-21        |                  | 08-Apr-21        | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: Completion of Prototype                                  |
| FEE20595EX  | External Milestone: ATLAS FRR for FE ADC                            | 0          | 0%         |                       | 08-Apr-21        |                  | 08-Apr-21        | 311         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ External Milestone: ATLAS FRR for FE ADC                            |
| <b>6.04.01.02.08 LAr FE ADC Production Chip Cycle</b>         |   | <b>62</b>  | <b>0%</b>  | <b>02-Apr-21</b>      | <b>30-Jun-21</b> | <b>02-Apr-21</b> | <b>30-Jun-21</b> | <b>319</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 30-Jun-21, 6.04.01.02.08 LAr FE ADC Production Chip Cycle           |
| <b>No AP2 Task Group - Temp</b>                               |   | <b>62</b>  | <b>0%</b>  | <b>02-Apr-21</b>      | <b>30-Jun-21</b> | <b>02-Apr-21</b> | <b>30-Jun-21</b> | <b>319</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 30-Jun-21, No AP2 Task Group - Temp                                 |
| FEE20600  | Production ADC Schematics Design                                    | 30         | 0%         | 02-Apr-21             | 14-May-21        | 02-Apr-21        | 14-May-21        | 253         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Production ADC Schematics Design                                    |
| FEE20610  | Production ADC Physical Layout Design                               | 32         | 0%         | 02-Apr-21             | 18-May-21        | 02-Apr-21        | 18-May-21        | 253         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Production ADC Physical Layout Design                               |
| FEE20610T   | Travel for Production ADC Physical Layout Design                    | 32         | 0%         | 02-Apr-21             | 18-May-21        | 02-Apr-21        | 18-May-21        | 253         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Production ADC Physical Layout Design                    |
| FEE20620  | Production ADC Post Layout Simulation                               | 30         | 0%         | 18-May-21             | 30-Jun-21        | 18-May-21        | 30-Jun-21        | 253         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Production ADC Post Layout Simulation                               |
| FEE20630  | Milestone: Production ADC design complete                           | 0          | 0%         |                       | 30-Jun-21        |                  | 30-Jun-21        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: Production ADC design complete                           |
| <b>6.04.01.02.09 LAr FE ADC Production Qualification Test</b> |   | <b>130</b> | <b>0%</b>  | <b>30-Jun-21</b>      | <b>06-Jan-22</b> | <b>30-Jun-21</b> | <b>06-Jan-22</b> | <b>319</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 06-Jan-22, 6.04.01.02.09 LAr FE ADC Production Qualification Test   |
| <b>No AP2 Task Group - Temp</b>                               |   | <b>130</b> | <b>0%</b>  | <b>30-Jun-21</b>      | <b>06-Jan-22</b> | <b>30-Jun-21</b> | <b>06-Jan-22</b> | <b>319</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 06-Jan-22, No AP2 Task Group - Temp                                 |
| FEE20650T   | Travel for Batch Qualification Evaluation Board Schematics Design   | 43         | 0%         | 30-Jun-21             | 31-Aug-21        | 30-Jun-21        | 31-Aug-21        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Batch Qualification Evaluation Board Schematics Design   |
| FEE20650  | Batch Qualification Evaluation Board Schematics Design              | 44         | 0%         | 30-Jun-21             | 01-Sep-21        | 30-Jun-21        | 01-Sep-21        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Batch Qualification Evaluation Board Schematics Design              |
| FEE20660T   | Travel for Batch Qualification Board Layout Design                  | 38         | 0%         | 01-Sep-21             | 27-Oct-21        | 01-Sep-21        | 27-Oct-21        | 321         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Batch Qualification Board Layout Design                  |
| FEE20660  | Batch Qualification Board Layout Design                             | 40         | 0%         | 01-Sep-21             | 29-Oct-21        | 01-Sep-21        | 29-Oct-21        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Batch Qualification Board Layout Design                             |
| FEE20670M   | Material for Batch Qualification Irradiation Board Fabrication      | 44         | 0%         | 29-Oct-21             | 04-Jan-22        | 29-Oct-21        | 04-Jan-22        | 320         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Batch Qualification Irradiation Board Fabrication      |
| FEE20670T   | Travel for Batch Qualification Irradiation Board Fabrication        | 44         | 0%         | 29-Oct-21             | 04-Jan-22        | 29-Oct-21        | 04-Jan-22        | 320         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Batch Qualification Irradiation Board Fabrication        |
| FEE20690M   | Material for Batch Qualification Irradiation Test PC (C++) Software | 44         | 0%         | 29-Oct-21             | 04-Jan-22        | 29-Oct-21        | 04-Jan-22        | 320         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Batch Qualification Irradiation Test PC (C++) Software |
| FEE20670  | Batch Qualification Irradiation Board Fabrication                   | 46         | 0%         | 29-Oct-21             | 06-Jan-22        | 29-Oct-21        | 06-Jan-22        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Batch Qualification Irradiation Board Fabrication                   |
| FEE20680  | Batch Qualification Irradiation Board FPGA Software                 | 46         | 0%         | 29-Oct-21             | 06-Jan-22        | 29-Oct-21        | 06-Jan-22        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Batch Qualification Irradiation Board FPGA Software                 |
| FEE20690  | Batch Qualification Irradiation Test PC (C++) Software              | 46         | 0%         | 29-Oct-21             | 06-Jan-22        | 29-Oct-21        | 06-Jan-22        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Batch Qualification Irradiation Test PC (C++) Software              |
| FEE20675  | Milestone: ADC Batch testing board fabrication complete             | 0          | 0%         |                       | 06-Jan-22        |                  | 06-Jan-22        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: ADC Batch testing board fabrication complete             |
| FEE20695  | Milestone: ADC Batch qualification setup complete                   | 0          | 0%         |                       | 06-Jan-22        |                  | 06-Jan-22        | 319         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: ADC Batch qualification setup complete                   |
| <b>6.04.01.02.10 LAr FE ADC Production Evaluation</b>         |   | <b>502</b> | <b>0%</b>  | <b>08-Apr-22</b>      | <b>03-Apr-24</b> | <b>08-Apr-22</b> | <b>03-Apr-24</b> | <b>382</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 03-Apr-24, 6.04.01.02.10 LAr FE ADC Production Evaluation           |
| <b>No AP2 Task Group - Temp</b>                               |   | <b>502</b> | <b>0%</b>  | <b>08-Apr-22</b>      | <b>03-Apr-24</b> | <b>08-Apr-22</b> | <b>03-Apr-24</b> | <b>382</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▼ 03-Apr-24, No AP2 Task Group - Temp                                 |
| FEE20700R   | REQD: From Columbia 12% ASICs                                       | 0          | 0%         | 08-Apr-22             |                  | 08-Apr-22        |                  | 253         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ REQD: From Columbia 12% ASICs                                       |
| FEE20710M   | Material for Prod Qualification (Inc. Irradiation) 12% ASICs        | 58         | 0%         | 08-Apr-22             | 30-Jun-22        | 08-Apr-22        | 30-Jun-22        | 315         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Prod Qualification (Inc. Irradiation) 12% ASICs        |

■ Primary Baseline   
■ Remaining Work   
◆ Milestone   
■ Critical Remaining Work   
▼ Summary





| ATLAS Upgrade Phase II - LAr                             |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             | 25-Oct-19 13:57 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|--|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|-----------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID  | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016            |   | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|  |   |            |            |                       |                  |                  |                  |             | Q               | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q |
| FEE30170   | IpGBT Engineering Chip Design Work, Reproduce Findings in Tests via     | 43         | 0%         | 08-Feb-19             | 10-Apr-19        | 08-Feb-19        | 10-Apr-19        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30180   | IpGBT Engineering Chip Design Work, Implement Necessary Changes         | 43         | 0%         | 11-Apr-19             | 11-Jun-19        | 11-Apr-19        | 11-Jun-19        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30190   | IpGBT Engineering Chip Design Work, Overall Integration and Prepare for | 45         | 0%         | 12-Jun-19             | 14-Aug-19        | 12-Jun-19        | 14-Aug-19        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30200   | Milestone: IpGBT Engineering Chip Submitted                             | 0          | 0%         |                       | 14-Aug-19        |                  | 14-Aug-19        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30210   | IpGBT Engineering Chip Fab. + Packaging                                 | 158        | 0%         | 15-Aug-19             | 31-Mar-20        | 15-Aug-19        | 31-Mar-20        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30225A  | AVAIL: IpGBT Engineering Chip for FEB2                                  | 0          | 0%         |                       | 31-Mar-20        |                  | 31-Mar-20        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.01.03.03 FE Electronics-SMU IpGBT Production</b> |   | <b>520</b> | <b>0%</b>  | <b>01-Apr-20</b>      | <b>21-Apr-22</b> | <b>01-Apr-20</b> | <b>21-Apr-22</b> | <b>314</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>No AP2 Task Group - Temp</b>                          |   | <b>520</b> | <b>0%</b>  | <b>01-Apr-20</b>      | <b>21-Apr-22</b> | <b>01-Apr-20</b> | <b>21-Apr-22</b> | <b>314</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30240   | IpGBT Engineering Chip Functional Tests                                 | 45         | 0%         | 01-Apr-20             | 03-Jun-20        | 01-Apr-20        | 03-Jun-20        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30250   | IpGBT Final Production Design Work and Preparation                      | 43         | 0%         | 04-Jun-20             | 04-Aug-20        | 04-Jun-20        | 04-Aug-20        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30260   | Milestone: IpGBT Submission for Wafer Production and Packaging          | 0          | 0%         |                       | 04-Aug-20        |                  | 04-Aug-20        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30290M  | Material for IpGBT for FEB 2 Prototype                                  | 42         | 0%         | 04-Aug-20             | 02-Oct-20        | 04-Aug-20        | 02-Oct-20        | 315         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30290   | IpGBT QA, Define Parameters to be Tested, Design QA Setup               | 43         | 0%         | 04-Aug-20             | 05-Oct-20        | 04-Aug-20        | 05-Oct-20        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30270EX   | External Milestone: IpGBT Fabrication + Production Packaging            | 89         | 0%         | 04-Aug-20             | 10-Dec-20        | 04-Aug-20        | 10-Dec-20        | 442         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30300   | IpGBT QA, QA Setup Schematics Capturing, Key Components (Socket)        | 45         | 0%         | 05-Oct-20             | 09-Dec-20        | 05-Oct-20        | 09-Dec-20        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30310   | IpGBT QA, Develop Firmware  | 43         | 0%         | 09-Dec-20             | 10-Feb-21        | 09-Dec-20        | 10-Feb-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30280   | Milestone: IpGBT Fabrication and Packaging finish, ATLAS PRR            | 0          | 0%         |                       | 10-Dec-20        |                  | 10-Dec-20        | 442         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30320   | IpGBT QA, Setup PCBs Layout   | 43         | 0%         | 10-Feb-21             | 13-Apr-21        | 10-Feb-21        | 13-Apr-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30330M  | Material for IpGBT QA, PCBs Fabrication, Develop DAQ and Software       | 43         | 0%         | 13-Apr-21             | 14-Jun-21        | 13-Apr-21        | 14-Jun-21        | 315         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30330   | IpGBT QA, PCBs Fabrication, Develop DAQ and Software                    | 44         | 0%         | 13-Apr-21             | 15-Jun-21        | 13-Apr-21        | 15-Jun-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30335   | Milestone: IpGBT QA boards fabrication complete                         | 0          | 0%         |                       | 15-Jun-21        |                  | 15-Jun-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30340   | IpGBT QA, Debug and Bring up the QA System                              | 43         | 0%         | 15-Jun-21             | 16-Aug-21        | 15-Jun-21        | 16-Aug-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30345M10  | Solicit Quotes  | 10         | 0%         | 16-Aug-21             | 30-Aug-21        | 16-Aug-21        | 30-Aug-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30345   | IpGBT Prototype and Production  | 42         | 0%         | 16-Aug-21             | 15-Oct-21        | 16-Aug-21        | 15-Oct-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30345M20  | Select Vendor and Place Order   | 10         | 0%         | 30-Aug-21             | 14-Sep-21        | 30-Aug-21        | 14-Sep-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30345M30  | Delivery  | 21         | 0%         | 14-Sep-21             | 14-Oct-21        | 14-Sep-21        | 14-Oct-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30345M40  | PMT: Closeout for IpGBT Prototype and Production                        | 1          | 0%         | 14-Oct-21             | 15-Oct-21        | 14-Oct-21        | 15-Oct-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30355   | Milestone: production IpGBT purchased                                   | 0          | 0%         |                       | 15-Oct-21        |                  | 15-Oct-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30350   | IpGBT QA, Measure the first 1/3 of IpGBT Production Batch               | 42         | 0%         | 15-Oct-21             | 15-Dec-21        | 15-Oct-21        | 15-Dec-21        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30360   | IpGBT QA, Measure the 2/3 of IpGBT Production Batch                     | 44         | 0%         | 15-Dec-21             | 17-Feb-22        | 15-Dec-21        | 17-Feb-22        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| FEE30370   | IpGBT QA, Measure all IpGBT Production Batch                            | 44         | 0%         | 17-Feb-22             | 21-Apr-22        | 17-Feb-22        | 21-Apr-22        | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary









| ATLAS Upgrade Phase II - LAr   |   |             |            | AP2 Detailed Schedule |                  |                  |                  |             | 25-Oct-19 13:57 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      |   |  |
|--|---|-------------|------------|-----------------------|------------------|------------------|------------------|-------------|-----------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|--------------------------------------|---|--|
| Activity ID  | Activity Name   | Duration    | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016            |   | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027                                 |   |  |
|  |   |             |            |                       |                  |                  |                  |             | Q               | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q                                    | Q   | Q  |
| FEE31065   | Milestone: control link prototype update design complete        | 0           | 0%         |                       | 13-Jan-21        |                  | 13-Jan-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      |   | ◆ Milestone: control link prototype update design complete |
| FEE31070   | Control Link Prototype Final Integration                        | 22          | 0%         | 13-Jan-21             | 12-Feb-21        | 13-Jan-21        | 12-Feb-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Control Link Prototype Final Integration                            |  |
| FEE31070T  | Travel: Control Link Prototype Final Integration                | 22          | 0%         | 13-Jan-21             | 12-Feb-21        | 13-Jan-21        | 12-Feb-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Travel: Control Link Prototype Final Integration                    |  |
| FEE31070M  | Material for Control Link Prototype Final Integration           | 1           | 0%         | 11-Feb-21             | 12-Feb-21        | 11-Feb-21        | 12-Feb-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Material for Control Link Prototype Final Integration               |  |
| FEE31080   | Milestone: Control Link Prototype Delivered for FEB2 Prototype  | 0           | 0%         |                       | 12-Feb-21        |                  | 12-Feb-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ◆ Milestone: Control Link Prototype Delivered for FEB2 Prototype      |  |
| <b>6.04.01.03.09 FE Electronics-SMU Data and Control Links for F</b> |   | <b>390</b>  | <b>0%</b>  | <b>12-Feb-21</b>      | <b>29-Aug-22</b> | <b>12-Feb-21</b> | <b>29-Aug-22</b> | <b>587</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 29-Aug-22, 6.04.01.03.09 FE Electronics-SMU Data and C              |  |
| <b>No AP2 Task Group - Temp</b>                                      |   | <b>390</b>  | <b>0%</b>  | <b>12-Feb-21</b>      | <b>29-Aug-22</b> | <b>12-Feb-21</b> | <b>29-Aug-22</b> | <b>587</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 29-Aug-22, No AP2 Task Group - Temp                                 |  |
| FEE31090   | Merge Control and Data Links System Level Design                | 60          | 0%         | 12-Feb-21             | 10-May-21        | 12-Feb-21        | 10-May-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Links System Level Design                    |  |
| FEE31110   | Merge Control and Data Links Schematics Level Design            | 60          | 0%         | 10-May-21             | 04-Aug-21        | 10-May-21        | 04-Aug-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Links Schematics Level Design                |  |
| FEE31120   | Merge Control and Data Links Layout Design                      | 53          | 0%         | 04-Aug-21             | 20-Oct-21        | 04-Aug-21        | 20-Oct-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Links Layout Design                          |  |
| FEE31130   | Milestone: data+control link layout merged                      | 0           | 0%         |                       | 20-Oct-21        |                  | 20-Oct-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ◆ Milestone: data+control link layout merged                          |  |
| FEE31140   | Merge Control and Data Link PCB Level Design                    | 44          | 0%         | 20-Oct-21             | 22-Dec-21        | 20-Oct-21        | 22-Dec-21        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Link PCB Level Design                        |  |
| FEE31150   | Merge Control and Data Link FEB2 Integration                    | 43          | 0%         | 22-Dec-21             | 24-Feb-22        | 22-Dec-21        | 24-Feb-22        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Link FEB2 Integration                        |  |
| FEE31150T  | Travel: Merge Control and Data Link FEB2 Integration            | 43          | 0%         | 22-Dec-21             | 24-Feb-22        | 22-Dec-21        | 24-Feb-22        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Travel: Merge Control and Data Link FEB2 Integration                |  |
| FEE31160   | Milestone: Data and Control Link Design for Production Complete | 0           | 0%         |                       | 24-Feb-22        |                  | 24-Feb-22        | 294         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ◆ Milestone: Data and Control Link Design for Production Complete     |  |
| FEE31170   | Merge Control and Data Links Performance Testing                | 43          | 0%         | 24-Feb-22             | 26-Apr-22        | 24-Feb-22        | 26-Apr-22        | 415         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Links Performance Testing                    |  |
| FEE31180   | Merge Control and Data Links Environmental and Lifetime Testing | 43          | 0%         | 26-Apr-22             | 27-Jun-22        | 26-Apr-22        | 27-Jun-22        | 415         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Merge Control and Data Links Environmental and Lifetime Te          |  |
| FEE31185   | Documentation   | 44          | 0%         | 27-Jun-22             | 29-Aug-22        | 27-Jun-22        | 29-Aug-22        | 587         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Documentation   |  |
| <b>6.04.01.90 L3 Project Management</b>                              |   | <b>2023</b> | <b>0%</b>  | <b>02-Oct-17</b>      | <b>30-Sep-25</b> | <b>02-Oct-17</b> | <b>30-Sep-25</b> | <b>0</b>    |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 30-Sep-25, 6.04.01.90   |  |
| <b>L3 Project Management</b>   |   | <b>2023</b> | <b>0%</b>  | <b>02-Oct-17</b>      | <b>30-Sep-25</b> | <b>02-Oct-17</b> | <b>30-Sep-25</b> | <b>0</b>    |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 30-Sep-25, L3 Project M   |  |
| MGT43090   | Project Management - FY18                                       | 252         | 0%         | 02-Oct-17             | 28-Sep-18        | 02-Oct-17        | 28-Sep-18        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY18   |  |
| MGT43100   | Project Management - FY19                                       | 253         | 0%         | 01-Oct-18             | 30-Sep-19        | 01-Oct-18        | 30-Sep-19        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY19   |  |
| MGT43110   | Project Management - FY20                                       | 254         | 0%         | 01-Oct-19             | 30-Sep-20        | 01-Oct-19        | 30-Sep-20        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY20   |  |
| MGT43120   | Project Management - FY21                                       | 253         | 0%         | 01-Oct-20             | 30-Sep-21        | 01-Oct-20        | 30-Sep-21        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY21   |  |
| MGT43130   | Project Management - FY22                                       | 253         | 0%         | 01-Oct-21             | 30-Sep-22        | 01-Oct-21        | 30-Sep-22        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY22   |  |
| MGT43140   | Project Management - FY23                                       | 252         | 0%         | 03-Oct-22             | 29-Sep-23        | 03-Oct-22        | 29-Sep-23        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY23   |  |
| MGT43150   | Project Management - FY24                                       | 253         | 0%         | 02-Oct-23             | 30-Sep-24        | 02-Oct-23        | 30-Sep-24        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - FY24   |  |
| MGT43160   | Project Management - FY25                                       | 253         | 0%         | 01-Oct-24             | 30-Sep-25        | 01-Oct-24        | 30-Sep-25        | 0           |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ■ Project Management - F  |  |
| <b>6.04.02 FEB2</b>  |   | <b>2275</b> | <b>0%</b>  | <b>03-Oct-16</b>      | <b>30-Sep-25</b> | <b>03-Oct-16</b> | <b>30-Sep-25</b> | <b>4</b>    |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 30-Sep-25, 6.04.02 FEB  |  |
| <b>6.04.02.01 Columbia</b>   |   | <b>2056</b> | <b>0%</b>  | <b>03-Oct-16</b>      | <b>11-Nov-24</b> | <b>03-Oct-16</b> | <b>18-Nov-24</b> | <b>223</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 18-Nov-24, 6.04.02.01 Columbia                                      |  |
| <b>6.04.02.01.01 LAr FEB2 Analog Test PCB (PA/shaper + ADC)</b>      |   | <b>495</b>  | <b>0%</b>  | <b>02-Oct-17</b>      | <b>16-Sep-19</b> | <b>02-Oct-17</b> | <b>16-Sep-19</b> | <b>255</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 16-Sep-19, 6.04.02.01.01 LAr FEB2 Analog Test PCB (PA/shaper + ADC) |  |
| <b>No AP2 Task Group - Temp</b>                                      |   | <b>495</b>  | <b>0%</b>  | <b>02-Oct-17</b>      | <b>16-Sep-19</b> | <b>02-Oct-17</b> | <b>16-Sep-19</b> | <b>255</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                      | ▶ 16-Sep-19, No AP2 Task Group - Temp                                 |  |
| FEB21002   | FEB2 Architecture Study - Dataflow                              | 44          | 0%         | 02-Oct-17             | 04-Dec-17        | 02-Oct-17        | 04-Dec-17        | 27          |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ■ FEB2 Architecture Study - Dataflow |   |  |

■ Primary Baseline   
■ Remaining Work   
◆ Milestone   
■ Critical Remaining Work   
▶ Summary







| ATLAS Upgrade Phase II - LAr                                     |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             | 25-Oct-19 13:57 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |
|--|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|-----------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|---|
| Activity ID  | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016            |   | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |   |
|  |   |            |            |                       |                  |                  |                  |             | Q               | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q   | Q   |
| FEB21235   | Milestone: Start 20 Prototype Board Fabrication                         | 0          | 0%         |                       | 18-Oct-21        |                  | 18-Oct-21        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ Milestone: Start 20 Prototype Board Fabrication |
| FEB21240T  | Travel for 20 Prototype Board Fabrication                               | 39         | 0%         | 18-Oct-21             | 13-Dec-21        | 18-Oct-21        | 13-Dec-21        | 252         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for 20 Prototype Board Fabrication                               |   |
| FEB21240   | 20 Prototype Board Fabrication  | 42         | 0%         | 18-Oct-21             | 16-Dec-21        | 18-Oct-21        | 16-Dec-21        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ 20 Prototype Board Fabrication  |   |
| FEB21240M  | Material for 20 Prototype Board Fabrication                             | 1          | 0%         | 15-Dec-21             | 16-Dec-21        | 15-Dec-21        | 16-Dec-21        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for 20 Prototype Board Fabrication                             |   |
| FEB21245   | 20 Prototype Board Functional Test                                      | 20         | 0%         | 16-Dec-21             | 17-Jan-22        | 16-Dec-21        | 17-Jan-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ 20 Prototype Board Functional Test                                      |   |
| FEB21250M  | Material for Ship 16 FEB2 Prototypes Boards to BNL                      | 4          | 0%         | 17-Jan-22             | 21-Jan-22        | 17-Jan-22        | 21-Jan-22        | 250         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Ship 16 FEB2 Prototypes Boards to BNL                      |   |
| FEB21250   | Ship 16 FEB2 Prototypes Boards to BNL                                   | 5          | 0%         | 17-Jan-22             | 24-Jan-22        | 17-Jan-22        | 24-Jan-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Ship 16 FEB2 Prototypes Boards to BNL                                   |   |
| FEB21250A  | AVAIL: 16 FEB2 Prototype Boards for BNL                                 | 0          | 0%         |                       | 24-Jan-22        |                  | 24-Jan-22        | 255         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ AVAIL: 16 FEB2 Prototype Boards for BNL                                 |   |
| FEB21260   | Prototype Board Performance Test in FEC Test BNL                        | 44         | 0%         | 24-Jan-22             | 28-Mar-22        | 24-Jan-22        | 28-Mar-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Prototype Board Performance Test in FEC Test BNL                        |   |
| FEB21260T  | Travel for Prototype Board Performance Test in FEC Test BNL             | 44         | 0%         | 24-Jan-22             | 28-Mar-22        | 24-Jan-22        | 28-Mar-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Prototype Board Performance Test in FEC Test BNL             |   |
| FEB21270   | Document FEB2 Results of FEC Test                                       | 22         | 0%         | 28-Mar-22             | 27-Apr-22        | 28-Mar-22        | 27-Apr-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Document FEB2 Results of FEC Test                                       |   |
| FEB21280   | Milestone: Completion of Prototype                                      | 0          | 0%         |                       | 27-Apr-22        |                  | 27-Apr-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: Completion of Prototype                                      |   |
| FEB21282EX   | External Milestone: ATLAS FDR for FEB2                                  | 0          | 0%         |                       | 27-Apr-22        |                  | 27-Apr-22        | 255         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ External Milestone: ATLAS FDR for FEB2                                  |   |
| <b>6.04.02.01.05 LAr FEB2 Preproduction (w/final components)</b> |   | <b>149</b> | <b>0%</b>  | <b>21-Apr-22</b>      | <b>22-Nov-22</b> | <b>21-Apr-22</b> | <b>22-Nov-22</b> | <b>249</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▬ 22-Nov-22, 6.04.02.01.05 LAr FEB2 Preproduction (w/final components)    |   |
| <b>No AP2 Task Group - Temp</b>                                  |   | <b>149</b> | <b>0%</b>  | <b>21-Apr-22</b>      | <b>22-Nov-22</b> | <b>21-Apr-22</b> | <b>22-Nov-22</b> | <b>249</b>  |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ▬ 22-Nov-22, No AP2 Task Group - Temp                                     |   |
| FEB21329R  | REQD: Optical Modules from SMU 1ST 50%                                  | 0          | 0%         | 21-Apr-22             |                  | 21-Apr-22        |                  | 314         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ REQD: Optical Modules from SMU 1ST 50%                                  |   |
| FEB21328R  | REQD: Received PA/shaper Chips from BNL - First 25%                     | 0          | 0%         | 29-Apr-22             |                  | 27-Apr-22        |                  | 310         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ REQD: Received PA/shaper Chips from BNL - First 25%                     |   |
| FEB21290   | Pre-Production Board Schematics Design                                  | 20         | 0%         | 27-Apr-22             | 25-May-22        | 27-Apr-22        | 25-May-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Pre-Production Board Schematics Design                                  |   |
| FEB21300   | Pre-Production Board Layout Design                                      | 20         | 0%         | 25-May-22             | 23-Jun-22        | 25-May-22        | 23-Jun-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Pre-Production Board Layout Design                                      |   |
| FEB21324R  | REQD: Received ADC Chips from Nevis/UT Austin - First 12%               | 0          | 0%         | 20-Jun-22             |                  | 20-Jun-22        |                  | 272         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ REQD: Received ADC Chips from Nevis/UT Austin - First 12%               |   |
| FEB21310   | Pre-Production Board Design Review                                      | 10         | 0%         | 23-Jun-22             | 08-Jul-22        | 23-Jun-22        | 08-Jul-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Pre-Production Board Design Review                                      |   |
| FEB21310T  | Travel for Pre-Production Board Design Review                           | 10         | 0%         | 23-Jun-22             | 08-Jul-22        | 23-Jun-22        | 08-Jul-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Travel for Pre-Production Board Design Review                           |   |
| FEB21320   | Pre-Production Board Design Finalization                                | 10         | 0%         | 08-Jul-22             | 22-Jul-22        | 08-Jul-22        | 22-Jul-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Pre-Production Board Design Finalization                                |   |
| FEB21322   | Milestone: Pre-Production Board Design Completed                        | 0          | 0%         |                       | 22-Jul-22        |                  | 22-Jul-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ◆ Milestone: Pre-Production Board Design Completed                        |   |
| FEB21330M10  | Solicit for Quote   | 10         | 0%         | 22-Jul-22             | 05-Aug-22        | 22-Jul-22        | 05-Aug-22        | 256         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Solicit for Quote   |   |
| FEB21332M  | Material for PCB Fabrication and Assembly                               | 41         | 0%         | 22-Jul-22             | 20-Sep-22        | 22-Jul-22        | 20-Sep-22        | 251         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for PCB Fabrication and Assembly                               |   |
| FEB21330   | Pre-Production Board Fabrication (w/Final Components)                   | 43         | 0%         | 22-Jul-22             | 22-Sep-22        | 22-Jul-22        | 22-Sep-22        | 249         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Pre-Production Board Fabrication (w/Final Components)                   |   |
| FEB21330M20  | Select Vendor   | 5          | 0%         | 05-Aug-22             | 12-Aug-22        | 05-Aug-22        | 12-Aug-22        | 256         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Select Vendor   |   |
| FEB21330M30  | Delivery  | 20         | 0%         | 12-Aug-22             | 12-Sep-22        | 12-Aug-22        | 12-Sep-22        | 256         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Delivery  |   |
| FEB21330M40  | PMT: Closeout FOR Pre-Production Board Fabrication (w/Final Components) | 1          | 0%         | 12-Sep-22             | 13-Sep-22        | 12-Sep-22        | 13-Sep-22        | 256         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ PMT: Closeout FOR Pre-Production Board Fabrication (w/Final Components) |   |
| FEB21340M  | Material for Pre-Production Board Functional Test (QTY = 10)            | 21         | 0%         | 22-Sep-22             | 24-Oct-22        | 22-Sep-22        | 24-Oct-22        | 250         |                 |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | ■ Material for Pre-Production Board Functional Test (QTY = 10)            |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary

| ATLAS Upgrade Phase II - LAr                    |  |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |  |  |
|---|--|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|--|--|
| Activity ID                                     | Activity Name  | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027   |  |
|   |  |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q  | Q  |
| FEB21340T                                       | Travel for Pre-Production Board Functional Test (QTY = 10)         | 21         | 0%         | 22-Sep-22             | 24-Oct-22        | 22-Sep-22        | 24-Oct-22        | 250         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |  | Travel for Pre-Production Board Functional Test (QTY = 10) |
| FEB21340  | Pre-Production Board Functional Test (QTY = 10)                    | 22         | 0%         | 22-Sep-22             | 25-Oct-22        | 22-Sep-22        | 25-Oct-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Pre-Production Board Functional Test (QTY = 10)                    |  |
| FEB21350  | Pre-Production Board Performance Test                              | 20         | 0%         | 25-Oct-22             | 22-Nov-22        | 25-Oct-22        | 22-Nov-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Pre-Production Board Performance Test                              |  |
| FEB21360  | Milestone: Completion of Pre-Production                            | 0          | 0%         |                       | 22-Nov-22        |                  | 22-Nov-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ Milestone: Completion of Pre-Production                          |  |
| FEB21365EX                                      | External Milestone: ATLAS PRR for FEB2                             | 0          | 0%         |                       | 22-Nov-22        |                  | 22-Nov-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ External Milestone: ATLAS PRR for FEB2                           |  |
| <b>6.04.02.01.06 LAr FEB2 Production Design</b> |  | <b>40</b>  | <b>0%</b>  | <b>22-Nov-22</b>      | <b>20-Jan-23</b> | <b>22-Nov-22</b> | <b>20-Jan-23</b> | <b>249</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ▼ 20-Jan-23, 6.04.02.01.06 LAr FEB2 Production Design              |  |
| <b>No AP2 Task Group - Temp</b>                 |  | <b>40</b>  | <b>0%</b>  | <b>22-Nov-22</b>      | <b>20-Jan-23</b> | <b>22-Nov-22</b> | <b>20-Jan-23</b> | <b>249</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ▼ 20-Jan-23, No AP2 Task Group - Temp                              |  |
| FEB21370  | Production Board Schematics Design                                 | 10         | 0%         | 22-Nov-22             | 07-Dec-22        | 22-Nov-22        | 07-Dec-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Schematics Design                                 |  |
| FEB21380  | Production Board Layout Design                                     | 10         | 0%         | 07-Dec-22             | 21-Dec-22        | 07-Dec-22        | 21-Dec-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Layout Design                                     |  |
| FEB21390  | Production Board Design Review                                     | 10         | 0%         | 21-Dec-22             | 06-Jan-23        | 21-Dec-22        | 06-Jan-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Design Review                                     |  |
| FEB21390T                                       | Travel for Production Board Design Review                          | 10         | 0%         | 21-Dec-22             | 06-Jan-23        | 21-Dec-22        | 06-Jan-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board Design Review                          |  |
| FEB21400  | Production Board Design Finalization                               | 10         | 0%         | 06-Jan-23             | 20-Jan-23        | 06-Jan-23        | 20-Jan-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Design Finalization                               |  |
| FEB21410  | Milestone: FEB2 Design ready for Production                        | 0          | 0%         | 20-Jan-23             |                  | 20-Jan-23        |                  | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ Milestone: FEB2 Design ready for Production                      |  |
| <b>6.04.02.01.07 LAr FEB2 Production</b>        |  | <b>828</b> | <b>0%</b>  | <b>11-Aug-21</b>      | <b>11-Nov-24</b> | <b>11-Aug-21</b> | <b>18-Nov-24</b> | <b>223</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | 18-Nov-24, 6.04.02.01.07 LAr FEB2 Production                       |  |
| <b>No AP2 Task Group - Temp</b>                 |  | <b>828</b> | <b>0%</b>  | <b>11-Aug-21</b>      | <b>11-Nov-24</b> | <b>11-Aug-21</b> | <b>18-Nov-24</b> | <b>223</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | 18-Nov-24, No AP2 Task Group - Temp                                |  |
| FEB21484R                                       | REQD: Optical Modules from SMU Final 50%                           | 0          | 0%         | 11-Aug-21             |                  | 11-Aug-21        |                  | 699         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: Optical Modules from SMU Final 50%                         |  |
| FEB21420M                                       | PMT: for Production Board PCB Fabrication - First 25%              | 21         | 0%         | 20-Jan-23             | 21-Feb-23        | 20-Jan-23        | 21-Feb-23        | 250         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Fabrication - First 25%              |  |
| FEB21420  | Production Board PCB Fabrication - First 25%                       | 22         | 0%         | 20-Jan-23             | 22-Feb-23        | 20-Jan-23        | 22-Feb-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Fabrication - First 25%                       |  |
| FEB21446R                                       | REQD: Received PA/shaper Chips from BNL - Second 25%               | 0          | 0%         | 31-Jan-23             |                  | 27-Jan-23        |                  | 330         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: Received PA/shaper Chips from BNL - Second 25%             |  |
| FEB21430  | Production Board PCB Assembly - First Articles                     | 20         | 0%         | 22-Feb-23             | 22-Mar-23        | 22-Feb-23        | 22-Mar-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Assembly - First Articles                     |  |
| FEB21430M                                       | Material for Production Board PCB Assembly - First Articles        | 20         | 0%         | 22-Feb-23             | 22-Mar-23        | 22-Feb-23        | 22-Mar-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Production Board PCB Assembly - First Articles        |  |
| FEB21430T                                       | Travel for Production Board PCB Assembly - First Articles          | 20         | 0%         | 22-Feb-23             | 22-Mar-23        | 22-Feb-23        | 22-Mar-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board PCB Assembly - First Articles          |  |
| FEB21442R                                       | REQD: Received ADC Chips from Nevis/UT Austin - Second 25%         | 0          | 0%         | 08-Mar-23             |                  | 08-Mar-23        |                  | 303         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: Received ADC Chips from Nevis/UT Austin - Second 25%       |  |
| FEB21440  | Production Board Test - First Articles (QTY = 7)                   | 20         | 0%         | 22-Mar-23             | 19-Apr-23        | 22-Mar-23        | 19-Apr-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Test - First Articles (QTY = 7)                   |  |
| FEB21440T                                       | Travel for Production Board Test - First Articles (QTY = 7)        | 20         | 0%         | 22-Mar-23             | 19-Apr-23        | 22-Mar-23        | 19-Apr-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board Test - First Articles (QTY = 7)        |  |
| FEB21450  | Production Board PCB Assembly - First 25% (QTY = 405)              | 23         | 0%         | 19-Apr-23             | 22-May-23        | 19-Apr-23        | 22-May-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Assembly - First 25% (QTY = 405)              |  |
| FEB21450M                                       | PMT: for Production Board PCB Assembly - First 25% (QTY = 405)     | 1          | 0%         | 19-May-23             | 22-May-23        | 19-May-23        | 22-May-23        | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Assembly - First 25% (QTY = 405)     |  |
| FEB21490M                                       | PMT: for Production Board PCB Fabrication - Second 25% (QTY = 405) | 21         | 0%         | 22-May-23             | 21-Jun-23        | 22-May-23        | 21-Jun-23        | 250         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Fabrication - Second 25% (QTY = 405) |  |
| FEB21490  | Production Board PCB Fabrication - Second 25% (QTY = 405)          | 22         | 0%         | 22-May-23             | 22-Jun-23        | 22-May-23        | 22-Jun-23        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Fabrication - Second 25% (QTY = 405)          |  |
| FEB21460M                                       | Material for Production Board Test - First 25% (QTY = 405)         | 42         | 0%         | 22-May-23             | 21-Jul-23        | 22-May-23        | 21-Jul-23        | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Production Board Test - First 25% (QTY = 405)         |  |
| FEB21460T                                       | Travel for Production Board Test - First 25% (QTY = 405)           | 42         | 0%         | 22-May-23             | 21-Jul-23        | 22-May-23        | 21-Jul-23        | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board Test - First 25% (QTY = 405)           |  |

█ Primary Baseline   
█ Remaining Work   
█ Actual Work   
█ Critical Remaining Work   
◆ Milestone   
▶ Summary



| ATLAS Upgrade Phase II - LAr |   |          |            | AP2 Detailed Schedule |           |           |           |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |
|------------------------------|---|----------|------------|-----------------------|-----------|-----------|-----------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|---|
| Activity ID                  | Activity Name   | Duration | % Complete | BL Start              | BL Finish | WS Start  | WS Finish | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |   |
|                              |   |          |            |                       |           |           |           |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q   |
| FEB21460                     | Production Board Test - First 25% (QTY = 405)                           | 43       | 0%         | 22-May-23             | 24-Jul-23 | 22-May-23 | 24-Jul-23 | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Test - First 25% (QTY = 405)                           |
| FEB21470M                    | Material for Ship First Set of 160 FEB2 Boards to BNL                   | 43       | 0%         | 22-May-23             | 24-Jul-23 | 22-May-23 | 24-Jul-23 | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Ship First Set of 160 FEB2 Boards to BNL                   |
| FEB21470                     | Ship First Set of 160 FEB2 Boards to BNL                                | 44       | 0%         | 22-May-23             | 25-Jul-23 | 22-May-23 | 25-Jul-23 | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Ship First Set of 160 FEB2 Boards to BNL                                |
| FEB21471A                    | AVAIL: Set of 160 FEB2 Boards for BNL                                   | 0        | 0%         | 30-May-23             |           | 30-May-23 |           | 254         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ AVAIL: Set of 160 FEB2 Boards for BNL                                 |
| FEB21480                     | Ship First Set of 160 FEB2 Boards to Non-US Test Facility               | 44       | 0%         | 30-May-23             | 01-Aug-23 | 30-May-23 | 01-Aug-23 | 319         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Ship First Set of 160 FEB2 Boards to Non-US Test Facility               |
| FEB21480M                    | Material for Ship First Set of 160 FEB2 Boards to Non-US Test Facility  | 44       | 0%         | 30-May-23             | 01-Aug-23 | 30-May-23 | 01-Aug-23 | 319         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Ship First Set of 160 FEB2 Boards to Non-US Test Facility  |
| FEB21486R                    | REQD: Received PA/shaper Chips from BNL - Third 25%                     | 0        | 0%         | 05-Jun-23             |           | 01-Jun-23 |           | 312         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: Received PA/shaper Chips from BNL - Third 25%                   |
| FEB21500                     | Production Board PCB Assembly - Second 25% (QTY = 405)                  | 21       | 0%         | 22-Jun-23             | 24-Jul-23 | 22-Jun-23 | 24-Jul-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Assembly - Second 25% (QTY = 405)                  |
| FEB21500T                    | Travel for Production Board PCB Assembly - Second 25% (QTY = 405)       | 21       | 0%         | 22-Jun-23             | 24-Jul-23 | 22-Jun-23 | 24-Jul-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board PCB Assembly - Second 25% (QTY = 405)       |
| FEB21482R                    | REQD: Received ADC Chips from Nevis/UT Austin - Third 25%               | 0        | 0%         | 29-Jun-23             |           | 29-Jun-23 |           | 292         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: Received ADC Chips from Nevis/UT Austin - Third 25%             |
| FEB21500M                    | PMT: for Production Board PCB Assembly - Second 25% (QTY = 405)         | 1        | 0%         | 21-Jul-23             | 24-Jul-23 | 21-Jul-23 | 24-Jul-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Assembly - Second 25% (QTY = 405)         |
| FEB21550                     | Production Board PCB Fabrication - Third 25% (QTY = 405)                | 23       | 0%         | 24-Jul-23             | 24-Aug-23 | 24-Jul-23 | 24-Aug-23 | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Fabrication - Third 25% (QTY = 405)                |
| FEB21550M                    | PMT: for Production Board PCB Fabrication - Third 25% (QTY = 405)       | 23       | 0%         | 24-Jul-23             | 24-Aug-23 | 24-Jul-23 | 24-Aug-23 | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Fabrication - Third 25% (QTY = 405)       |
| FEB21530M                    | Material for Ship Second Set of 160 FEB2 Boards to BNL                  | 42       | 0%         | 24-Jul-23             | 21-Sep-23 | 24-Jul-23 | 21-Sep-23 | 283         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Ship Second Set of 160 FEB2 Boards to BNL                  |
| FEB21540M                    | Material for Ship Second Set of 160 FEB2 Boards to Non-US Test Facility | 42       | 0%         | 24-Jul-23             | 21-Sep-23 | 24-Jul-23 | 21-Sep-23 | 283         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Ship Second Set of 160 FEB2 Boards to Non-US Test Facility |
| FEB21530                     | Ship Second Set of 160 FEB2 Boards to BNL                               | 43       | 0%         | 24-Jul-23             | 22-Sep-23 | 24-Jul-23 | 22-Sep-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Ship Second Set of 160 FEB2 Boards to BNL                               |
| FEB21540                     | Ship Second Set of 160 FEB2 Boards to Non-US Test Facility              | 43       | 0%         | 24-Jul-23             | 22-Sep-23 | 24-Jul-23 | 22-Sep-23 | 283         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Ship Second Set of 160 FEB2 Boards to Non-US Test Facility              |
| FEB21510                     | Production Board Test - Second 25% (QTY = 405)                          | 44       | 0%         | 24-Jul-23             | 25-Sep-23 | 24-Jul-23 | 25-Sep-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Test - Second 25% (QTY = 405)                          |
| FEB21530A                    | AVAIL: Second Set of 160 FEB2 Boards for BNL                            | 0        | 0%         |                       | 31-Jul-23 |           | 31-Jul-23 | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ AVAIL: Second Set of 160 FEB2 Boards for BNL                          |
| FEB21560T                    | Travel for Production Board PCB Assembly - Third 25% (QTY = 405)        | 20       | 0%         | 25-Aug-23             | 22-Sep-23 | 25-Aug-23 | 22-Sep-23 | 277         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for Production Board PCB Assembly - Third 25% (QTY = 405)        |
| FEB21560                     | Production Board PCB Assembly - Third 25% (QTY = 405)                   | 21       | 0%         | 25-Aug-23             | 25-Sep-23 | 25-Aug-23 | 25-Sep-23 | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board PCB Assembly - Third 25% (QTY = 405)                   |
| FEB21560M                    | PMT: for Production Board PCB Assembly - Third 25% (QTY = 405)          | 1        | 0%         | 25-Sep-23             | 25-Sep-23 | 25-Sep-23 | 25-Sep-23 | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | PMT: for Production Board PCB Assembly - Third 25% (QTY = 405)          |
| FEB21541                     | Milestone: FEB2 Fabrication 50% Complete                                | 0        | 0%         |                       | 25-Sep-23 |           | 25-Sep-23 | 281         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ Milestone: FEB2 Fabrication 50% Complete                              |
| FEB21570                     | Production Board Test - Third 25% (QTY = 405)                           | 44       | 0%         | 26-Sep-23             | 28-Nov-23 | 26-Sep-23 | 28-Nov-23 | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Production Board Test - Third 25% (QTY = 405)                           |
| FEB21719R                    | REQD: First 25% FEB2 from BNL   | 0        | 0%         | 03-Nov-23             |           | 02-Oct-23 |           | 264         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ REQD: First 25% FEB2 from BNL   |
| FEB21720T                    | Travel for FEB2 Acceptance Tests at CERN - First 25%                    | 29       | 0%         | 03-Nov-23             | 15-Dec-23 | 02-Oct-23 | 13-Nov-23 | 292         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for FEB2 Acceptance Tests at CERN - First 25%                    |
| FEB21720                     | FEB2 Acceptance Tests at CERN - First 25%                               | 30       | 0%         | 03-Nov-23             | 18-Dec-23 | 02-Oct-23 | 14-Nov-23 | 264         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | FEB2 Acceptance Tests at CERN - First 25%                               |
| FEB21580A                    | AVAIL: Third Set of 160 FEB2 Boards for BNL                             | 0        | 0%         | 03-Oct-23             |           | 03-Oct-23 |           | 276         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ AVAIL: Third Set of 160 FEB2 Boards for BNL                           |
| FEB21580M                    | Material for Ship Third Set of 160 FEB2 Boards to BNL                   | 42       | 0%         | 03-Oct-23             | 01-Dec-23 | 03-Oct-23 | 01-Dec-23 | 341         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for Ship Third Set of 160 FEB2 Boards to BNL                   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary



| ATLAS Upgrade Phase II - LAR            |   |          |            | AP2 Detailed Schedule |           |           |           |             |   | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
|---|---|----------|------------|-----------------------|-----------|-----------|-----------|-------------|---|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|--|
| Activity ID                             | Activity Name   | Duration | % Complete | BL Start              | BL Finish | WS Start  | WS Finish | Total Float | 2016  |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |  |
|   |   |          |            |                       |           |           |           |             | Q   | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q  |
| FEB21683M                               | Material for Production Board Debugging/Repair - 2nd 50% (QTY =           | 28       | 0%         | 25-Jun-24             | 05-Aug-24 | 25-Jun-24 | 05-Aug-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Production Board Debugging/Repair - 2nd 50% (QTY = 173)           |
| FEB21690M                               | Material for Ship Final Set of FEB2 Boards to Non-US Test Facility (QTY = | 28       | 0%         | 25-Jun-24             | 05-Aug-24 | 25-Jun-24 | 05-Aug-24 | 230         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Ship Final Set of FEB2 Boards to Non-US Test Facility (QTY = 166) |
| FEB21683                                | Production Board Debugging/Repair - 2nd 50% (QTY = 173)                   | 30       | 0%         | 25-Jun-24             | 07-Aug-24 | 25-Jun-24 | 07-Aug-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Production Board Debugging/Repair - 2nd 50% (QTY = 173)                        |
| FEB21687                                | Production Board Test - Repaired Sample - 2nd 50% (QTY = 173)             | 30       | 0%         | 25-Jun-24             | 07-Aug-24 | 25-Jun-24 | 07-Aug-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Production Board Test - Repaired Sample - 2nd 50% (QTY = 173)                  |
| FEB21690                                | Ship Final Set of FEB2 Boards to Non-US Test Facility (QTY = 166)         | 30       | 0%         | 25-Jun-24             | 07-Aug-24 | 25-Jun-24 | 07-Aug-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Ship Final Set of FEB2 Boards to Non-US Test Facility (QTY = 166)              |
| FEB21700                                | MS Tier 2 Physics Division: FEB2 Delivery Complete                        | 0        | 0%         |                       | 07-Aug-24 |           | 07-Aug-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | MS Tier 2 Physics Division: FEB2 Delivery Complete                             |
| FEB21710                                | Finalize FEB2 Documentation   | 66       | 0%         | 07-Aug-24             | 11-Nov-24 | 07-Aug-24 | 11-Nov-24 | 228         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Finalize FEB2 Documentation  |
| FEB21759R                               | REQD: Final 25% FEB2 from BNL   | 0        | 0%         | 05-Aug-24             |           | 04-Oct-24 |           | 223         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | REQD: Final 25% FEB2 from BNL  |
| FEB21760T                               | Travel for FEB2 Acceptance Tests at CERN - Final 25%                      | 29       | 0%         | 07-Aug-24             | 18-Sep-24 | 04-Oct-24 | 15-Nov-24 | 224         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for FEB2 Acceptance Tests at CERN - Final 25%                           |
| FEB21760                                | FEB2 Acceptance Tests at CERN - Final 25%                                 | 30       | 0%         | 07-Aug-24             | 19-Sep-24 | 04-Oct-24 | 18-Nov-24 | 223         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | FEB2 Acceptance Tests at CERN - Final 25%                                      |
| FEB21770                                | Milestone: FEB2 Acceptance Tests at CERN - 100% Complete                  | 0        | 0%         |                       | 19-Sep-24 |           | 18-Nov-24 | 223         |   |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Milestone: FEB2 Acceptance Tests at CERN - 100% Complete                       |
| <b>6.04.02.01.08 Software License</b>   |   | 1874     | 0%         | 03-Oct-16             | 01-Mar-24 | 03-Oct-16 | 01-Mar-24 | 405         | 01-Mar-24, 6.04.02.01.08 Software License           |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| <b>No AP2 Task Group - Temp</b>         |   | 1874     | 0%         | 03-Oct-16             | 01-Mar-24 | 03-Oct-16 | 01-Mar-24 | 405         | 01-Mar-24, No AP2 Task Group - Temp                 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21780                                | PADS Software License from Mentor FY17                                    | 103      | 0%         | 03-Oct-16             | 01-Mar-17 | 03-Oct-16 | 01-Mar-17 | 405         | PADS Software License from Mentor FY17              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21780M                               | Material for PADS Software License from Mentor FY17                       | 1        | 0%         | 01-Mar-17             | 01-Mar-17 | 01-Mar-17 | 01-Mar-17 | 405         | Material for PADS Software License from Mentor FY17 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21790                                | PADS Software License from Mentor FY18                                    | 253      | 0%         | 02-Mar-17             | 01-Mar-18 | 02-Mar-17 | 01-Mar-18 | 405         | PADS Software License from Mentor FY18              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21790M                               | Material for PADS Software License from Mentor FY18                       | 1        | 0%         | 01-Mar-18             | 01-Mar-18 | 01-Mar-18 | 01-Mar-18 | 405         | Material for PADS Software License from Mentor FY18 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21800                                | PADS Software License from Mentor FY19                                    | 253      | 0%         | 02-Mar-18             | 01-Mar-19 | 02-Mar-18 | 01-Mar-19 | 405         | PADS Software License from Mentor FY19              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21800M                               | Material for PADS Software License from Mentor FY19                       | 1        | 0%         | 01-Mar-19             | 01-Mar-19 | 01-Mar-19 | 01-Mar-19 | 405         | Material for PADS Software License from Mentor FY19 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21810                                | PADS Software License from Mentor FY20                                    | 253      | 0%         | 04-Mar-19             | 02-Mar-20 | 04-Mar-19 | 02-Mar-20 | 405         | PADS Software License from Mentor FY20              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21810M                               | Material for PADS Software License from Mentor FY20                       | 1        | 0%         | 02-Mar-20             | 02-Mar-20 | 02-Mar-20 | 02-Mar-20 | 405         | Material for PADS Software License from Mentor FY20 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21820                                | PADS Software License from Mentor FY21                                    | 252      | 0%         | 03-Mar-20             | 01-Mar-21 | 03-Mar-20 | 01-Mar-21 | 405         | PADS Software License from Mentor FY21              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21820M                               | Material for PADS Software License from Mentor FY21                       | 1        | 0%         | 01-Mar-21             | 01-Mar-21 | 01-Mar-21 | 01-Mar-21 | 405         | Material for PADS Software License from Mentor FY21 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21830                                | PADS Software License from Mentor FY22                                    | 253      | 0%         | 02-Mar-21             | 01-Mar-22 | 02-Mar-21 | 01-Mar-22 | 405         | PADS Software License from Mentor FY22              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21830M                               | Material for PADS Software License from Mentor FY22                       | 1        | 0%         | 01-Mar-22             | 01-Mar-22 | 01-Mar-22 | 01-Mar-22 | 405         | Material for PADS Software License from Mentor FY22 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21840                                | PADS Software License from Mentor FY23                                    | 253      | 0%         | 02-Mar-22             | 01-Mar-23 | 02-Mar-22 | 01-Mar-23 | 405         | PADS Software License from Mentor FY23              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21840M                               | Material for PADS Software License from Mentor FY23                       | 1        | 0%         | 01-Mar-23             | 01-Mar-23 | 01-Mar-23 | 01-Mar-23 | 405         | Material for PADS Software License from Mentor FY23 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21850                                | PADS Software License from Mentor FY24                                    | 254      | 0%         | 02-Mar-23             | 01-Mar-24 | 02-Mar-23 | 01-Mar-24 | 405         | PADS Software License from Mentor FY24              |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| FEB21850M                               | Material for PADS Software License from Mentor FY24                       | 1        | 0%         | 01-Mar-24             | 01-Mar-24 | 01-Mar-24 | 01-Mar-24 | 405         | Material for PADS Software License from Mentor FY24 |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| <b>6.04.02.90 L3 Project Management</b> |   | 2023     | 0%         | 02-Oct-17             | 30-Sep-25 | 02-Oct-17 | 30-Sep-25 | 0           | 30-Sep-25, 6.04.02.90 L3 Project Management         |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |
| <b>L3 Project Management</b>            |   | 2023     | 0%         | 02-Oct-17             | 30-Sep-25 | 02-Oct-17 | 30-Sep-25 | 0           | 30-Sep-25, L3 Project Management                    |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |

█ Primary Baseline   
█ Remaining Work   
█ Actual Work   
█ Critical Remaining Work   
◆ Milestone   
▬ Summary

| Activity ID                                      | Activity Name   | Duration    | % Complete | BL Start         | BL Finish        | WS Start         | WS Finish        | Total Float | 2016-2027  |      |      |      |      |      |      |      |      |      |      |      |
|--|---|-------------|------------|------------------|------------------|------------------|------------------|-------------|--|------|------|------|------|------|------|------|------|------|------|------|
|  |   |             |            |                  |                  |                  |                  |             | 2016   | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
| MGT43170   | Project Management - FY18   | 252         | 0%         | 02-Oct-17        | 28-Sep-18        | 02-Oct-17        | 28-Sep-18        | 0           | Project Management - FY18  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43180   | Project Management - FY19   | 253         | 0%         | 01-Oct-18        | 30-Sep-19        | 01-Oct-18        | 30-Sep-19        | 0           | Project Management - FY19  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43190   | Project Management - FY20   | 254         | 0%         | 01-Oct-19        | 30-Sep-20        | 01-Oct-19        | 30-Sep-20        | 0           | Project Management - FY20  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43200   | Project Management - FY21   | 253         | 0%         | 01-Oct-20        | 30-Sep-21        | 01-Oct-20        | 30-Sep-21        | 0           | Project Management - FY21  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43210   | Project Management - FY22   | 253         | 0%         | 01-Oct-21        | 30-Sep-22        | 01-Oct-21        | 30-Sep-22        | 0           | Project Management - FY22  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43220   | Project Management - FY23   | 252         | 0%         | 03-Oct-22        | 29-Sep-23        | 03-Oct-22        | 29-Sep-23        | 0           | Project Management - FY23  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43230   | Project Management - FY24   | 253         | 0%         | 02-Oct-23        | 30-Sep-24        | 02-Oct-23        | 30-Sep-24        | 0           | Project Management - FY24  |      |      |      |      |      |      |      |      |      |      |      |
| MGT43240   | Project Management - FY25   | 253         | 0%         | 01-Oct-24        | 30-Sep-25        | 01-Oct-24        | 30-Sep-25        | 0           | Project Management - FY25  |      |      |      |      |      |      |      |      |      |      |      |
| <b>6.04.03 BE Electronics</b>                    |   | <b>2023</b> | <b>0%</b>  | <b>02-Oct-17</b> | <b>23-Dec-25</b> | <b>02-Oct-17</b> | <b>30-Sep-25</b> | <b>759</b>  | 30-Sep-25, 6.04.03 BE  |      |      |      |      |      |      |      |      |      |      |      |
| <b>6.04.03.01 BE-Electronics-SB</b>              |   | <b>1772</b> | <b>0%</b>  | <b>02-Jan-18</b> | <b>19-Dec-24</b> | <b>02-Jan-18</b> | <b>02-Jan-25</b> | <b>948</b>  | 02-Jan-25, 6.04.03.01 BE-Elect   |      |      |      |      |      |      |      |      |      |      |      |
| <b>6.04.03.01.01 BEE Pre-Prototype V1 Design</b> |   | <b>465</b>  | <b>0%</b>  | <b>02-Jan-18</b> | <b>31-Oct-19</b> | <b>02-Jan-18</b> | <b>31-Oct-19</b> | <b>307</b>  | 31-Oct-19, 6.04.03.01.01 BEE Pre-Prototype V1 Design                                   |      |      |      |      |      |      |      |      |      |      |      |
| <b>BEE Pre-Prototype V1 Design</b>               |   | <b>465</b>  | <b>0%</b>  | <b>02-Jan-18</b> | <b>31-Oct-19</b> | <b>02-Jan-18</b> | <b>31-Oct-19</b> | <b>307</b>  | 31-Oct-19, BEE Pre-Prototype V1 Design   |      |      |      |      |      |      |      |      |      |      |      |
| BEE10010   | Evaluate Phase I LASP MB and AMC Parts Obsolence                          | 34          | 0%         | 02-Jan-18        | 16-Feb-18        | 02-Jan-18*       | 16-Feb-18        | 0           | Evaluate Phase I LASP MB and AMC Parts Obsolence                                       |      |      |      |      |      |      |      |      |      |      |      |
| BEE10020   | Study New Phase I LASP MB and AMC Parts                                   | 31          | 0%         | 20-Feb-18        | 03-Apr-18        | 20-Feb-18        | 03-Apr-18        | 235         | Study New Phase I LASP MB and AMC Parts  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10030   | Select FPGA, GbE Switch and Major Parts Needing Replacement               | 44          | 0%         | 04-Apr-18        | 05-Jun-18        | 04-Apr-18        | 05-Jun-18        | 235         | Select FPGA, GbE Switch and Major Parts Needing Replacement                            |      |      |      |      |      |      |      |      |      |      |      |
| BEE10040   | Purchase FPGA Evaluation Board and Develop Simple Example Firmware        | 28          | 0%         | 06-Jun-18        | 16-Jul-18        | 06-Jun-18        | 16-Jul-18        | 235         | Purchase FPGA Evaluation Board and Develop Simple Example Firmware                     |      |      |      |      |      |      |      |      |      |      |      |
| BEE10040M  | Material for Purchasing FPGA Evaluation Board and Develop Simple          | 28          | 0%         | 16-Jul-18        | 16-Jul-18        | 06-Jun-18        | 16-Jul-18        | 235         | Material for Purchasing FPGA Evaluation Board and Develop Simple Example Firmware      |      |      |      |      |      |      |      |      |      |      |      |
| BEE10050   | Further Develop V1 Firmware   | 29          | 0%         | 17-Jul-18        | 24-Aug-18        | 17-Jul-18        | 24-Aug-18        | 235         | Further Develop V1 Firmware  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10060   | Debug V1 Firmware   | 29          | 0%         | 27-Aug-18        | 05-Oct-18        | 27-Aug-18        | 05-Oct-18        | 235         | Debug V1 Firmware  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10070   | Milestone: I/O and Architecture Conceptual Design                         | 0           | 0%         |                  | 05-Oct-18        |                  | 05-Oct-18        | 235         | Milestone: I/O and Architecture Conceptual Design                                      |      |      |      |      |      |      |      |      |      |      |      |
| BEE10075A  | AVAIL: I/O and Architecture Conceptual Design                             | 0           | 0%         |                  | 05-Oct-18        |                  | 05-Oct-18        | 235         | AVAIL: I/O and Architecture Conceptual Design  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10080   | sRTM V1 Designs   | 45          | 0%         | 08-Oct-18        | 11-Dec-18        | 08-Oct-18        | 11-Dec-18        | 265         | sRTM V1 Designs  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10085   | Purchase Xilinx FPGA Evaluation Board and Develop Simple Example Firmware | 45          | 0%         | 08-Oct-18        | 11-Dec-18        | 08-Oct-18        | 11-Dec-18        | 403         | Purchase Xilinx FPGA Evaluation Board and Develop Simple Example Firmware              |      |      |      |      |      |      |      |      |      |      |      |
| BEE10085M  | Material for Purchase Xilinx FPGA Evaluation Board and Develop Simple     | 45          | 0%         | 11-Dec-18        | 11-Dec-18        | 08-Oct-18        | 11-Dec-18        | 403         | Material for Purchase Xilinx FPGA Evaluation Board and Develop Simple Example Firmware |      |      |      |      |      |      |      |      |      |      |      |
| BEE10090   | sRTM V1 Schematics, Infrastructure and Power                              | 33          | 0%         | 12-Dec-18        | 29-Jan-19        | 12-Dec-18        | 29-Jan-19        | 265         | sRTM V1 Schematics, Infrastructure and Power   |      |      |      |      |      |      |      |      |      |      |      |
| BEE10095   | sRTM V1 Schematics, FPGA  | 31          | 0%         | 30-Jan-19        | 14-Mar-19        | 30-Jan-19        | 14-Mar-19        | 265         | sRTM V1 Schematics, FPGA   |      |      |      |      |      |      |      |      |      |      |      |
| BEE10150   | sRTM Eval Test Card Infrastructure Design and Schematic                   | 30          | 0%         | 15-Mar-19        | 25-Apr-19        | 15-Mar-19        | 25-Apr-19        | 265         | sRTM Eval Test Card Infrastructure Design and Schematic                                |      |      |      |      |      |      |      |      |      |      |      |
| BEE10100   | sRTM V1 Schematics, Electro-Optics  | 32          | 0%         | 15-Mar-19        | 29-Apr-19        | 15-Mar-19        | 29-Apr-19        | 307         | sRTM V1 Schematics, Electro-Optics   |      |      |      |      |      |      |      |      |      |      |      |
| BEE10125   | sRTM V1 Layout, Infrastructure and Power                                  | 43          | 0%         | 15-Mar-19        | 14-May-19        | 15-Mar-19        | 14-May-19        | 280         | sRTM V1 Layout, Infrastructure and Power   |      |      |      |      |      |      |      |      |      |      |      |
| BEE10125M  | Material for sRTM V1 Layout   | 43          | 0%         | 14-May-19        | 14-May-19        | 15-Mar-19        | 14-May-19        | 280         | Material for sRTM V1 Layout  |      |      |      |      |      |      |      |      |      |      |      |
| BEE10160   | sRTM Eval Test Card Electro-Optics Block Design and Schematic             | 20          | 0%         | 26-Apr-19        | 23-May-19        | 26-Apr-19        | 23-May-19        | 265         | sRTM Eval Test Card Electro-Optics Block Design and Schematic                          |      |      |      |      |      |      |      |      |      |      |      |
| BEE10105   | sRTM V1 Firmware Development  | 43          | 0%         | 30-Apr-19        | 28-Jun-19        | 30-Apr-19        | 28-Jun-19        | 307         | sRTM V1 Firmware Development   |      |      |      |      |      |      |      |      |      |      |      |



