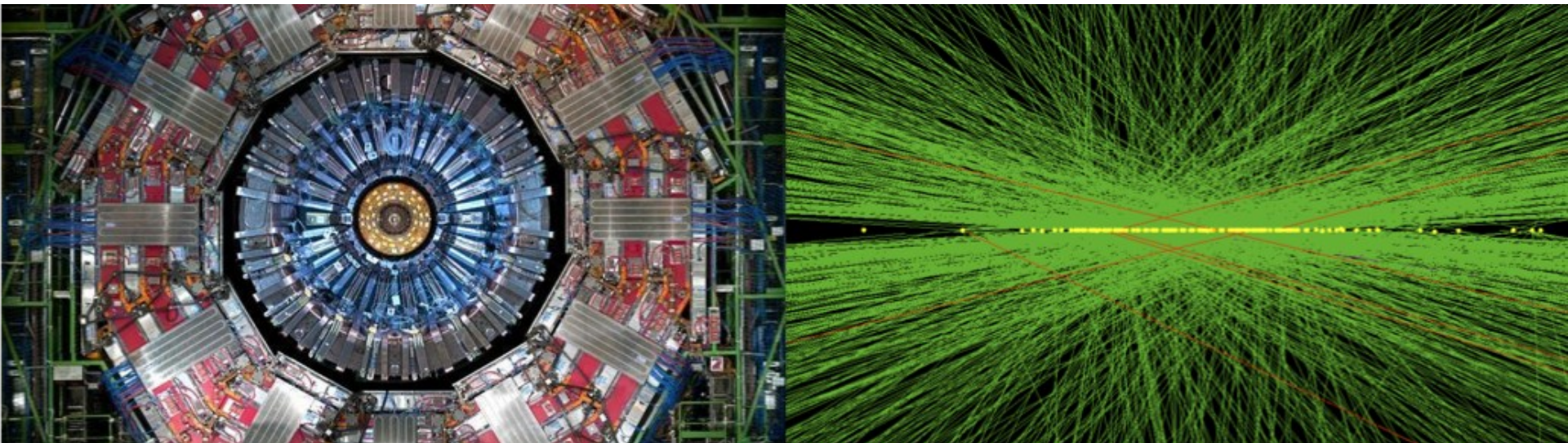




US-MTD: FNAL Group Meeting

Frank Chlebana

Apr 14, 2021





FNAL Workplan

We have planned the work assuming we will use specific FNAL / SMU resources in order to estimate the budget and schedule

Need to remain flexible and have the ability to react to a rapidly changing environment

COVID impact on availability of SMU interns

Availability of FNAL ASIC resources due to delays for other projects

In order to mitigate these risks we will outsource some work that was originally planned for FNAL to one of our partners

Will use the P6 schedule to monitor progress during monthly statusing

Work may be completed by different resources that was used to estimate the budget

We expect that the schedule (and milestones) will remain the same

Cost estimate should also be accurate

Moving work using higher costed resources may require additional lower costed resources



FNAL SOW

The updated schedule based on BCR103 has not yet been approved...
This will happen following a project cost and schedule review (Apr 29)

In order to get the money flowing... we can use the schedule to get a cost estimate for the FNAL SOW and have a second SOW / Change Order for the remaining funds once the schedule has been approved...



BCR Implementation

Bill has implemented the ETL BCR

We provided feedback (Ted and Frank) on the ETROC (looks ok...)

Frank Golf and Artur are reviewing the ETL-Assembly section

Expect to provide feedback this week...

Using Oct 1, 2020 as the change date

Activities prior to Oct 1, 2020 are not included

Applying changes to the “stated” schedule some activities are shifted

The CD-2 plan does have work prior to Oct 1, 2020 that was not in the CD-1 plan

Most changes occur after 16-Mar-20 “ETL – T5 -Start post TDR design”

ETROC1 testing, COVID related costs, and emulator development

Can add a supplemental cost activity on Oct 1, 2020 to capture additional cost prior to Oct 1, 2020...

Could also treat as a cost variance and reset costs once we baseline...



Cost and Schedule Workshop

We are planning to have a "schedule workshop" on Apr 29 from 8-11am FNAL time with a slot for spillover discussions from 2:30 - 3:30 if needed

The goal of the workshop is to review the BTL and ETL schedules together with the project office and verify that it is ready for the director's review

We will also be asked to look for ways to reduce costs

In preparation for the workshop we will need to review the updated schedule that has the changes from BCR-102/103 and work with Bill to reconcile any problems.

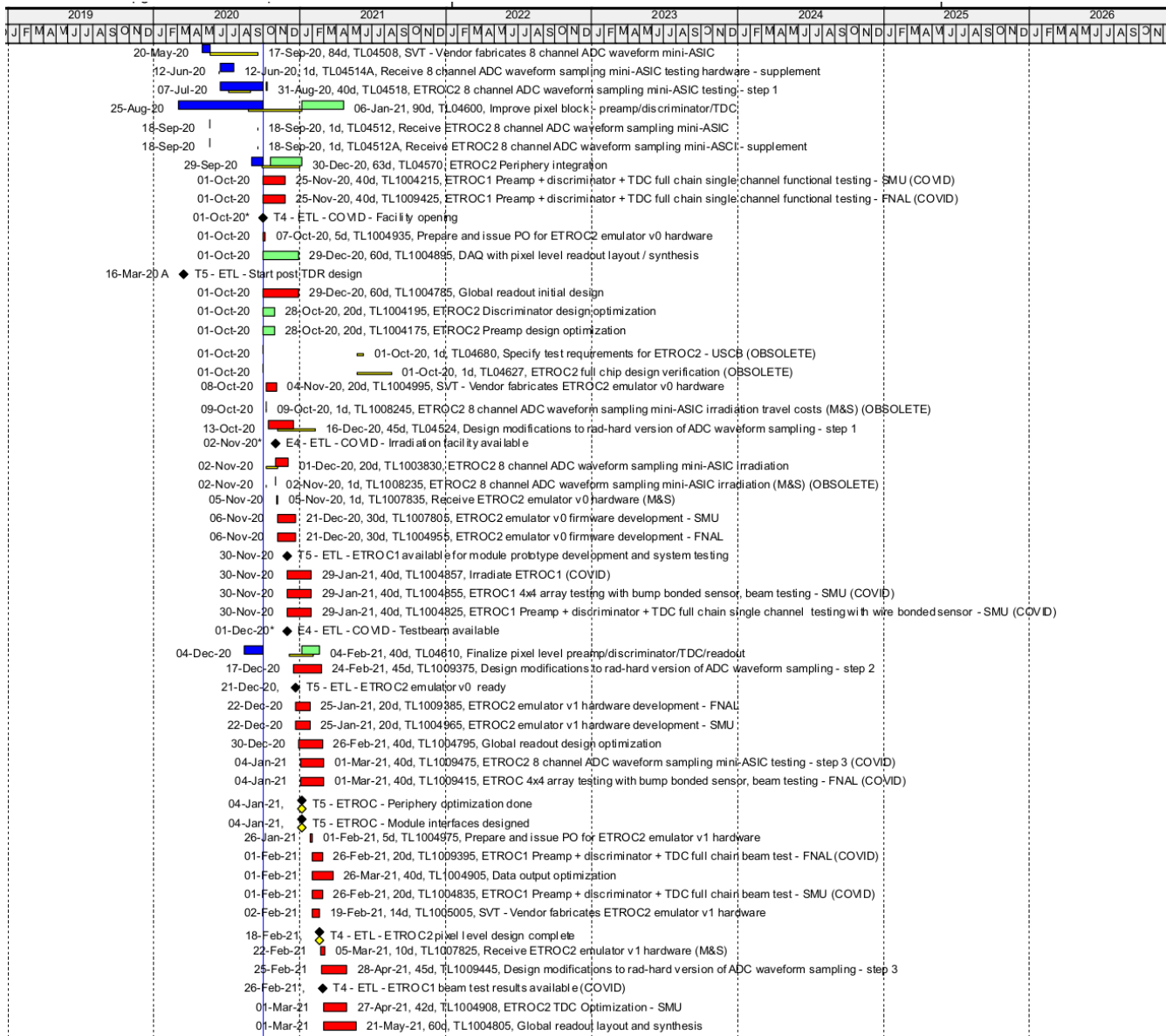
- schedule technical details (hot spots, pred/succ, code assignments...)
- resource allocation (no overloading, uncosted labor)