| ATLAS Upgrade Phase II - LAr                      |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|---|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID                                       | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|   |   |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q |
| BEE10105M   | Material for sRTM V1 Firmware Development                     | 43         | 0%         | 28-Jun-19             | 28-Jun-19        | 30-Apr-19        | 28-Jun-19        | 307         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10130  | sRTM V1 Layout, FPGA  | 42         | 0%         | 15-May-19             | 15-Jul-19        | 15-May-19        | 15-Jul-19        | 280         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10170  | sRTM Eval Test Card Schematic Review                          | 5          | 0%         | 24-May-19             | 31-May-19        | 24-May-19        | 31-May-19        | 265         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10180  | sRTM Eval Test Card Testing Firmware and Software Development | 44         | 0%         | 24-May-19             | 26-Jul-19        | 24-May-19        | 26-Jul-19        | 374         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10190  | sRTM Eval Test Card PCB Layout, Infrastructure                | 40         | 0%         | 03-Jun-19             | 29-Jul-19        | 03-Jun-19        | 29-Jul-19        | 265         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10110  | sRTM V1 Software Development                                  | 43         | 0%         | 01-Jul-19             | 29-Aug-19        | 01-Jul-19        | 29-Aug-19        | 307         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10135  | sRTM V1 Layout, Electro-Optics                                | 48         | 0%         | 16-Jul-19             | 20-Sep-19        | 16-Jul-19        | 20-Sep-19        | 280         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10195  | sRTM Eval Test Card PCB Layout, Electro-Optics                | 60         | 0%         | 30-Jul-19             | 23-Oct-19        | 30-Jul-19        | 23-Oct-19        | 265         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10120  | sRTM V1 Software and Firmware Integration                     | 43         | 0%         | 29-Aug-19             | 31-Oct-19        | 29-Aug-19        | 31-Oct-19        | 307         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10140  | sRTM V1 Layout Review   | 10         | 0%         | 23-Sep-19             | 04-Oct-19        | 23-Sep-19        | 04-Oct-19        | 280         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.03.01.02 BEE Pre-Prototype V1 Testing</b> |   | <b>137</b> | <b>0%</b>  | <b>01-Apr-20</b>      | <b>14-Oct-20</b> | <b>01-Apr-20</b> | <b>14-Oct-20</b> | <b>329</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>BEE Pre-Prototype V1 Testing</b>               |   | <b>137</b> | <b>0%</b>  | <b>01-Apr-20</b>      | <b>14-Oct-20</b> | <b>01-Apr-20</b> | <b>14-Oct-20</b> | <b>329</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10200  | sRTM V1 PCB Manufacture                                       | 20         | 0%         | 01-Apr-20             | 28-Apr-20        | 01-Apr-20        | 28-Apr-20        | 158         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10200M   | Material for sRTM V1 PCB Manufacture                          | 20         | 0%         | 28-Apr-20             | 28-Apr-20        | 01-Apr-20        | 28-Apr-20        | 158         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10220  | sRTM V1 Test Card PCB Manufacture                             | 23         | 0%         | 01-Apr-20             | 01-May-20        | 01-Apr-20        | 01-May-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10220M   | Material for sRTM V1 Test Card PCB Manufacture                | 23         | 0%         | 01-May-20             | 01-May-20        | 01-Apr-20        | 01-May-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10210  | sRTM V1 PCB Preseries Assembly                                | 25         | 0%         | 29-Apr-20             | 03-Jun-20        | 29-Apr-20        | 03-Jun-20        | 158         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10210M   | Material for sRTM V1 PCB Preseries Assembly (2 Boards)        | 25         | 0%         | 03-Jun-20             | 03-Jun-20        | 29-Apr-20        | 03-Jun-20        | 158         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10230  | sRTM V1 Test Card PCB Assembly                                | 25         | 0%         | 04-May-20             | 08-Jun-20        | 04-May-20        | 08-Jun-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10230M   | Material for sRTM V1 Test Card PCB Assembly                   | 25         | 0%         | 08-Jun-20             | 08-Jun-20        | 04-May-20        | 08-Jun-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10240  | sRTM V1 and V1 Test Card Validation, System                   | 30         | 0%         | 09-Jun-20             | 21-Jul-20        | 09-Jun-20        | 21-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10240M   | Material for sRTM V1 and V1 Test Card Validation, System      | 30         | 0%         | 21-Jul-20             | 21-Jul-20        | 09-Jun-20        | 21-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10240T   | Travel for sRTM V1 and V1 Test Card Validation, System        | 30         | 0%         | 09-Jun-20             | 21-Jul-20        | 09-Jun-20        | 21-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10250  | Receive Test LASP   | 5          | 0%         | 22-Jul-20             | 28-Jul-20        | 22-Jul-20        | 28-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10250M   | Material for Receive Test LASP                                | 5          | 0%         | 22-Jul-20             | 28-Jul-20        | 22-Jul-20        | 28-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10260EX  | External Milestone: Recieve of Test LASP                      | 0          | 0%         |                       | 28-Jul-20        |                  | 28-Jul-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10270  | sRTM V1 and V1 Test Card Validation, High Speed I/O           | 50         | 0%         | 29-Jul-20             | 07-Oct-20        | 29-Jul-20        | 07-Oct-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10275A   | AVAIL: sRTM V1 for AZ   | 0          | 0%         |                       | 07-Oct-20        |                  | 07-Oct-20        | 333         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10280A   | AVAIL: sRTM V1 for BNL  | 0          | 0%         |                       | 07-Oct-20        |                  | 07-Oct-20        | 232         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10285EX  | External Milestone: ATLAS PDR                                 | 0          | 0%         | 08-Oct-20             |                  | 08-Oct-20        |                  | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10290T   | Travel for ATLAS PDR  | 4          | 0%         | 08-Oct-20             | 14-Oct-20        | 08-Oct-20        | 14-Oct-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| BEE10295  | Milestone: ATLAS PDR  | 0          | 0%         |                       | 14-Oct-20        |                  | 14-Oct-20        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.03.01.03 BEE Pre-Prototype V2</b>         |   | <b>255</b> | <b>0%</b>  | <b>15-Oct-20</b>      | <b>18-Oct-21</b> | <b>15-Oct-20</b> | <b>18-Oct-21</b> | <b>193</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>BEE Pre-Prototype V2</b>                       |   | <b>255</b> | <b>0%</b>  | <b>15-Oct-20</b>      | <b>18-Oct-21</b> | <b>15-Oct-20</b> | <b>18-Oct-21</b> | <b>193</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary



| ATLAS Upgrade Phase II - LAr            |  |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  |  |
|---|--|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|--|--|
| Activity ID                             | Activity Name  | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |  |  |
|   |  |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q  | Q  |
| BEE10520                                | Prototype sRTM Infrastructure Design and Schematic Changes         | 10         | 0%         | 19-Oct-21             | 01-Nov-21        | 19-Oct-21        | 01-Nov-21        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |  | Prototype sRTM Infrastructure Design and Schematic Changes |
| BEE10620                                | Prototype sRTM Test Card Schematic Changes                         | 18         | 0%         | 19-Oct-21             | 11-Nov-21        | 19-Oct-21        | 11-Nov-21        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Test Card Schematic Changes                         |  |
| BEE10530                                | Prototype sRTM FPGA block Design and Schematic Changes             | 10         | 0%         | 02-Nov-21             | 15-Nov-21        | 02-Nov-21        | 15-Nov-21        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM FPGA block Design and Schematic Changes             |  |
| BEE10630                                | Prototype sRTM Test Card PCB Layout Changes                        | 45         | 0%         | 12-Nov-21             | 18-Jan-22        | 12-Nov-21        | 18-Jan-22        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Test Card PCB Layout Changes                        |  |
| BEE10540                                | Prototype sRTM Schematic Review                                    | 5          | 0%         | 16-Nov-21             | 22-Nov-21        | 16-Nov-21        | 22-Nov-21        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Schematic Review                                    |  |
| BEE10570                                | Prototype sRTM Testing Firmware and Software Changes               | 43         | 0%         | 23-Nov-21             | 25-Jan-22        | 23-Nov-21        | 25-Jan-22        | 210         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Testing Firmware and Software Changes               |  |
| BEE10590                                | Prototype sRTM PCB Layout Changes                                  | 43         | 0%         | 23-Nov-21             | 25-Jan-22        | 23-Nov-21        | 25-Jan-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM PCB Layout Changes                                  |  |
| BEE10590M                               | Material for Prototype sRTM PCB Layout Changes                     | 43         | 0%         | 25-Jan-22             | 25-Jan-22        | 23-Nov-21        | 25-Jan-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Prototype sRTM PCB Layout Changes                     |  |
| BEE10640                                | Prototype sRTM Test Card PCB Manufacture                           | 20         | 0%         | 19-Jan-22             | 15-Feb-22        | 19-Jan-22        | 15-Feb-22        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Test Card PCB Manufacture                           |  |
| BEE10640M                               | Material for Prototype sRTM Test Card PCB Manufacture              | 20         | 0%         | 15-Feb-22             | 15-Feb-22        | 19-Jan-22        | 15-Feb-22        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Prototype sRTM Test Card PCB Manufacture              |  |
| BEE10600                                | Prototype sRTM PCB Manufacture, 5 Boards                           | 23         | 0%         | 26-Jan-22             | 28-Feb-22        | 26-Jan-22        | 28-Feb-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM PCB Manufacture, 5 Boards                           |  |
| BEE10600M                               | Material Payment for Prototype sRTM PCB Manufacture, 5 Boards      | 23         | 0%         | 28-Feb-22             | 28-Feb-22        | 26-Jan-22        | 28-Feb-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material Payment for Prototype sRTM PCB Manufacture, 5 Boards      |  |
| BEE10650                                | Prototype sRTM Test Card PCB Assembly                              | 20         | 0%         | 16-Feb-22             | 16-Mar-22        | 16-Feb-22        | 16-Mar-22        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Test Card PCB Assembly                              |  |
| BEE10650M                               | Material for Prototype sRTM Test Card PCB Assembly                 | 20         | 0%         | 16-Mar-22             | 16-Mar-22        | 16-Feb-22        | 16-Mar-22        | 175         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Prototype sRTM Test Card PCB Assembly                 |  |
| BEE10610                                | Prototype sRTM PCB Assembly, 5 boards                              | 32         | 0%         | 01-Mar-22             | 13-Apr-22        | 01-Mar-22        | 13-Apr-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM PCB Assembly, 5 boards                              |  |
| BEE10610M                               | Material Payment for Prototype sRTM PCB Assembly, 5 boards         | 32         | 0%         | 13-Apr-22             | 13-Apr-22        | 01-Mar-22        | 13-Apr-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material Payment for Prototype sRTM PCB Assembly, 5 boards         |  |
| BEE10660                                | Prototype sRTM Validation  | 44         | 0%         | 14-Apr-22             | 15-Jun-22        | 14-Apr-22        | 15-Jun-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Prototype sRTM Validation  |  |
| BEE106560T                              | Travel for Prototype sRTM Validation                               | 44         | 0%         | 14-Apr-22             | 15-Jun-22        | 14-Apr-22        | 15-Jun-22        | 1592        |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for Prototype sRTM Validation                               |  |
| BEE10660M                               | Material for Prototype sRTM Validation                             | 44         | 0%         | 14-Jun-22             | 15-Jun-22        | 14-Apr-22        | 15-Jun-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Prototype sRTM Validation                             |  |
| BEE10661                                | Ship 2 Prototype Boards to BNL for BEC Evaluation Performance Test | 2          | 0%         |                       |                  | 16-Jun-22        | 17-Jun-22        | 194         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Ship 2 Prototype Boards to BNL for BEC Evaluation Performance Test |  |
| BEE10662                                | Ship 1 Prototype Board to AZ for Firmware Test                     | 2          | 0%         |                       |                  | 16-Jun-22        | 17-Jun-22        | 155         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Ship 1 Prototype Board to AZ for Firmware Test                     |  |
| BEE10662T                               | Travel for Ship 1 Prototype Board to AZ for Firmware Test          | 2          | 0%         |                       |                  | 16-Jun-22        | 17-Jun-22        | 249         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for Ship 1 Prototype Board to AZ for Firmware Test          |  |
| BEE10665A                               | AVAIL: 2 Pre-Production Boards for BNL                             | 0          | 0%         |                       |                  |                  | 17-Jun-22        | 194         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | AVAIL: 2 Pre-Production Boards for BNL                             |  |
| BEE10666A                               | AVAIL: 1 Pre-Production Board for AZ                               | 0          | 0%         |                       |                  |                  | 17-Jun-22        | 1590        |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | AVAIL: 1 Pre-Production Board for AZ                               |  |
| BEE10667R                               | REQD: LASP BEC Evaluation Performance Test Results                 | 0          | 0%         |                       |                  | 08-Sep-22        |                  | 193         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | REQD: LASP BEC Evaluation Performance Test Results                 |  |
| BEE10670EX                              | External Milestone: ATLAS FDR                                      | 0          | 0%         | 16-Jun-22             |                  | 08-Sep-22        |                  | 1534        |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | External Milestone: ATLAS FDR                                      |  |
| BEE10680                                | Milestone: ATLAS FDR   | 0          | 0%         |                       | 21-Jun-22        |                  | 08-Sep-22        | 193         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Milestone: ATLAS FDR   |  |
| <b>6.04.03.01.05 BEE Pre-Production</b> |  | <b>208</b> | <b>0%</b>  | <b>22-Jun-22</b>      | <b>22-May-23</b> | <b>08-Sep-22</b> | <b>05-Jul-23</b> | <b>356</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | 05-Jul-23, 6.04.03.01.05 BEE Pre-Production                        |  |
| <b>No AP2 Task Group - Temp</b>         |  | <b>208</b> | <b>0%</b>  | <b>22-Jun-22</b>      | <b>22-May-23</b> | <b>08-Sep-22</b> | <b>05-Jul-23</b> | <b>356</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | 05-Jul-23, No AP2 Task Group - Temp                                |  |
| BEE10685                                | Pre-Production sRTM Schematic Changes                              | 15         | 0%         | 22-Jun-22             | 13-Jul-22        | 08-Sep-22        | 28-Sep-22        | 193         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Production sRTM Schematic Changes                              |  |
| BEE10690                                | Pre-Production sRTM PCB Layout Changes                             | 40         | 0%         | 14-Jul-22             | 08-Sep-22        | 29-Sep-22        | 25-Nov-22        | 193         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Production sRTM PCB Layout Changes                             |  |