CAMs will be asked to walk through the schedule and discuss the plan and cost estimate

- general work plan and activity logic
- cost rollup
- critical path evaluation
- determination of float to CMS need by dates
- connections to external constraints and across WBS areas
- milestone alignment with international CMS

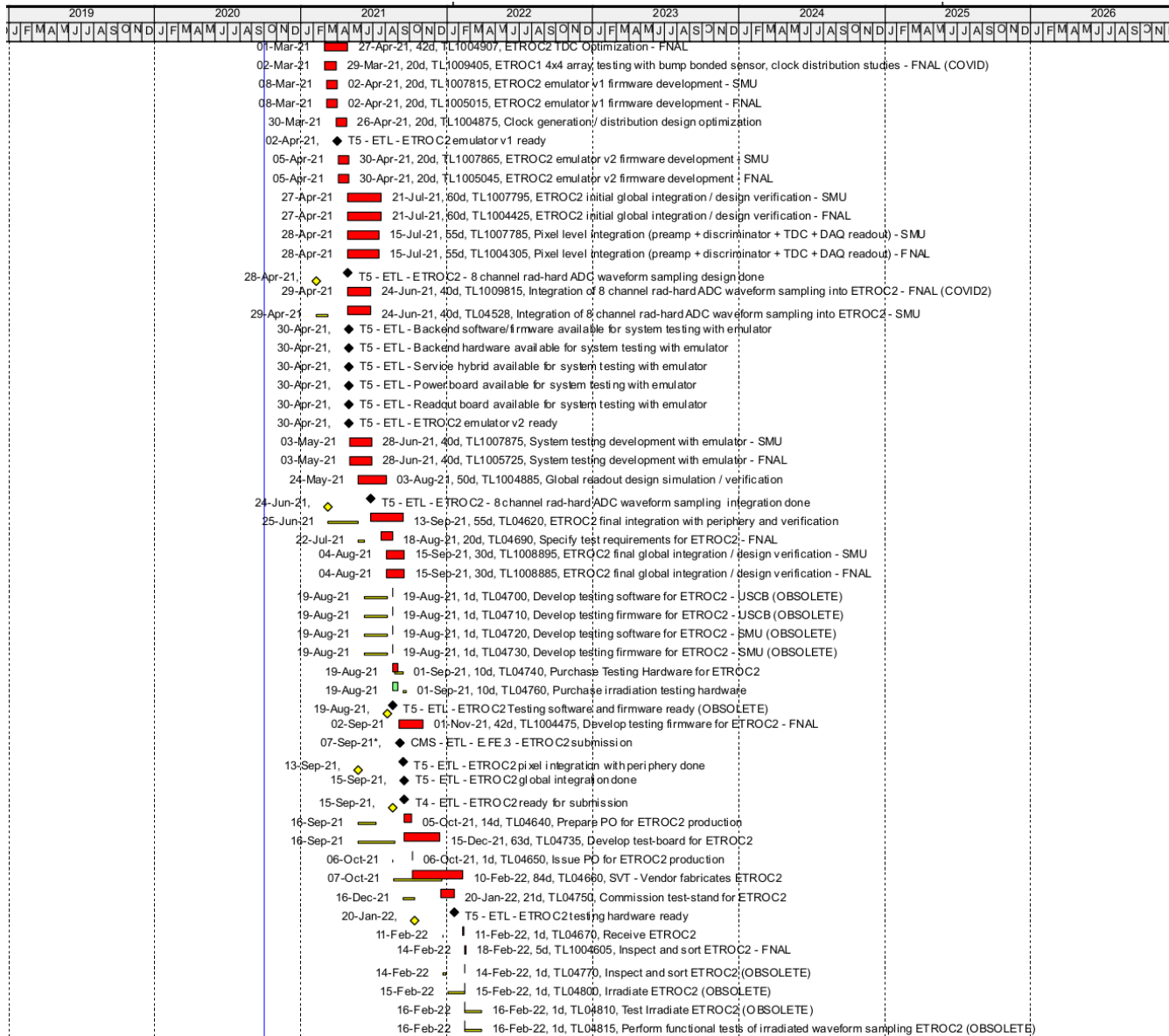


Gantt Chart (2020 - 2021)





Gantt Chart (2020 - 2021)





Budget from P6

Activity ID	FY2020, FQ4	FY2021, FQ1	FY2021, FQ2	FY2021, FQ3	FY2021, FQ4	FY2022, FQ1
WBS: 402W-DEV-6.8.4.2.1 ETL - Frontend ASICs General		\$7,742.66	\$1,054.54			\$7,897.49
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory		\$7,742.66	\$1,054.54			\$7,897.49
Resource ID: <u>FN_MS_PASS_FY19</u>		\$2,218.16	\$1,054.54			\$2,262.49
Resource ID: <u>FN_MS_STND_FY19</u>		\$5,524.50				\$5,635.00
WBS: 402W-DEV-6.8.4.2.3 ETL - Frontend ASICs v2 development	\$93,712.99	\$414,780.37	\$385,235.79	\$598,030.96	\$440,467.80	\$87,934.60
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory	\$76,831.06	\$357,582.63	\$328,720.74	\$539,370.79	\$419,494.42	\$87,934.60
Resource ID: <u>c_FN_MS_STND_FY19</u>						
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>						
Resource ID: <u>c_FNd_ELTN_DESIGN_EN</u>						
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>			\$2,375.06			
Resource ID: <u>FN_MS_STND_FY19</u>	\$23,900.40	\$3,314.70	\$2,209.80		\$45,300.90	
Resource ID: <u>FN_MS_TRVL_FY19</u>		\$5,966.46				
Resource ID: <u>FN_U_PT_EXP_PHYST</u>						
Resource ID: <u>FN_U_PT_EXP_RA</u>						
Resource ID: <u>FNd_ASIC_DESIGN_EN</u>	\$52,930.66	\$312,869.28	\$157,773.33	\$444,884.96	\$341,604.52	\$1,978.39
Resource ID: <u>FNd_ELTN_DESIGN_EN</u>		\$35,432.19	\$166,362.55	\$94,485.83	\$32,588.99	\$85,956.21
Resource ID: <u>FNn_ENGNRING_PHYST</u>						
Responsible Institution: <u>SM</u> Southern Methodist University	\$16,881.93	\$57,197.74	\$56,515.05	\$58,660.16	\$20,973.38	
Resource ID: <u>CMS-HL_FN_SM_P_ENG_GRAD_STUD</u>	\$16,881.93	\$34,669.78	\$33,148.90	\$13,036.09		
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_ASIC_DES</u>		\$5,546.31	\$16,597.24	\$45,624.08	\$20,973.38	
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>		\$16,981.65	\$6,768.91			
Responsible Institution: <u>UCSB</u> University of California - Santa Barbara						
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>						
Labor		\$405,499.21	\$383,025.99	\$598,030.96	\$395,166.89	\$87,934.60
M&S		\$17,023.82	\$3,264.34	\$0.00	\$45,300.90	\$7,897.49
Total Labor		\$405,499.21	\$1,464,158.44			
Total M&S		\$17,023.82	\$56,462.73			



Activities from P6

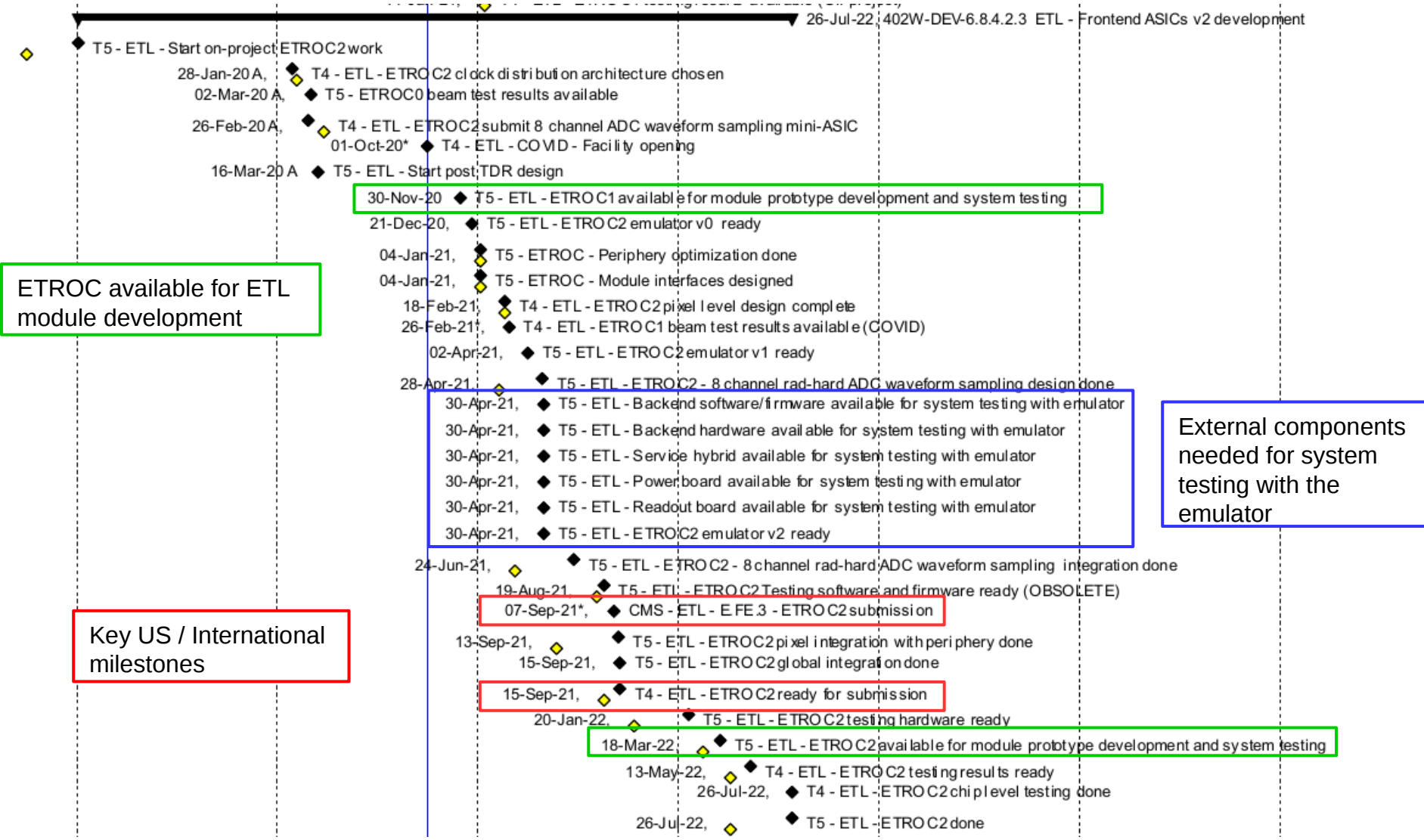
Activity ID	Activity Name	FY2020, FQ3	FY2020, FQ4	FY2021, FQ1	FY2021, FQ2	FY2021, FQ3	FY2021, FQ4	FY2022, FQ1
Responsible Institution: SM Southern Methodist University		\$41,326.40	\$16,881.93	\$57,197.74	\$56,515.05	\$58,660.16	\$20,973.38	
Resource ID: CMS-HL_FN_SM_P_ENG_GRAD_STUD		\$32,459.30	\$16,881.93	\$34,669.78	\$33,148.90	\$13,036.09		
TL04502	ETROC2 8 channel ADC waveform sampling design							
TL04513	ETROC2 8 channel ADC waveform sampling testing specification							
TL04522	ETROC2 8 channel ADC waveform sampling rad-hard version design	\$13,911.13						
TL04504	ETROC2 8 channel ADC waveform sampling improvements							
TL04506	Submit ETROC2 8 channel ADC waveform sampling mini-ASIC							
TL04515	ETROC2 8 channel ADC waveform sampling testing platform development	\$18,548.17						
TL04627	ETROC2 full chip design verification (OBSOLETE)							
TL04518	ETROC2 8 channel ADC waveform sampling mini-ASIC testing - step 1		\$16,881.93					
TL1003830	ETROC2 8 channel ADC waveform sampling mini-ASIC irradiation			\$4,966.13				
TL04524	Design modifications to rad-hard version of ADC waveform sampling - step 1			\$26,227.36				
TL1009375	Design modifications to rad-hard version of ADC waveform sampling - step 2			\$3,476.29	\$16,077.84			
TL1009475	ETROC2 8 channel ADC waveform sampling mini-ASIC testing - step 3 (COVID)				\$6,207.66			
TL1009445	Design modifications to rad-hard version of ADC waveform sampling - step 3				\$10,863.41	\$8,690.72		
TL04528	Integration of 8 channel rad-hard ADC waveform sampling into ETROC2 - SMU					\$4,345.36		
TL04815	Perform functional tests of irradiated waveform sampling ETROC2 (OBSOLETE)							
TL04785	Perform initial functionality test of ETROC2 waveform sampling - SMU							
Resource ID: CMS-HL_FN_SM_P_PHYS_ASIC_DES				\$5,546.31	\$16,597.24	\$45,624.08	\$20,973.38	
TL1004935	Prepare and issue PO for ETROC2 emulator v0 hardware			\$1,167.64				
TL1007805	ETROC2 emulator v0 firmware development - SMU			\$2,919.11				
TL1004965	ETROC2 emulator v1 hardware development - SMU			\$1,459.56	\$4,378.67			
TL1007815	ETROC2 emulator v1 firmware development - SMU				\$2,627.20	\$291.91		
TL1004908	ETROC2 TDC Optimization - SMU				\$9,591.37	\$7,923.30		
TL1007865	ETROC2 emulator v2 firmware development - SMU					\$2,919.11		
TL1007875	System testing development with emulator - SMU					\$5,838.22		
TL1007785	Pixel level integration (preamp + discriminator + TDC + DAQ readout) - SMU					\$10,747.64	\$2,388.36	
TL1007795	ETROC2 initial global integration / design verification - SMU					\$17,903.89	\$5,449.01	
TL1008895	ETROC2 final global integration / design verification - SMU						\$13,136.00	
Resource ID: CMS-HL_FN_SM_P_PHYS_GRAD_STUD		\$8,867.10		\$16,981.65	\$6,768.91			
TL04585	Develop ASIC periphery common design blocks - SMU	\$8,867.10						
TL1004215	ETROC1 Preamp + discriminator + TDC full chain single channel functional testing - SMU (COVID)			\$4,750.11				
TL04590	Pixel level readout							
TL1007805	ETROC2 emulator v0 firmware development - SMU			\$4,750.11				
TL1004857	Irradiate ETROC1 (COVID)			\$2,493.81	\$2,256.30			
TL1004855	ETROC1 4x4 array testing with bump bonded sensor, beam testing - SMU (COVID)			\$2,493.81	\$2,256.30			
TL1004825	ETROC1 Preamp + discriminator + TDC full chain single channel testing with wire bonded sensor - SMU			\$2,493.81	\$2,256.30			
TL1007815	ETROC2 emulator v1 firmware development - SMU							
TL1007865	ETROC2 emulator v2 firmware development - SMU							
TL1007795	ETROC2 initial global integration / design verification - SMU							
TL04720	Develop testing software for ETROC2 - SMU (OBSOLETE)							
TL04730	Develop testing firmware for ETROC2 - SMU (OBSOLETE)							
TL1008895	ETROC2 final global integration / design verification - SMU							
TL04770	Inspect and sort ETROC2 (OBSOLETE)							
TL04800	Irradiate ETROC2 (OBSOLETE)							
TL04810	Test Irradiate ETROC2 (OBSOLETE)							
TL04820	Evaluate results of irradiated ETROC2 (OBSOLETE)							
TL04780	Perform initial functionality test of ETROC2 - SMU							
TL1008915	ETROC2 initial SEU testing (irradiation) - SMU							
TL1008905	ETROC2 initial TID testing (irradiation) - SMU							
TL1009345	Perform final functionality test of ETROC2 - SMU							
TL1009025	ETROC2 initial system testing - SMU							
TL1008935	ETROC2 final system testing - SMU							
TL1009255	ETROC2 final SEU testing (irradiation) - SMU							
TL1009235	ETROC2 final TID testing (irradiation) - SMU							