█ Primary Baseline   
█ Remaining Work   
█ Actual Work   
█ Critical Remaining Work   
◆ Milestone   
▬ Summary









| ATLAS Upgrade Phase II - LAR                                   |  |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |  |  |
|--|--|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|--|--|
| Activity ID  | Activity Name  | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027   |  |
|  |  |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q  | Q  |
| BEE12240   | LASP FW - Packetizer Block - Develop Pre-prototype V1 FW                 | 40         | 0%         | 15-Jan-21             | 12-Mar-21        | 15-Jan-21        | 12-Mar-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |  | LASP FW - Packetizer Block - Develop Pre-prototype V1 FW |
| BEE12245   | LASP FW - MON Block - Develop Pre-prototype V1 FW                        | 40         | 0%         | 15-Jan-21             | 12-Mar-21        | 15-Jan-21        | 12-Mar-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |  | LASP FW - MON Block - Develop Pre-prototype V1 FW        |
| BEE12280   | SRTM FW - GBT Block - Develop Pre-prototype V1 FW                        | 40         | 0%         | 15-Jan-21             | 12-Mar-21        | 15-Jan-21        | 12-Mar-21        | 176         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - GBT Block - Develop Pre-prototype V1 FW                        |  |
| BEE12280M  | Material (Test Cards) for SRTM FW - GBT Block - Develop Pre-prototype V1 | 40         | 0%         | 15-Jan-21             | 12-Mar-21        | 15-Jan-21        | 12-Mar-21        | 176         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material (Test Cards) for SRTM FW - GBT Block - Develop Pre-prototype V1 |  |
| BEE12280T  | Travel for SRTM FW - GBT Block - Develop Pre-prototype V1 FW             | 40         | 0%         | 15-Jan-21             | 12-Mar-21        | 15-Jan-21        | 12-Mar-21        | 186         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for SRTM FW - GBT Block - Develop Pre-prototype V1 FW             |  |
| BEE12250   | LASP FW - XAUI Block - Develop Pre-prototype V1 FW                       | 40         | 0%         | 15-Mar-21             | 07-May-21        | 15-Mar-21        | 07-May-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - XAUI Block - Develop Pre-prototype V1 FW                       |  |
| BEE12290   | SRTM FW - MGT Block - Develop Pre-prototype V1 FW                        | 40         | 0%         | 15-Mar-21             | 07-May-21        | 15-Mar-21        | 07-May-21        | 186         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - MGT Block - Develop Pre-prototype V1 FW                        |  |
| BEE12320   | LASP FW - Buffer Block - Simulate and Check Pre-prototype V1 FW          | 30         | 0%         | 10-May-21             | 21-Jun-21        | 10-May-21        | 21-Jun-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - Buffer Block - Simulate and Check Pre-prototype V1 FW          |  |
| BEE12320M  | Material forLASP FW - Buffer Block - Simulate and Check Pre-prototype V1 | 30         | 0%         | 10-May-21             | 21-Jun-21        | 10-May-21        | 21-Jun-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material forLASP FW - Buffer Block - Simulate and Check Pre-prototype    |  |
| BEE12320T  | Travel for LASP FW - Buffer Block - Simulate and Check Pre-prototype V1  | 30         | 0%         | 10-May-21             | 21-Jun-21        | 10-May-21        | 21-Jun-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for LASP FW - Buffer Block - Simulate and Check Pre-prototype V   |  |
| BEE12295   | SRTM FW - XAUI block - Develop Pre-prototype V1 FW                       | 40         | 0%         | 10-May-21             | 06-Jul-21        | 10-May-21        | 06-Jul-21        | 186         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - XAUI block - Develop Pre-prototype V1 FW                       |  |
| BEE12330   | LASP FW - Packetizer Block - Simulate and Check Pre-prototype V1 FW      | 30         | 0%         | 22-Jun-21             | 03-Aug-21        | 22-Jun-21        | 03-Aug-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - Packetizer Block - Simulate and Check Pre-prototype V1 FW      |  |
| BEE12360   | SRTM FW - SOC Block - Simulate and Check Pre-prototype V1 FW             | 30         | 0%         | 07-Jul-21             | 17-Aug-21        | 07-Jul-21        | 17-Aug-21        | 186         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - SOC Block - Simulate and Check Pre-prototype V1 FW             |  |
| BEE12340   | LASP FW - MON Block - Simulate and Check Pre-prototype V1 FW             | 30         | 0%         | 04-Aug-21             | 15-Sep-21        | 04-Aug-21        | 15-Sep-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - MON Block - Simulate and Check Pre-prototype V1 FW             |  |
| BEE12380   | SRTM FW - MGT Block - Simulate and Check Pre-prototype V1 FW             | 30         | 0%         | 18-Aug-21             | 29-Sep-21        | 18-Aug-21        | 29-Sep-21        | 186         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - MGT Block - Simulate and Check Pre-prototype V1 FW             |  |
| BEE12350   | LASP FW - XAUI Block - Simulate and Check Pre-prototype V1 FW            | 30         | 0%         | 16-Sep-21             | 28-Oct-21        | 16-Sep-21        | 28-Oct-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - XAUI Block - Simulate and Check Pre-prototype V1 FW            |  |
| BEE12370   | SRTM FW - GBT Block - Simulate and Check Pre-prototype V1 FW             | 30         | 0%         | 29-Oct-21             | 10-Dec-21        | 29-Oct-21        | 10-Dec-21        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - GBT Block - Simulate and Check Pre-prototype V1 FW             |  |
| BEE12390   | SRTM FW - XAUI block - Simulate and Check Pre-prototype V1 FW            | 30         | 0%         | 13-Dec-21             | 25-Jan-22        | 13-Dec-21        | 25-Jan-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - XAUI block - Simulate and Check Pre-prototype V1 FW            |  |
| BEE12390M  | Material for SRTM FW - XAUI block - Simulate and Check Pre-prototype V1  | 30         | 0%         | 13-Dec-21             | 25-Jan-22        | 13-Dec-21        | 25-Jan-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material for SRTM FW - XAUI block - Simulate and Check Pre-pro           |  |
| BEE12405   | LASP and SRTM FW - Prepare for Pre-Prototype V1 Tests with Hardware      | 40         | 0%         | 26-Jan-22             | 23-Mar-22        | 26-Jan-22        | 23-Mar-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP and SRTM FW - Prepare for Pre-Prototype V1 Tests with H             |  |
| BEE12410   | LASP FW - Validate Pre-prototype V1 FW with Hardware                     | 40         | 0%         | 24-Mar-22             | 18-May-22        | 24-Mar-22        | 18-May-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - Validate Pre-prototype V1 FW with Hardware                     |  |
| BEE12410M  | Material (Test Cards) for LASP FW - Validate Pre-prototype V1 FW with    | 40         | 0%         | 24-Mar-22             | 18-May-22        | 24-Mar-22        | 18-May-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Material (Test Cards) for LASP FW - Validate Pre-prototype V1 FW         |  |
| BEE12410T  | Travel for LASP FW - Validate Pre-prototype V1 FW with Hardware          | 40         | 0%         | 24-Mar-22             | 18-May-22        | 24-Mar-22        | 18-May-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for LASP FW - Validate Pre-prototype V1 FW with Hardwa            |  |
| BEE12420   | SRTM FW - Validate Pre-prototype V1 FW with Hardware                     | 40         | 0%         | 19-May-22             | 15-Jul-22        | 19-May-22        | 15-Jul-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - Validate Pre-prototype V1 FW with Hardware                     |  |
| BEE12420T  | Travel for SRTM FW - Validate Pre-prototype V1 FW with Hardware          | 40         | 0%         | 19-May-22             | 15-Jul-22        | 19-May-22        | 15-Jul-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | Travel for SRTM FW - Validate Pre-prototype V1 FW with Hard              |  |
| BEE12430   | Milestone: Specification of Mezzanine Protocols                          | 0          | 0%         |                       | 15-Jul-22        |                  | 15-Jul-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ◆ Milestone: Specification of Mezzanine Protocols                        |  |
| <b>6.04.03.02.03 Firmware and Integration Pre-Prototype V2</b> |  | <b>240</b> | <b>0%</b>  | <b>18-Jul-22</b>      | <b>27-Jun-23</b> | <b>18-Jul-22</b> | <b>27-Jun-23</b> | <b>136</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ▶ 27-Jun-23, 6.04.03.02.03 Firmware and Integrati                        |  |
| <b>No AP2 Task Group - Temp</b>                                |  | <b>240</b> | <b>0%</b>  | <b>18-Jul-22</b>      | <b>27-Jun-23</b> | <b>18-Jul-22</b> | <b>27-Jun-23</b> | <b>136</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | ▶ 27-Jun-23, No AP2 Task Group - Temp                                    |  |
| BEE12500   | LASP FW - Buffer Block - Develop Pre-prototype V2 FW                     | 40         | 0%         | 18-Jul-22             | 12-Sep-22        | 18-Jul-22        | 12-Sep-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | LASP FW - Buffer Block - Develop Pre-prototype V2 FW                     |  |
| BEE12530   | SRTM FW - SOC Block - Develop Pre-prototype V2 FW                        | 40         | 0%         | 18-Jul-22             | 12-Sep-22        | 18-Jul-22        | 12-Sep-22        | 136         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | SRTM FW - SOC Block - Develop Pre-prototype V2 FW                        |  |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▶ Summary









| ATLAS Upgrade Phase II - LAr                             |  |             |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|--|--|-------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID  | Activity Name  | Duration    | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|  |  |             |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q |
| MGT43300   | Project Management - FY23  | 252         | 0%         | 03-Oct-22             | 29-Sep-23        | 03-Oct-22        | 29-Sep-23        | 0           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| MGT43310   | Project Management - FY24  | 253         | 0%         | 02-Oct-23             | 30-Sep-24        | 02-Oct-23        | 30-Sep-24        | 0           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| MGT43320   | Project Management - FY25  | 253         | 0%         | 01-Oct-24             | 30-Sep-25        | 01-Oct-24        | 30-Sep-25        | 0           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.04 System Integration</b>                        |  | <b>2023</b> | <b>0%</b>  | <b>02-Oct-17</b>      | <b>30-Sep-25</b> | <b>02-Oct-17</b> | <b>30-Sep-25</b> | <b>4</b>    |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.04.01 FEB2 Integration-BNL</b>                   |  | <b>1524</b> | <b>0%</b>  | <b>01-Oct-18</b>      | <b>21-Nov-24</b> | <b>01-Oct-18</b> | <b>08-Oct-24</b> | <b>251</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.04.01.01 LAr FEB2 Slice Test PCB Integration</b> |  | <b>510</b>  | <b>0%</b>  | <b>01-Oct-18</b>      | <b>08-Jan-21</b> | <b>01-Oct-18</b> | <b>05-Oct-20</b> | <b>255</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>No AP2 Task Group - Temp</b>                          |  | <b>510</b>  | <b>0%</b>  | <b>01-Oct-18</b>      | <b>08-Jan-21</b> | <b>01-Oct-18</b> | <b>05-Oct-20</b> | <b>255</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460010  | Slice Test Board Test Stand Electrical Design                        | 45          | 0%         | 01-Oct-18             | 04-Dec-18        | 01-Oct-18        | 04-Dec-18        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460010T   | Travel for Slice Test Board Test Stand Electrical Design             | 45          | 0%         | 01-Oct-18             | 30-Nov-18        | 01-Oct-18        | 04-Dec-18        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460020  | Slice Test Board Test Stand Mechanical Design                        | 55          | 0%         | 05-Dec-18             | 22-Feb-19        | 05-Dec-18        | 22-Feb-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460020T   | Travel for Slice Test Board Test Stand Mechanical Design             | 55          | 0%         | 05-Dec-18             | 19-Feb-19        | 05-Dec-18        | 22-Feb-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460021  | LAr FEB2 Analog Test Board Test Stand Electrical Design              | 20          | 0%         |                       |                  | 25-Feb-19        | 22-Mar-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460021T   | Travel for LAr FEB2 Analog Test Board Test Stand Electrical Design   | 20          | 0%         |                       |                  | 25-Feb-19        | 22-Mar-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460022  | LAr FEB2 Analog Test Board Test Stand Mechanical Design              | 15          | 0%         |                       |                  | 25-Mar-19        | 12-Apr-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460022T   | Travel for LAr FEB2 Analog Test Board Test Stand Mechanical Design   | 15          | 0%         |                       |                  | 25-Mar-19        | 12-Apr-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460023  | LAr FEB2 Analog Test Board Test Stand Fabrication                    | 25          | 0%         |                       |                  | 15-Apr-19        | 17-May-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460023M   | Material for LAr FEB2 Analog Test Board Test Stand Fabrication       | 25          | 0%         |                       |                  | 15-Apr-19        | 17-May-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460023T   | Travel for LAr FEB2 Analog Test Board Test Stand Fabrication         | 25          | 0%         |                       |                  | 15-Apr-19        | 17-May-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460024  | LAr FEB2 Analog Test Board Test Stand Assembly                       | 20          | 0%         |                       |                  | 20-May-19        | 17-Jun-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460024M   | Material for LAr FEB2 Analog Test Board Test Stand Assembly          | 20          | 0%         |                       |                  | 20-May-19        | 17-Jun-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460024T   | Travel for LAr FEB2 Analog Test Board Test Stand Assembly            | 20          | 0%         |                       |                  | 20-May-19        | 17-Jun-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460025  | Milestone: LAr FEB2 Analog Test Board Test Stand Complete            | 0           | 0%         |                       |                  |                  | 17-Jun-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460026  | LAr FEB2 Analog Test Board Test Stand Hardware/Software Integration  | 20          | 0%         |                       |                  | 18-Jun-19        | 16-Jul-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460026M   | Material for LAr FEB2 Analog Test Board Test Stand Hardware/Software | 20          | 0%         |                       |                  | 18-Jun-19        | 16-Jul-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460026T   | Travel for LAr FEB2 Analog Test Board Test Stand Hardware/Software   | 20          | 0%         |                       |                  | 18-Jun-19        | 16-Jul-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460027R   | REQD: LAr FEB2 Analog Test Board                                     | 0           | 0%         |                       |                  |                  | 17-Jul-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460028  | LAr FEB2 Analog Test Board Test                                      | 43          | 0%         |                       |                  | 17-Jul-19        | 16-Sep-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460028T   | Travel for LAr FEB2 Analog Test Board Test                           | 43          | 0%         |                       |                  | 17-Jul-19        | 16-Sep-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460029  | Milestone: Completion of LAr FEB2 Analog Test Board Test             | 0           | 0%         |                       |                  |                  | 16-Sep-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460030  | Slice Test Board Test Stand Fabrication                              | 52          | 0%         | 25-Feb-19             | 22-Apr-19        | 17-Sep-19        | 29-Nov-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460030M   | Material for Slice Test Board Test Stand Fabrication                 | 52          | 0%         | 19-Apr-19             | 22-Apr-19        | 17-Sep-19        | 29-Nov-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

█ Primary Baseline   
█ Remaining Work   
█ Actual Work   
█ Critical Remaining Work   
◆ Milestone   
▬ Summary