Delayed activities got shifted into CY21

Work reassigned to FNAL

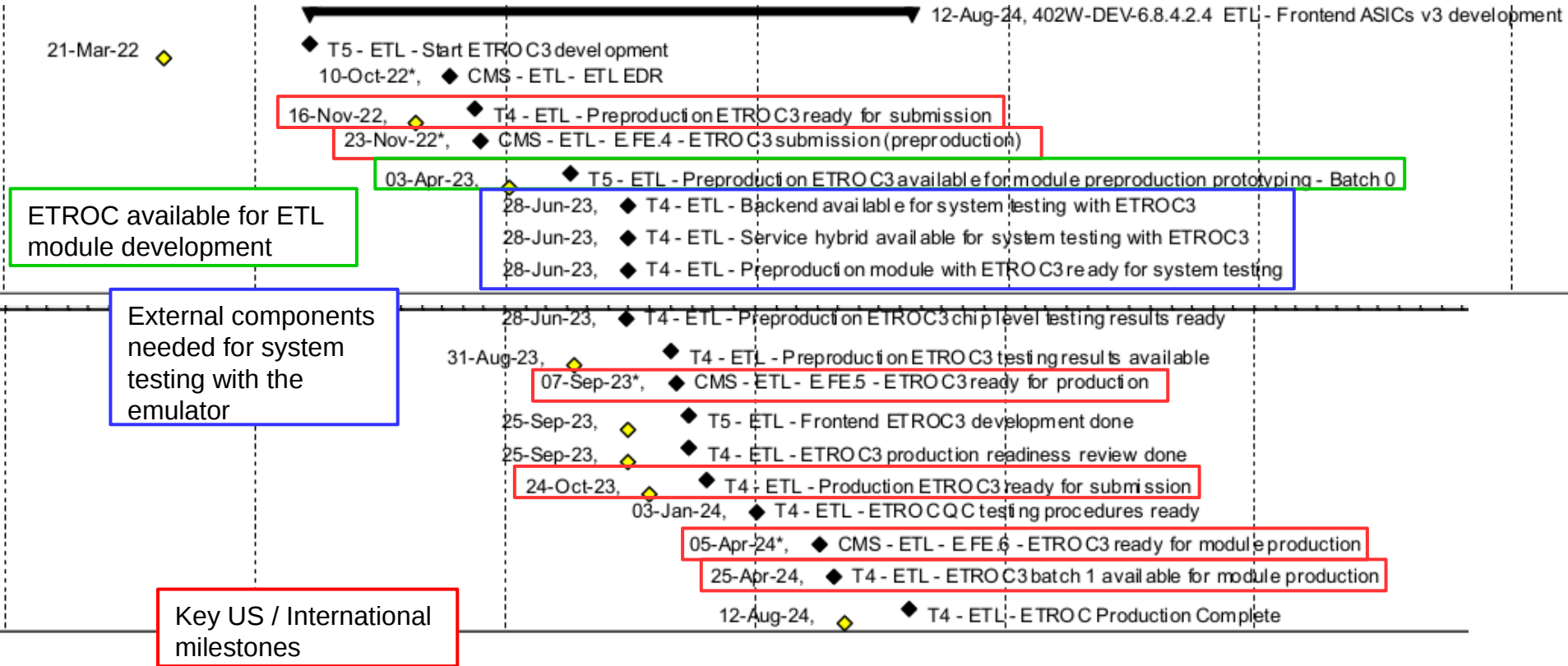


Milestones (ETROC2)