| ATLAS Upgrade Phase II - LAr                          |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
|---|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|---|---|---|---|
| Activity ID   | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |   |   |   |   |
|   |   |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q | Q | Q | Q |
| SYS460030T  | Travel for Slice Test Board Test Stand Fabrication            | 52         | 0%         | 25-Feb-19             | 22-Apr-19        | 17-Sep-19        | 29-Nov-19        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460040   | Slice Test Board Test Stand Assembly                          | 43         | 0%         | 23-Apr-19             | 09-Jul-19        | 02-Dec-19        | 31-Jan-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460040M  | Material for Slice Test Board Test Stand Assembly             | 43         | 0%         | 09-Jul-19             | 09-Jul-19        | 02-Dec-19        | 31-Jan-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460040T  | Travel for Slice Test Board Test Stand Assembly               | 43         | 0%         | 23-Apr-19             | 05-Jul-19        | 02-Dec-19        | 31-Jan-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460050   | Milestone: Slice Test Board Test Stand Complete               | 0          | 0%         |                       | 09-Jul-19        |                  | 31-Jan-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460060   | Slice Test Board Test Stand Hardware Integration              | 40         | 0%         | 10-Jul-19             | 25-Sep-19        | 03-Feb-20        | 30-Mar-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460060M  | Material for Slice Test Board Test Stand Hardware Integration | 40         | 0%         | 25-Sep-19             | 25-Sep-19        | 03-Feb-20        | 30-Mar-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460060T  | Travel for Slice Test Board Test Stand Hardware Integration   | 40         | 0%         | 10-Jul-19             | 24-Sep-19        | 03-Feb-20        | 30-Mar-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460070   | Slice Test Board Test Stand Software Integration              | 45         | 0%         | 26-Sep-19             | 13-Dec-19        | 31-Mar-20        | 02-Jun-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460070T  | Travel for Slice Test Board Test Stand Software Integration   | 45         | 0%         | 26-Sep-19             | 11-Dec-19        | 31-Mar-20        | 02-Jun-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460075R  | REQD: Slice Test Board from COLUMBIA                          | 0          | 0%         |                       |                  | 03-Jun-20        |                  | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460080T  | Travel for Slice Test Board Evaluation Test                   | 44         | 0%         | 03-Jun-20             | 04-Aug-20        | 03-Jun-20        | 04-Aug-20        | 256         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460080   | Slice Test Board Evaluation Test                              | 45         | 0%         | 03-Jun-20             | 05-Aug-20        | 03-Jun-20        | 05-Aug-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460080M  | Material for Slice Test Board Evaluation Test                 | 45         | 0%         | 05-Aug-20             | 05-Aug-20        | 03-Jun-20        | 05-Aug-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460100   | Slice Test Board Performance Test                             | 42         | 0%         | 22-Oct-20             | 08-Jan-21        | 06-Aug-20        | 05-Oct-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460100T  | Travel for Slice Test Board Performance Test                  | 42         | 0%         | 22-Oct-20             | 05-Jan-21        | 06-Aug-20        | 05-Oct-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460110   | Milestone: Slice Test Board Performance Test Complete         | 0          | 0%         |                       | 08-Jan-21        |                  | 05-Oct-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| <b>6.04.04.01.02 FEB2 FE Crate System Integration</b> |   | <b>394</b> | <b>0%</b>  | <b>11-Jan-21</b>      | <b>27-Apr-22</b> | <b>06-Oct-20</b> | <b>27-Apr-22</b> | <b>255</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| <b>No AP2 Task Group - Temp</b>                       |   | <b>394</b> | <b>0%</b>  | <b>11-Jan-21</b>      | <b>27-Apr-22</b> | <b>06-Oct-20</b> | <b>27-Apr-22</b> | <b>255</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460120   | FEB2 FEC Test Stand Electrical Design                         | 60         | 0%         | 11-Jan-21             | 25-Feb-21        | 06-Oct-20        | 31-Dec-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460120T  | Travel for FEB2 FEC Test Stand Electrical Design              | 60         | 0%         | 11-Jan-21             | 24-Feb-21        | 06-Oct-20        | 31-Dec-20        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460130   | FEB2 FEC Test Stand Mechanical Design                         | 60         | 0%         | 26-Feb-21             | 28-Apr-21        | 04-Jan-21        | 29-Mar-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460130T  | Travel for FEB2 FEC Test Stand Mechanical Design              | 60         | 0%         | 26-Feb-21             | 28-Apr-21        | 04-Jan-21        | 29-Mar-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460140   | FEB2 FEC Test Stand Fabrication                               | 60         | 0%         | 29-Apr-21             | 29-Jun-21        | 30-Mar-21        | 22-Jun-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460140M  | Material for FEB2 FEC Test Stand Fabrication                  | 60         | 0%         | 29-Jun-21             | 29-Jun-21        | 30-Mar-21        | 22-Jun-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460140T  | Travel for FEB2 FEC Test Stand Fabrication                    | 60         | 0%         | 29-Apr-21             | 28-Jun-21        | 30-Mar-21        | 22-Jun-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460150   | FEB2 FEC Test Stand Assembly                                  | 60         | 0%         | 30-Jun-21             | 14-Sep-21        | 23-Jun-21        | 16-Sep-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460150M  | Material for FEB2 FEC Test Stand Assembly                     | 60         | 0%         | 14-Sep-21             | 14-Sep-21        | 23-Jun-21        | 16-Sep-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460150T  | Travel for FEB2 FEC Test Stand Assembly                       | 60         | 0%         | 30-Jun-21             | 10-Sep-21        | 23-Jun-21        | 16-Sep-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |
| SYS460160   | Milestone: FEB2 FEC Test Stand Complete                       | 0          | 0%         |                       | 14-Sep-21        |                  | 16-Sep-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |   |   |   |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▬ Summary

| ATLAS Upgrade Phase II - LAR                            |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|---|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Activity ID   | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |
|   |   |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q |
| SYS460170   | FEB2 FEC Test Stand Hardware Integration                        | 45         | 0%         | 15-Sep-21             | 17-Nov-21        | 17-Sep-21        | 19-Nov-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460170M  | Material for FEB2 FEC Test Stand Hardware Integration           | 45         | 0%         | 17-Nov-21             | 17-Nov-21        | 17-Sep-21        | 19-Nov-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460170T  | Travel for FEB2 FEC Test Stand Hardware Integration             | 45         | 0%         | 15-Sep-21             | 16-Nov-21        | 17-Sep-21        | 19-Nov-21        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460180   | FEB2 FEC Test Stand Software Integration                        | 43         | 0%         | 18-Nov-21             | 20-Jan-22        | 22-Nov-21        | 24-Jan-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460189R  | REQD: FEB2 Prototype Boards                                     | 0          | 0%         | 24-Jan-22             |                  | 25-Jan-22        |                  | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460190   | FEB2 FEC Evaluation Test  | 44         | 0%         | 24-Jan-22             | 28-Mar-22        | 25-Jan-22        | 28-Mar-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460190M  | Material for FEB2 FEC Evaluation Test                           | 44         | 0%         | 25-Mar-22             | 28-Mar-22        | 25-Jan-22        | 28-Mar-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460195   | Document FEB2 FEC Evaluation Test                               | 22         | 0%         |                       |                  | 29-Mar-22        | 27-Apr-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460210EX   | External Milestone: FEB2 FDR                                    | 0          | 0%         | 27-Apr-22             |                  | 27-Apr-22        |                  | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460200   | Milestone: FEB2 FEC Evaluation Test Complete                    | 0          | 0%         |                       | 28-Mar-22        |                  | 27-Apr-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>6.04.04.01.03 FEB2 Production System Integration</b> |   | <b>620</b> | <b>0%</b>  | <b>28-Mar-22</b>      | <b>21-Nov-24</b> | <b>28-Apr-22</b> | <b>08-Oct-24</b> | <b>251</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| <b>No AP2 Task Group - Temp</b>                         |   | <b>620</b> | <b>0%</b>  | <b>28-Mar-22</b>      | <b>21-Nov-24</b> | <b>28-Apr-22</b> | <b>08-Oct-24</b> | <b>251</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460220   | FEB2 Prod Test Stand Electrical Design                          | 21         | 0%         | 28-Mar-22             | 12-May-22        | 28-Apr-22        | 26-May-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460220T  | Travel for FEB2 Prod Test Stand Electrical Design               | 21         | 0%         | 28-Mar-22             | 11-May-22        | 28-Apr-22        | 26-May-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460230   | FEB2 Prod Test Stand Mechanical Design                          | 21         | 0%         | 12-May-22             | 01-Jul-22        | 27-May-22        | 27-Jun-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460230T  | Travel for FEB2 Prod Test Stand Mechanical Design               | 21         | 0%         | 12-May-22             | 30-Jun-22        | 27-May-22        | 27-Jun-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460240   | FEB2 Prod Test Stand Fabrication                                | 21         | 0%         | 01-Jul-22             | 16-Aug-22        | 28-Jun-22        | 27-Jul-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460240M  | Material for FEB2 Prod Test Stand Fabrication                   | 21         | 0%         | 15-Aug-22             | 16-Aug-22        | 28-Jun-22        | 27-Jul-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460240T  | Travel for FEB2 Prod Test Stand Fabrication                     | 21         | 0%         | 01-Jul-22             | 12-Aug-22        | 28-Jun-22        | 27-Jul-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460250   | FEB2 Prod Test Stand Assembly                                   | 21         | 0%         | 16-Aug-22             | 04-Oct-22        | 28-Jul-22        | 25-Aug-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460250M  | Material for FEB2 Prod Test Stand Assembly                      | 21         | 0%         | 03-Oct-22             | 04-Oct-22        | 28-Jul-22        | 25-Aug-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460250T  | Travel for FEB2 Prod Test Stand Assembly                        | 21         | 0%         | 16-Aug-22             | 29-Sep-22        | 28-Jul-22        | 25-Aug-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460260   | Milestone: FEB2 Prod Test Stand Complete                        | 0          | 0%         |                       | 04-Oct-22        |                  | 25-Aug-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460270   | FEB2 Prod Test Stand Hardware/Software Integration              | 20         | 0%         | 04-Oct-22             | 16-Nov-22        | 26-Aug-22        | 23-Sep-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460270M  | Material for FEB2 Prod Test Stand Hardware/Software Integration | 20         | 0%         | 15-Nov-22             | 16-Nov-22        | 26-Aug-22        | 23-Sep-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460270T  | Travel for FEB2 Prod Test Stand Hardware/Software Integration   | 20         | 0%         | 04-Oct-22             | 15-Nov-22        | 26-Aug-22        | 23-Sep-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460290   | FEB2 Prod Test Stand Database Integration                       | 20         | 0%         | 30-Dec-22             | 16-Feb-23        | 26-Sep-22        | 24-Oct-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460290M  | Material for FEB2 Prod Test Stand Database Integration          | 20         | 0%         | 15-Feb-23             | 16-Feb-23        | 26-Sep-22        | 24-Oct-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460290T  | Travel for FEB2 Prod Test Stand Database Integration            | 20         | 0%         | 30-Dec-22             | 14-Feb-23        | 26-Sep-22        | 24-Oct-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460300   | FEB2 Pre-Production Board Performance Test                      | 20         | 0%         | 16-Feb-23             | 24-Mar-23        | 25-Oct-22        | 21-Nov-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
| SYS460300T  | Travel for for FEB2 Pre-Production Board Performance Test       | 20         | 0%         | 16-Feb-23             | 23-Mar-23        | 25-Oct-22        | 21-Nov-22        | 255         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

■ Primary Baseline   
■ Remaining Work   
■ Actual Work   
■ Critical Remaining Work   
◆ Milestone   
▶ Summary







| Activity ID                                     | Activity Name   | Duration   | % Complete | BL Start         | BL Finish        | WS Start         | WS Finish        | Total Float | Gantt Chart |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|------------|------------|------------------|------------------|------------------|------------------|-------------|-------------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|   |   |            |            |                  |                  |                  |                  |             | 2016        | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460500                                       | Milestone: LASP Tech Eval Board Evaluation Test                         | 0          | 0%         |                  | 10-Oct-18        |                  | 10-Oct-18        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>6.04.04.02.02 LASP Prototype Integration</b> |   | <b>803</b> | <b>0%</b>  | <b>12-Oct-18</b> | <b>25-Mar-22</b> | <b>12-Oct-18</b> | <b>14-Dec-21</b> | <b>193</b>  |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>No AP2 Task Group - Temp</b>                 |   | <b>803</b> | <b>0%</b>  | <b>12-Oct-18</b> | <b>25-Mar-22</b> | <b>12-Oct-18</b> | <b>14-Dec-21</b> | <b>193</b>  |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460510                                       | LASP Prototype Test Stand Electrical Design                             | 45         | 0%         | 12-Oct-18        | 14-Dec-18        | 12-Oct-18        | 14-Dec-18        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460520                                       | LASP Prototype Test Stand Mechanical Design                             | 55         | 0%         | 17-Dec-18        | 06-Mar-19        | 17-Dec-18        | 06-Mar-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460521                                       | LASP-sRTM Test Stand Optical Test Board Electrical Design               | 41         | 0%         |                  |                  | 07-Mar-19        | 02-May-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460522                                       | LASP-sRTM Test Stand Optical Test Board Fabrication                     | 44         | 0%         |                  |                  | 03-May-19        | 05-Jul-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460522M                                      | Material for LASP-sRTM Test Stand Optical Test Board Fabrication        | 44         | 0%         |                  |                  | 03-May-19        | 05-Jul-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460523                                       | LASP-sRTM Optical Test Board Assembly                                   | 40         | 0%         |                  |                  | 08-Jul-19        | 30-Aug-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460523M                                      | Material for LASP-sRTM Optical Test Board Assembly                      | 40         | 0%         |                  |                  | 08-Jul-19        | 30-Aug-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460524                                       | LASP-sRTM Optical Test Board Hardware Integration                       | 43         | 0%         |                  |                  | 03-Sep-19        | 01-Nov-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460524M                                      | Material for LASP-sRTM Optical Test Board Hardware Integration          | 43         | 0%         |                  |                  | 03-Sep-19        | 01-Nov-19        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460525                                       | LASP-sRTM Evaluation Board Test Stand Electrical Design                 | 42         | 0%         |                  |                  | 04-Nov-19        | 03-Jan-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460526                                       | LASP-sRTM Evaluation Board Test Stand Mechanical Design                 | 44         | 0%         |                  |                  | 06-Jan-20        | 06-Mar-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460530                                       | LASP-sRTM Evaluation Board Test Stand Fabrication                       | 35         | 0%         | 07-Mar-19        | 02-May-19        | 09-Mar-20        | 24-Apr-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460530M                                      | Material for LASP-sRTM Evaluation Board Test Stand Fabrication          | 35         | 0%         | 02-May-19        | 02-May-19        | 09-Mar-20        | 24-Apr-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460540                                       | LASP-sRTM Evaluation Board Test Stand Assembly                          | 35         | 0%         | 03-May-19        | 19-Jul-19        | 27-Apr-20        | 15-Jun-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460540M                                      | Material for LASP-sRTM Evaluation Board Test Stand Assembly             | 35         | 0%         | 19-Jul-19        | 19-Jul-19        | 27-Apr-20        | 15-Jun-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460550                                       | Milestone: LASP-sRTM Evaluation Board Test Stand Complete               | 0          | 0%         |                  | 19-Jul-19        |                  | 15-Jun-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460560                                       | LASP-sRTM Evaluation Board Test Stand Hardware Integration              | 35         | 0%         | 22-Jul-19        | 23-Sep-19        | 16-Jun-20        | 04-Aug-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460560M                                      | Material for LASP-sRTM Evaluation Board Test Stand Hardware Integration | 35         | 0%         | 20-Sep-19        | 23-Sep-19        | 16-Jun-20        | 04-Aug-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460570                                       | LASP-sRTM Evaluation Board Test Stand Software Integration              | 45         | 0%         | 23-Sep-19        | 25-Nov-19        | 05-Aug-20        | 07-Oct-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460575R                                      | REQD: sRTM Evaluation Board   | 0          | 0%         | 08-Oct-20        |                  | 08-Oct-20        |                  | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460580                                       | LASP-sRTM Evaluation Board Evaluation Function Test                     | 43         | 0%         | 08-Oct-20        | 09-Dec-20        | 08-Oct-20        | 09-Dec-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460580M                                      | Material for LASP-sRTM Evaluation Board Evaluation Function Test        | 43         | 0%         | 09-Dec-20        | 09-Dec-20        | 08-Oct-20        | 09-Dec-20        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460585A                                      | AVAIL: LASP-sRTM Evaluation Board Evaluation Function Test              | 0          | 0%         | 10-Dec-20        |                  | 10-Dec-20        |                  | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460590                                       | LASP-sRTM Evaluation Board Performance Test                             | 50         | 0%         | 10-Dec-20        | 27-Jan-21        | 10-Dec-20        | 22-Feb-21        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460600                                       | LASP-sRTM Prototype Test Stand Electrical Design                        | 47         | 0%         | 27-Jan-21        | 30-Mar-21        | 23-Feb-21        | 28-Apr-21        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460610                                       | LASP-sRTM Prototype Test Stand Mechanical Design                        | 40         | 0%         | 30-Mar-21        | 16-Jun-21        | 29-Apr-21        | 24-Jun-21        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SYS460620                                       | LASP-sRTM Prototype Test Stand Fabrication                              | 40         | 0%         | 16-Jun-21        | 17-Aug-21        | 25-Jun-21        | 20-Aug-21        | 232         |             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

■ Primary Baseline   
 ■ Remaining Work   
 ■ Actual Work   
 ■ Critical Remaining Work   
 ◆ Milestone   
 ── Summary









| ATLAS Upgrade Phase II - LAr                           |   |            |            | AP2 Detailed Schedule |                  |                  |                  |             |      | 25-Oct-19 13:57 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |                                     |
|--|---|------------|------------|-----------------------|------------------|------------------|------------------|-------------|------|-----------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|-------------------------------------|
| Activity ID  | Activity Name   | Duration   | % Complete | BL Start              | BL Finish        | WS Start         | WS Finish        | Total Float | 2016 |                 | 2017 |   | 2018 |   | 2019 |   | 2020 |   | 2021 |   | 2022 |   | 2023 |   | 2024 |   | 2025 |   | 2026 |   | 2027 |   |                                     |
|  |   |            |            |                       |                  |                  |                  |             | Q    | Q               | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q | Q    | Q   | Q                                   |
| ASIC460070   | Pre-Prototype ASIC Irradiation Test   | 17         | 0%         | 25-Aug-17             | 20-Sep-17        | 25-Aug-17        | 20-Sep-17        | 86          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype ASIC Irradiation Test   |                                     |
| ASIC460080   | Pre-Prototype ASIC Feature Characterization                                 | 10         | 0%         | 20-Sep-17             | 04-Oct-17        | 20-Sep-17        | 04-Oct-17        | 86          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype ASIC Feature Characterization   |                                     |
| ASIC460090   | Milestone: ATLAS LAr Frontend Analog Down Select                            | 0          | 0%         |                       | 04-Oct-17        |                  | 04-Oct-17        | 86          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Milestone: ATLAS LAr Frontend Analog Down Select  |                                     |
| <b>6.04.05.01.03 LAr FE ASIC Pre-prototype2 Design</b> |   | <b>298</b> | <b>0%</b>  | <b>06-Dec-17</b>      | <b>11-Feb-19</b> | <b>06-Dec-17</b> | <b>08-Feb-19</b> | <b>1</b>    |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | 08-Feb-19, 6.04.05.01.03 LAr FE ASIC Pre-prototype2 Design                              |                                     |
| <b>No AP2 Task Group - Temp</b>                        |   | <b>298</b> | <b>0%</b>  | <b>06-Dec-17</b>      | <b>11-Feb-19</b> | <b>06-Dec-17</b> | <b>08-Feb-19</b> | <b>1</b>    |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | 08-Feb-19, No AP2 Task Group - Temp   |                                     |
| ASIC460101A  | AVAIL: Design Available for Penn Component                                  | 0          | 0%         |                       | 06-Dec-17        |                  | 06-Dec-17        | 61          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | AVAIL: Design Available for Penn Component  |                                     |
| ASIC460100T  | Travel for Pre-Prototype2 ASIC Core and Frame Schematics Design             | 41         | 0%         | 06-Dec-17             | 02-Feb-18        | 06-Dec-17        | 02-Feb-18        | 3           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for Pre-Prototype2 ASIC Core and Frame Schematics Design                         |                                     |
| ASIC460100   | Pre-Prototype2 ASIC Core and Frame Schematics Design                        | 43         | 0%         | 06-Dec-17             | 06-Feb-18        | 06-Dec-17*       | 06-Feb-18        | 0           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Core and Frame Schematics Design                                    |                                     |
| ASIC460110   | Pre-Prototype2 ASIC Core and Frame Physical Layout Design                   | 60         | 0%         | 07-Feb-18             | 02-May-18        | 07-Feb-18        | 02-May-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Core and Frame Physical Layout Design                               |                                     |
| ASIC460129R  | REQD: ASIC Component Layout from Penn                                       | 0          | 0%         | 03-May-18             |                  | 03-May-18        |                  | 61          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | REQD: ASIC Component Layout from Penn   |                                     |
| ASIC460120   | Pre-Prototype2 ASIC Core and Frame Post Layout Simulation                   | 60         | 0%         | 03-May-18             | 27-Jul-18        | 03-May-18        | 27-Jul-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Core and Frame Post Layout Simulation                               |                                     |
| ASIC460130   | Pre-Prototype2 ASIC Final Integration                                       | 60         | 0%         | 30-Jul-18             | 23-Oct-18        | 30-Jul-18        | 23-Oct-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Final Integration   |                                     |
| ASIC460130T  | Travel for Pre-Prototype2 ASIC Final Integration                            | 60         | 0%         | 30-Jul-18             | 27-Sep-18        | 30-Jul-18        | 23-Oct-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for Pre-Prototype2 ASIC Final Integration  |                                     |
| ASIC460140   | Pre-Prototype2 ASIC Submission  | 22         | 0%         | 24-Oct-18             | 23-Nov-18        | 24-Oct-18        | 23-Nov-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Submission  |                                     |
| ASIC460140M  | Material for Pre-Prototype2 ASIC Submission                                 | 22         | 0%         | 26-Nov-18             | 26-Nov-18        | 24-Oct-18        | 23-Nov-18        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Pre-Prototype2 ASIC Submission   |                                     |
| ASIC460150   | Pre-Prototype2 ASIC Fabrication and Preparation for Testing and Preparation | 43         | 0%         | 27-Nov-18             | 28-Jan-19        | 26-Nov-18        | 25-Jan-19        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Fabrication and Preparation for Testing and Preparation for Testing |                                     |
| ASIC460160   | Pre-Prototype2 ASIC Packaging and Preparation for Testing and Preparation   | 10         | 0%         | 29-Jan-19             | 11-Feb-19        | 28-Jan-19        | 08-Feb-19        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Packaging and Preparation for Testing and Preparation for Testing   |                                     |
| ASIC460160M  | Material for Pre-Prototype2 ASIC Packaging and Preparation for Testing      | 10         | 0%         | 29-Jan-19             | 11-Feb-19        | 28-Jan-19        | 08-Feb-19        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Pre-Prototype2 ASIC Packaging and Preparation for Testing                  |                                     |
| ASIC460170   | External Milestone: ATLAS Specification Review for PA/S                     | 0          | 0%         |                       | 11-Feb-19        |                  | 08-Feb-19        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | External Milestone: ATLAS Specification Review for PA/S                                 |                                     |
| <b>6.04.05.01.04 LAr FE ASIC Pre-prototype2 Test</b>   |   | <b>196</b> | <b>0%</b>  | <b>30-Jul-18</b>      | <b>08-May-19</b> | <b>30-Jul-18</b> | <b>07-May-19</b> | <b>216</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | 07-May-19, 6.04.05.01.04 LAr FE ASIC Pre-prototype2 Test                                |                                     |
| <b>No AP2 Task Group - Temp</b>                        |   | <b>196</b> | <b>0%</b>  | <b>30-Jul-18</b>      | <b>08-May-19</b> | <b>30-Jul-18</b> | <b>07-May-19</b> | <b>216</b>  |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   | 07-May-19, No AP2 Task Group - Temp |
| ASIC460180   | Pre-Prototype2 Main Board Schematics Design and Preparation for Testing     | 44         | 0%         | 30-Jul-18             | 28-Sep-18        | 30-Jul-18        | 28-Sep-18        | 4           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 Main Board Schematics Design and Preparation for Testing                 |                                     |
| ASIC460190   | Pre-Prototype2 Main Board Layout Design                                     | 44         | 0%         | 28-Sep-18             | 03-Dec-18        | 28-Sep-18        | 03-Dec-18        | 4           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 Main Board Layout Design   |                                     |
| ASIC460200T  | Travel for Pre-Prototype2 Main Board Fabrication                            | 42         | 0%         | 03-Dec-18             | 01-Feb-19        | 03-Dec-18        | 01-Feb-19        | 6           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Travel for Pre-Prototype2 Main Board Fabrication  |                                     |
| ASIC460200   | Pre-Prototype2 Main Board Fabrication                                       | 44         | 0%         | 03-Dec-18             | 05-Feb-19        | 03-Dec-18        | 05-Feb-19        | 4           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 Main Board Fabrication   |                                     |
| ASIC460200M  | Material for Pre-Prototype2 Main Board Fabrication                          | 44         | 0%         | 03-Dec-18             | 06-Feb-19        | 03-Dec-18        | 06-Feb-19        | 4           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Pre-Prototype2 Main Board Fabrication                                      |                                     |
| ASIC460210   | Pre-Prototype2 ASIC Evaluation Test   | 20         | 0%         | 12-Feb-19             | 12-Mar-19        | 11-Feb-19        | 11-Mar-19        | 1           |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Evaluation Test   |                                     |
| ASIC460210M  | Material for Pre-Prototype 2 ASIC Evaluation test                           | 20         | 0%         | 12-Feb-19             | 12-Mar-19        | 11-Feb-19        | 11-Mar-19        | 54          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Material for Pre-Prototype 2 ASIC Evaluation test                                       |                                     |
| ASIC460245A  | AVAIL: Completion of Pre-Prototype2   | 0          | 0%         |                       | 12-Mar-19        |                  | 11-Mar-19        | 257         |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | AVAIL: Completion of Pre-Prototype2   |                                     |
| ASIC460240   | Shipping of Pre-Prototype2  | 10         | 0%         | 13-Mar-19             | 26-Mar-19        | 12-Mar-19        | 25-Mar-19        | 65          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Shipping of Pre-Prototype2  |                                     |
| ASIC460220   | Pre-Prototype2 ASIC Irradiation Test  | 20         | 0%         | 13-Mar-19             | 09-Apr-19        | 12-Mar-19        | 08-Apr-19        | 34          |      |                 |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      | Pre-Prototype2 ASIC Irradiation Test  |                                     |

█ Primary Baseline   
█ Remaining Work   
█ Actual Work   
█ Critical Remaining Work   
◆ Milestone   
▬ Summary









| Activity ID | Activity Name                                  | Duration | % Complete | BL Start  | BL Finish | WS Start  | WS Finish | Total Float | 2016-2027  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------|--|----------|------------|-----------|-----------|-----------|-----------|-------------|--|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|             |  |          |            |           |           |           |           |             | 2016   | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460660  | Milestone: Shipping 12.5% Complete             | 0        | 0%         |           | 29-Apr-22 |           | 27-Apr-22 | 310         | ◆ Milestone: Shipping 12.5% Complete             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460670M | Material for Prod ASIC Evaluation Test Batch 2 | 43       | 0%         | 11-Jul-22 | 09-Sep-22 | 07-Jul-22 | 07-Sep-22 | 289         | ■ Material for Prod ASIC Evaluation Test Batch 2 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460670  | Prod ASIC Evaluation Test Batch 2              | 44       | 0%         | 11-Jul-22 | 12-Sep-22 | 07-Jul-22 | 08-Sep-22 | 288         | ■ Prod ASIC Evaluation Test Batch 2              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460680  | Shipping Batch 2                               | 11       | 0%         | 12-Sep-22 | 27-Sep-22 | 08-Sep-22 | 23-Sep-22 | 288         | ■ Shipping Batch 2                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460680M | Material for Shipping Batch 2                  | 11       | 0%         | 12-Sep-22 | 27-Sep-22 | 08-Sep-22 | 23-Sep-22 | 320         | ■ Material for Shipping Batch 2                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460700M | Material for Prod ASIC Evaluation Test Batch 3 | 42       | 0%         | 12-Sep-22 | 10-Nov-22 | 08-Sep-22 | 08-Nov-22 | 289         | ■ Material for Prod ASIC Evaluation Test Batch 3 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460700  | Prod ASIC Evaluation Test Batch 3              | 43       | 0%         | 12-Sep-22 | 11-Nov-22 | 08-Sep-22 | 09-Nov-22 | 288         | ■ Prod ASIC Evaluation Test Batch 3              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460685  | Milestone: Shipping 25% Complete               | 0        | 0%         |           | 27-Sep-22 |           | 23-Sep-22 | 320         | ◆ Milestone: Shipping 25% Complete               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460710M | Material for Shipping Batch 3                  | 10       | 0%         | 11-Nov-22 | 28-Nov-22 | 09-Nov-22 | 23-Nov-22 | 288         | ■ Material for Shipping Batch 3                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460710  | Shipping Batch 3                               | 11       | 0%         | 11-Nov-22 | 29-Nov-22 | 09-Nov-22 | 25-Nov-22 | 288         | ■ Shipping Batch 3                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460730M | Material for Prod ASIC Evaluation Test Batch 4 | 40       | 0%         | 11-Nov-22 | 11-Jan-23 | 09-Nov-22 | 09-Jan-23 | 291         | ■ Material for Prod ASIC Evaluation Test Batch 4 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460730  | Prod ASIC Evaluation Test Batch 4              | 43       | 0%         | 11-Nov-22 | 16-Jan-23 | 09-Nov-22 | 12-Jan-23 | 288         | ■ Prod ASIC Evaluation Test Batch 4              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460720  | Milestone: Shipping 37.5% Complete             | 0        | 0%         |           | 29-Nov-22 |           | 25-Nov-22 | 320         | ◆ Milestone: Shipping 37.5% Complete             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460740  | Shipping Batch 4                               | 11       | 0%         | 16-Jan-23 | 31-Jan-23 | 12-Jan-23 | 27-Jan-23 | 288         | ■ Shipping Batch 4                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460740M | Material for Shipping Batch 4                  | 11       | 0%         | 16-Jan-23 | 31-Jan-23 | 12-Jan-23 | 27-Jan-23 | 320         | ■ Material for Shipping Batch 4                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460760M | Material for Prod ASIC Evaluation Test Batch 5 | 42       | 0%         | 16-Jan-23 | 16-Mar-23 | 12-Jan-23 | 14-Mar-23 | 289         | ■ Material for Prod ASIC Evaluation Test Batch 5 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460760T | Travel for Prod ASIC Evaluation Test Batch 5   | 42       | 0%         | 16-Jan-23 | 16-Mar-23 | 12-Jan-23 | 14-Mar-23 | 289         | ■ Travel for Prod ASIC Evaluation Test Batch 5   |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460760  | Prod ASIC Evaluation Test Batch 5              | 43       | 0%         | 16-Jan-23 | 17-Mar-23 | 12-Jan-23 | 15-Mar-23 | 288         | ■ Prod ASIC Evaluation Test Batch 5              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460750  | Milestone: Shipping 50% Complete               | 0        | 0%         |           | 31-Jan-23 |           | 27-Jan-23 | 320         | ◆ Milestone: Shipping 50% Complete               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460770  | Shipping Batch 5                               | 11       | 0%         | 17-Mar-23 | 03-Apr-23 | 15-Mar-23 | 30-Mar-23 | 288         | ■ Shipping Batch 5                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460770M | Material for Shipping Batch 5                  | 11       | 0%         | 17-Mar-23 | 03-Apr-23 | 15-Mar-23 | 30-Mar-23 | 288         | ■ Material for Shipping Batch 5                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460790  | Prod ASIC Evaluation Test Batch 6              | 45       | 0%         | 17-Mar-23 | 19-May-23 | 15-Mar-23 | 17-May-23 | 288         | ■ Prod ASIC Evaluation Test Batch 6              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460790M | Material for Prod ASIC Evaluation Test Batch 6 | 45       | 0%         | 17-Mar-23 | 19-May-23 | 15-Mar-23 | 17-May-23 | 288         | ■ Material for Prod ASIC Evaluation Test Batch 6 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460780  | Milestone: Shipping 62.5% Complete             | 0        | 0%         |           | 03-Apr-23 |           | 30-Mar-23 | 322         | ◆ Milestone: Shipping 62.5% Complete             |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460800M | Material for Shipping Batch 6                  | 9        | 0%         | 19-May-23 | 02-Jun-23 | 17-May-23 | 31-May-23 | 313         | ■ Material for Shipping Batch 6                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460800  | Shipping Batch 6                               | 10       | 0%         | 19-May-23 | 05-Jun-23 | 17-May-23 | 01-Jun-23 | 288         | ■ Shipping Batch 6                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460820M | Material for Prod ASIC Evaluation Test Batch 7 | 41       | 0%         | 19-May-23 | 19-Jul-23 | 17-May-23 | 17-Jul-23 | 290         | ■ Material for Prod ASIC Evaluation Test Batch 7 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460820  | Prod ASIC Evaluation Test Batch 7              | 43       | 0%         | 19-May-23 | 21-Jul-23 | 17-May-23 | 19-Jul-23 | 288         | ■ Prod ASIC Evaluation Test Batch 7              |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460805  | Milestone: Shipping 75% Complete               | 0        | 0%         |           | 05-Jun-23 |           | 01-Jun-23 | 312         | ◆ Milestone: Shipping 75% Complete               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460830  | Shipping Batch 7                               | 11       | 0%         | 21-Jul-23 | 07-Aug-23 | 19-Jul-23 | 03-Aug-23 | 288         | ■ Shipping Batch 7                               |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460830M | Material for Shipping Batch 7                  | 11       | 0%         | 21-Jul-23 | 07-Aug-23 | 19-Jul-23 | 03-Aug-23 | 288         | ■ Material for Shipping Batch 7                  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ASIC460850M | Material for Prod ASIC Evaluation Test Batch 8 | 43       | 0%         | 21-Jul-23 | 21-Sep-23 | 19-Jul-23 | 19-Sep-23 | 289         | ■ Material for Prod ASIC Evaluation Test Batch 8 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |