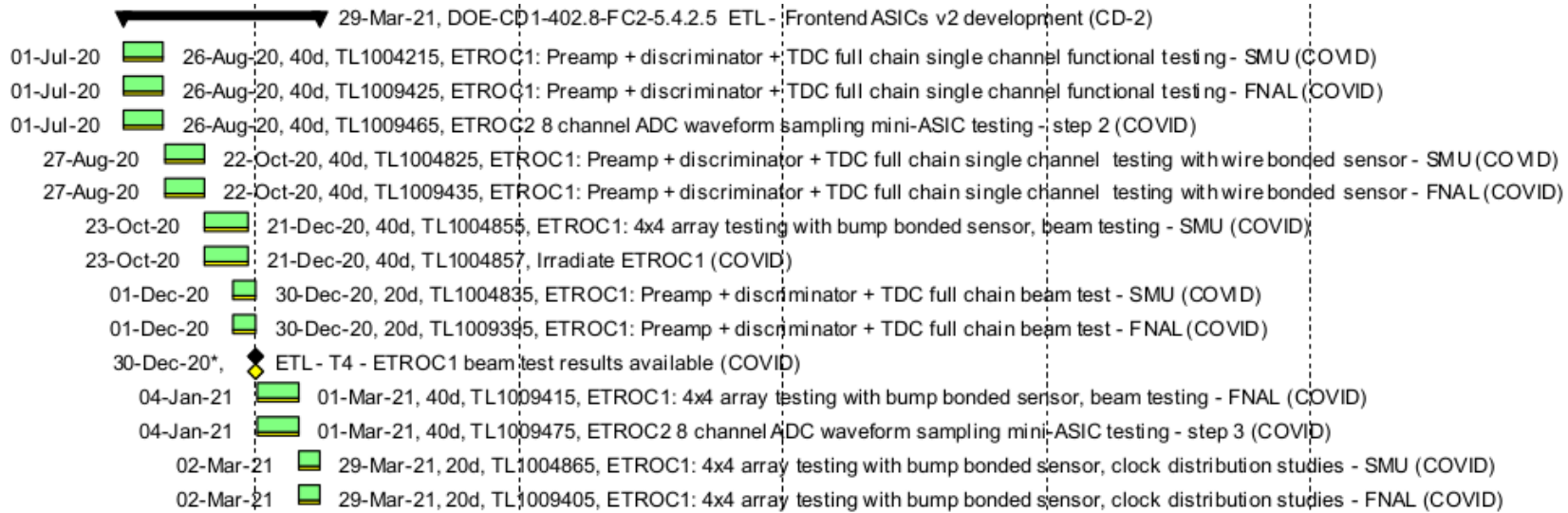
Milestones (ETROC3)





COVID

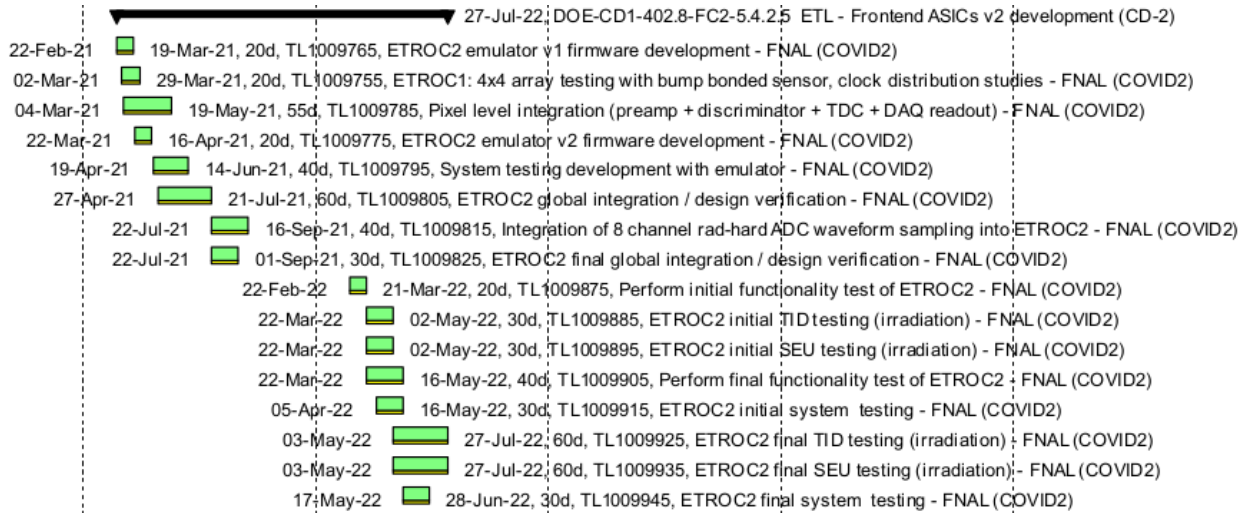
Activities added for ETROC1 testing



Activity ID	Activity Name	Planned Start	Planned Finish	Planned P	Planned I	Planned Labor C	Planned Nor	Planned Nonlab	Planned P	Resource IDs
DOE-CD1-402.8-FC2-5.4.2.5	402.8 TL - Timing Layer - CD2 Working - 9 December 2020	1-Jul-20	29-Mar-21	185d	960h	\$159,284.46	1120h	\$33,298.00	\$0.00	
DOE-CD1-402.8-FC2-5.4.2	ETL - Endcap Timing Layer	1-Jul-20	29-Mar-21	185d	960h	\$159,284.46	1120h	\$33,298.00	\$0.00	
DOE-CD1-402.8-FC2-5.4.2	ETL - Frontend ASICs	1-Jul-20	29-Mar-21	185d	960h	\$159,284.46	1120h	\$33,298.00	\$0.00	
DOE-CD1-402.8-FC2-5.4.2.5	ETL - Frontend ASICs v2 development (CD-2)	1-Jul-20	29-Mar-21	185d	960h	\$159,284.46	1120h	\$33,298.00	\$0.00	
TL1004215	ETROC1: Preamp + discriminator + TDC full chain single channel functional testing - SMU (COVID)	1-Jul-20	26-Aug-20	40d	0h	\$0.00	160h	\$4,580.32	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009425	ETROC1: Preamp + discriminator + TDC full chain single channel functional testing - FNAL (COVID)	1-Jul-20	26-Aug-20	40d	160h	\$25,458.10	0h	\$0.00	\$0.00	FNd_ELTN_DESIGN_EN
TL1009465	ETROC2 8 channel ADC waveform sampling mini-ASIC testing - step 2 (COVID)	1-Jul-20	26-Aug-20	40d	0h	\$0.00	200h	\$5,986.50	\$0.00	CMS-HL_FN_SM_P_ENG_GRAD_STUD
TL1004825	ETROC1: Preamp + discriminator + TDC full chain single channel testing with wire bonded sensor - SMU (COVID)	27-Aug-20	22-Oct-20	40d	0h	\$0.00	160h	\$4,648.24	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009435	ETROC1: Preamp + discriminator + TDC full chain single channel testing with wire bonded sensor - FNAL (COVID)	27-Aug-20	22-Oct-20	40d	200h	\$32,591.55	0h	\$0.00	\$0.00	FNd_ELTN_DESIGN_EN
TL1004855	ETROC1: 4x4 array testing with bump bonded sensor, beam testing - SMU (COVID)	23-Oct-20	21-Dec-20	40d	0h	\$0.00	160h	\$4,750.11	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1004857	Irradiate ETROC1 (COVID)	23-Oct-20	21-Dec-20	40d	0h	\$0.00	160h	\$4,750.11	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1004835	ETROC1: Preamp + discriminator + TDC full chain beam test - SMU (COVID)	1-Dec-20	30-Dec-20	20d	0h	\$0.00	80h	\$2,375.06	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009395	ETROC1: Preamp + discriminator + TDC full chain beam test - FNAL (COVID)	1-Dec-20	30-Dec-20	20d	180h	\$30,370.45	0h	\$0.00	\$0.00	FNd_ELTN_DESIGN_EN
TL1009407	ETL - T4 - ETROC1 beam test results available (COVID)		30-Dec-20	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1009415	ETROC1: 4x4 array testing with bump bonded sensor, beam testing - FNAL (COVID)	4-Jan-21	1-Mar-21	40d	180h	\$30,370.45	0h	\$0.00	\$0.00	FNd_ELTN_DESIGN_EN
TL1009475	ETROC2 8 channel ADC waveform sampling mini-ASIC testing - step 3 (COVID)	4-Jan-21	1-Mar-21	40d	0h	\$0.00	200h	\$6,207.66	\$0.00	CMS-HL_FN_SM_P_ENG_GRAD_STUD
TL1004865	ETROC1: 4x4 array testing with bump bonded sensor, clock distribution studies - SMU (COVID)	2-Mar-21	29-Mar-21	20d	0h	\$0.00	0h	\$0.00	\$0.00	CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009405	ETROC1: 4x4 array testing with bump bonded sensor, clock distribution studies - FNAL (COVID)	2-Mar-21	29-Mar-21	20d	240h	\$40,493.93	0h	\$0.00	\$0.00	FNd_ELTN_DESIGN_EN
	Prior to Oct 1, 2020					\$58,049.65		\$15,215.06	0	



COVID2

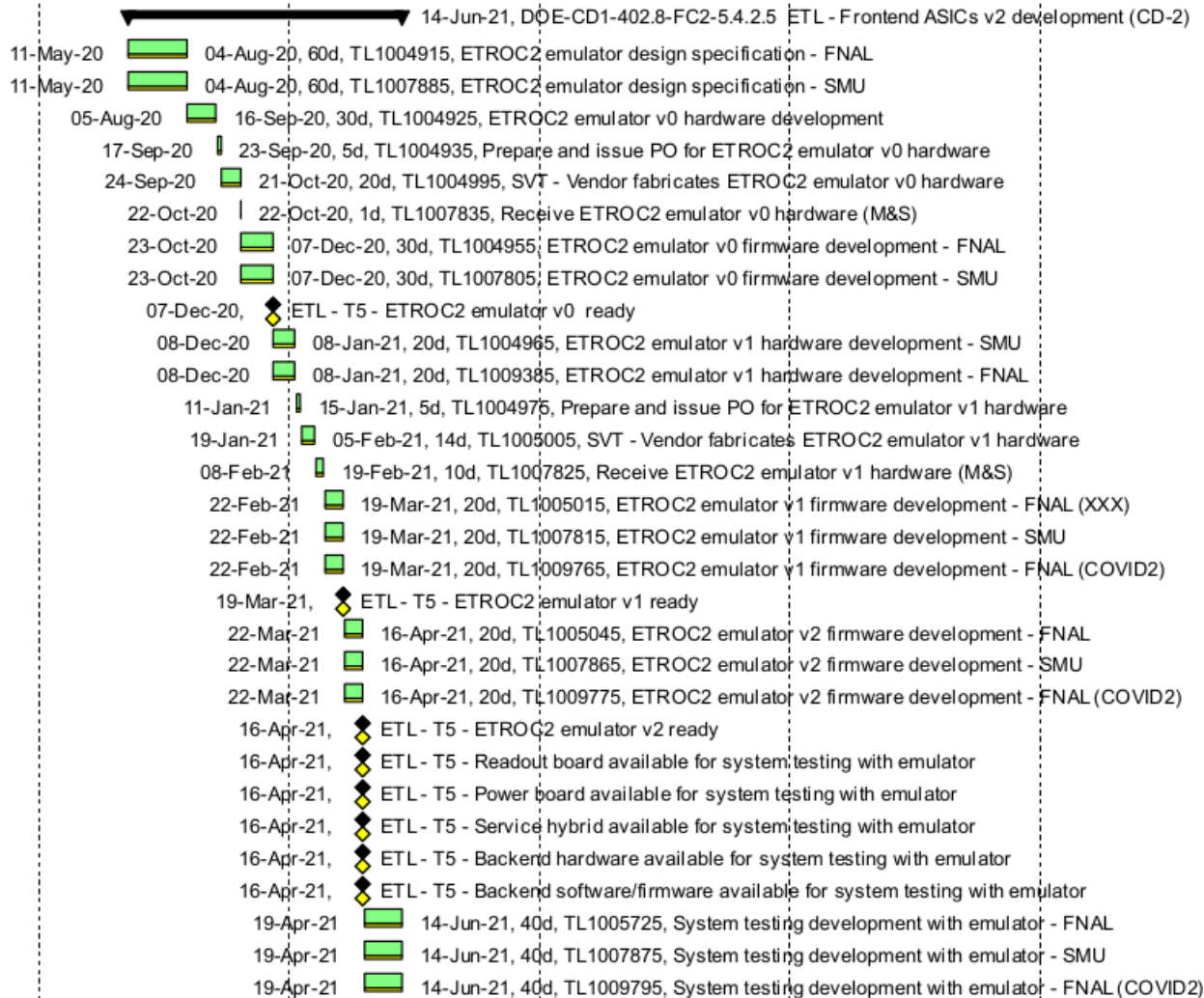


Replace SMU Grad Stud
with FNAL Engineering /
Hired PhD student

Activity ID	User Text	Activity Name	Planned Start	Planned Finish	Planned D	Planned H	Planned Labor Cost	Resource IDs
DOE-CD1-402.8-FC2-5	402.8 TL - Timing Layer - CD2 Working - 9 December 2020		22-Feb-21	27-Jul-22	361d	3360h	\$553,427.76	
DOE-CD1-402.8-FC2-5.4	ETL - Endcap Timing Layer		22-Feb-21	27-Jul-22	361d	3360h	\$553,427.76	
DOE-CD1-402.8-FC2-5.4.2	ETL - Frontend ASICs		22-Feb-21	27-Jul-22	361d	3360h	\$553,427.76	
DOE-CD1-402.8-FC2-5.4.2.5	ETL - Frontend ASICs v2 development (CD-2)		22-Feb-21	27-Jul-22	361d	3360h	\$553,427.76	
TL1009765	ETROC2 emulator v1 firmware development - FNAL (COVID2)		22-Feb-21	19-Mar-21	20d	160h	\$26,995.95	FNd_ELTN_DESIGN_EN
TL1009755	ETROC1: 4x4 array testing with bump bonded sensor, clock distribution studies - FNAL (COVID2)		2-Mar-21	29-Mar-21	20d	160h	\$26,995.95	FNd_ELTN_DESIGN_EN
TL1009785	Pixel level integration (preamp + discriminator + TDC + DAQ readout) - FNAL (COVID2)		4-Mar-21	19-May-21	55d	440h	\$74,238.87	FNd_ASIC_DESIGN_EN
TL1009775	ETROC2 emulator v2 firmware development - FNAL (COVID2)		22-Mar-21	16-Apr-21	20d	160h	\$26,995.95	FNd_ELTN_DESIGN_EN
TL1009795	System testing development with emulator - FNAL (COVID2)		19-Apr-21	14-Jun-21	40d	160h	\$26,995.95	FNd_ELTN_DESIGN_EN
TL1009805	ETROC2 global integration / design verification - FNAL (COVID2)		27-Apr-21	21-Jul-21	60d	960h	\$161,975.71	FNd_ASIC_DESIGN_EN
TL1009815	Integration of 8 channel rad-hard ADC waveform sampling into ETROC2 - FNAL (COVID2)		22-Jul-21	16-Sep-21	40d	120h	\$20,246.96	FNd_ASIC_DESIGN_EN
TL1009825	ETROC2 final global integration / design verification - FNAL (COVID2)		22-Jul-21	1-Sep-21	30d	240h	\$40,493.93	FNd_ASIC_DESIGN_EN
TL1009875	Perform initial functionality test of ETROC2 - FNAL (COVID2)		22-Feb-22	21-Mar-22	20d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009885	ETROC2 initial TID testing (irradiation) - FNAL (COVID2)		22-Mar-22	2-May-22	30d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009895	ETROC2 initial SEU testing (irradiation) - FNAL (COVID2)		22-Mar-22	2-May-22	30d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009905	Perform final functionality test of ETROC2 - FNAL (COVID2)		22-Mar-22	16-May-22	40d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009915	ETROC2 initial system testing - FNAL (COVID2)		5-Apr-22	16-May-22	30d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009925	ETROC2 final TID testing (irradiation) - FNAL (COVID2)		3-May-22	27-Jul-22	60d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009935	ETROC2 final SEU testing (irradiation) - FNAL (COVID2)		3-May-22	27-Jul-22	60d	120h	\$18,561.06	FNn_ENGNRING_PHYST
TL1009945	ETROC2 final system testing - FNAL (COVID2)		17-May-22	28-Jun-22	30d	120h	\$18,561.06	FNn_ENGNRING_PHYST



Emulator





Emulator Cost

Emulator cost include some cost increase from replacing SMU Grad Student labor (COVID2)

FNAL Labor: \$147418
 University Labor: \$37569
 M&S: \$4419

Activity ID	Activity Name	Planned Start	Planned Finish	Planned P	Planned Lab	Planned Labor	Planned NonLab	Planned NonLab	Planned Material	Resource IDs
DOE-CD1-402.8-FC2-5	402.8 TL - Timing Layer - CD2 Working - 9 December 2020	11-May-20	14-Jun-21	275d	956h	\$147,418.37	616h	\$37,569.32	\$4,419.60	
DOE-CD1-402.8-FC2-5.4	ETL - Endcap Timing Layer	11-May-20	14-Jun-21	275d	956h	\$147,418.37	616h	\$37,569.32	\$4,419.60	
DOE-CD1-402.8-FC2-5.4.2	ETL - Frontend ASICs	11-May-20	14-Jun-21	275d	956h	\$147,418.37	616h	\$37,569.32	\$4,419.60	
DOE-CD1-402.8-FC2-5.4.2.5	ETL - Frontend ASICs v2 development (CD-2)	11-May-20	14-Jun-21	275d	956h	\$147,418.37	616h	\$37,569.32	\$4,419.60	
TL1004915	ETROC2 emulator design specification - FNAL	11-May-20	4-Aug-20	60d	56h	\$6,364.52	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN, FN_U_PT_EXP_PHYST
TL1007885	ETROC2 emulator design specification - SMU	11-May-20	4-Aug-20	60d	0h	\$0.00	80h	\$5,629.74	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES
TL1004925	ETROC2 emulator v0 hardware development	5-Aug-20	16-Sep-20	30d	0h	\$0.00	80h	\$5,629.74	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES
TL1004935	Prepare and issue PO for ETROC2 emulator v0 hardware	17-Sep-20	23-Sep-20	5d	0h	\$0.00	16h	\$1,125.95	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES
TL1004995	SVT - Vendor fabricates ETROC2 emulator v0 hardware	24-Sep-20	21-Oct-20	20d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007835	Receive ETROC2 emulator v0 hardware (M&S)	22-Oct-20	22-Oct-20	1d	0h	\$0.00	0h	\$0.00	\$2,209.80	FN_MS_STND_FY19
TL1004955	ETROC2 emulator v0 firmware development - FNAL	23-Oct-20	7-Dec-20	30d	56h	\$6,748.99	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN, FN_U_PT_EXP_PHYST
TL1007805	ETROC2 emulator v0 firmware development - SMU	23-Oct-20	7-Dec-20	30d	0h	\$0.00	200h	\$7,669.22	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES, CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1005025	ETL - T5 - ETROC2 emulator v0 ready		7-Dec-20	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1004965	ETROC2 emulator v1 hardware development - SMU	8-Dec-20	8-Jan-21	20d	0h	\$0.00	80h	\$5,838.22	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES
TL1009385	ETROC2 emulator v1 hardware development - FNAL	8-Dec-20	8-Jan-21	20d	40h	\$6,748.99	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN
TL1004975	Prepare and issue PO for ETROC2 emulator v1 hardware	11-Jan-21	15-Jan-21	5d	16h	\$2,699.60	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN
TL1005005	SVT - Vendor fabricates ETROC2 emulator v1 hardware	19-Jan-21	5-Feb-21	14d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007825	Receive ETROC2 emulator v1 hardware (M&S)	8-Feb-21	19-Feb-21	10d	0h	\$0.00	0h	\$0.00	\$2,209.80	FN_MS_STND_FY19
TL1005015	ETROC2 emulator v1 firmware development - FNAL (XXX)	22-Feb-21	19-Mar-21	20d	56h	\$6,748.99	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN, FN_U_PT_EXP_PHYST
TL1007815	ETROC2 emulator v1 firmware development - SMU	22-Feb-21	19-Mar-21	20d	0h	\$0.00	40h	\$2,919.11	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES, CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009765	ETROC2 emulator v1 firmware development - FNAL (COVID2)	22-Feb-21	19-Mar-21	20d	160h	\$26,995.95	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN
TL1005035	ETL - T5 - ETROC2 emulator v1 ready		19-Mar-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1005045	ETROC2 emulator v2 firmware development - FNAL	22-Mar-21	16-Apr-21	20d	56h	\$6,748.99	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN, FN_U_PT_EXP_PHYST
TL1007865	ETROC2 emulator v2 firmware development - SMU	22-Mar-21	16-Apr-21	20d	0h	\$0.00	40h	\$2,919.11	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES, CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009775	ETROC2 emulator v2 firmware development - FNAL (COVID2)	22-Mar-21	16-Apr-21	20d	160h	\$26,995.95	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN
TL1005055	ETL - T5 - ETROC2 emulator v2 ready		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007515	ETL - T5 - Readout board available for system testing with emulator		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007525	ETL - T5 - Power board available for system testing with emulator		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007535	ETL - T5 - Service hybrid available for system testing with emulator		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007545	ETL - T5 - Backend hardware available for system testing with emulator		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1007555	ETL - T5 - Backend software/firmware available for system testing with emulator		16-Apr-21	0d	0h	\$0.00	0h	\$0.00	\$0.00	
TL1005725	System testing development with emulator - FNAL	19-Apr-21	14-Jun-21	40d	196h	\$30,370.45	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN, FN_U_PT_EXP_PHYST
TL1007875	System testing development with emulator - SMU	19-Apr-21	14-Jun-21	40d	0h	\$0.00	80h	\$5,838.22	\$0.00	CMS-HL_FN_SM_P_PHYS_ASIC_DES, CMS-HL_FN_SM_P_PHYS_GRAD_STUD
TL1009795	System testing development with emulator - FNAL (COVID2)	19-Apr-21	14-Jun-21	40d	160h	\$26,995.95	0h	\$0.00	\$0.00	FNJ_ELTN_DESIGN_EN
Before Oct 1, 2020						\$6,364.52		\$12,385.43	0	



Before Oct 1, 2020

	FNAL	University	M&S
COVID	\$58049	\$15215	0
COVID2	0	0	0
Emulator	\$6364	\$12385	0
Total	\$64413	\$27600	0

About \$92013 of labor was planned before Oct 1, 2020

Some of these activities would have been shifted after Oct 1, 2020 since they are merged with the working schedule...



FTE Estimate

		CD1				Dec9				DEV6			
		Before Oct 1, 2020	FTE	After Oct 1, 2020	FTE	Before Oct 1, 2020	FTE	After Oct 1, 2020	FTE	Before Oct 1, 2020	FTE	After Oct 1, 2020	FTE
V2	M&S	33400		442720		23000		772772		23000		779172	
	<u>FNAL ASIC Eng</u>	3367	1.90	617	0.35	2980	1.69	5782	3.27	1903	1.08	7956	4.50
	<u>FNAL Elec Eng</u>	0	0.00	264	0.15	320	0.18	3877	2.19	0	0.00	3756	2.12
	<u>FNAL Eng Phys</u>					0	0.00	960	0.54	0	0.00	960	0.54
	<u>ENG_GRAD_STUD</u>	4732	2.68	1294	0.73	3919	2.22	1900	1.07	3563	2.02	2725	1.54
	<u>PHYS ASIC DES</u>					416	0.24	1320	0.75	0	0.00	1215	0.69
	<u>PHYS_GRAD_STUD</u>	1169	0.66	1074	0.61	2103	1.19	624	0.35	1169	0.66	880	0.50
V3	M&S			1645272				1649272				1649272	
	<u>FNAL ASIC Eng</u>			3806	2.15		0.00	3488	1.97		0.00	3502	1.98
	<u>FNAL Elec Eng</u>			648	0.37		0.00	2120	1.20		0.00	2120	1.20
	<u>FNAL Eng Phys</u>			0	0.00		0.00	3320	1.88		0.00	3320	1.88
	<u>ENG_GRAD_STUD</u>			0	0.00		0.00	1920	1.09		0.00	1920	1.09
	<u>PHYS ASIC DES</u>			0	0.00		0.00	1200	0.68		0.00	1200	0.68
	<u>PHYS_GRAD_STUD</u>			5545	3.14		0.00	0	0.00		0.00	0	0.00
Total FTE			5.24		7.49		5.51		14.99		3.75		16.72

Kronos Report

		24SEP18 - 22SEP19	23SEP19 - 20SEP20	21SEP20 - 04APR21
402.84.100211	<u>Miryala</u>	45		
	<u>Olsen</u>	181	184	
	<u>Sun</u>	352	533.5	
	<u>Dyer</u>	11		
402.84.200211	<u>Olsen</u>		0	196
	<u>Sun</u>		781	831
	<u>Edwards</u>			530
	<u>Gonzalez</u>			2
	<u>Green</u>			20
	<u>Wu</u>			400
	<u>Dal Monte</u>			18
	<u>Dyer</u>			83
	<u>Gregorash</u>			35
	<u>Jonas</u>			8
<u>Lippert</u>			21.25	
Total		589	1498.5	2144.25

Dec9 is the CD-2 plan

DEV6 is the CD-2 plan merged with the working schedule
 No activities before Oct 1, 2020
 Merged with the "stated" schedule

For the period...

1-Oct-20 through 1-Apr-21: **3999 hours**

Includes some double counting...



Budget / Actuals (CAM eToolBox)

Budget based on the CD-1 plan

ControlAccount	WPCTC	10/31/2020	11/30/2020	12/31/2020	01/31/2021	02/28/2021
402.08.04.02 ETL - Frontend ASICs		\$30,245.47	\$25,870.75	\$23,313.95	\$24,774.59	\$24,312.31
	402.84.200211 ETL-ASICs MIE FNAL Labor	\$29,447.86	\$25,179.86	\$21,273.77	\$14,135.91	\$13,057.68
	402.84.200212 ETL-ASICs MIE FNAL MandS					
	402.84.200213 ETL-ASICs MIE FNAL Travel	\$797.62	\$690.90	\$727.26	\$690.90	\$363.63
	402.84.200291 ETL-ASICs MIE UNIV Labor			\$1,312.92	\$9,947.78	\$10,891.00
Total		\$30,245.47	\$25,870.75	\$23,313.95	\$24,774.59	\$24,312.31

Actuals for the CD-2 plan

ControlAccount	WPCTC	10/31/2020	11/30/2020	12/31/2020	01/31/2021	02/28/2021
402.08.04.02 ETL - Frontend ASICs		\$32,120.87	\$64,905.80	\$44,079.86	\$57,300.25	\$66,806.28
	402.84.200211 ETL-ASICs MIE FNAL Labor	\$32,120.87	\$64,238.38	\$42,205.22	\$48,422.03	\$65,808.13
	402.84.200212 ETL-ASICs MIE FNAL MandS		\$667.42	\$1,874.64	\$8,878.22	\$998.15
Total		\$32,120.87	\$64,905.80	\$44,079.86	\$57,300.25	\$66,806.28



Hour estimate from CD-1 plan

Activity ID	1-Jul-20	1-Oct-20	1-Jan-21	1-Apr-21	1-Jul-21	1-Oct-21	1-Jan-22	1-Apr-22	1-Jul-22	1-Oct-22	1-Jan-23	1-Apr-23	1-Jul-23
WBS: DOE-CD1-402.8-FC2-5.4.2.3 ETL - Frontend ASICs v2 development	---	---	---	---	---	---							
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory	---	---	---	---	---								
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>					216								
Resource ID: <u>FN_MS_STND_FY19</u>	28400		32000	9000	401720								
Resource ID: <u>FN_U_PT_EXP_PHYST</u>		80											
Resource ID: <u>FNd_ASIC_DESIGN_EN</u>	1051	385	16										
Resource ID: <u>FNd_ELTN_DESIGN_EN</u>		50	190	24									
Responsible Institution: <u>SM</u> Southern Methodist University	1734	481	745		995	147							
Resource ID: <u>CMS-HL_FN_SM_P_ENG_GRAD_STUD</u>	1734	441	221		576	56							
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>		40	524		419	91							
Responsible Institution: <u>UCSB</u> University of California - Santa Barbara		126	594										
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>		126	594										
WBS: DOE-CD1-402.8-FC2-5.4.2.4 ETL - Frontend ASICs v3 development			---	---	---	---	---	---	---	---			---
Responsible Institution: <u>FN</u> Fermi National Accelerator Laboratory			---	---	---	---	---	---	---				---
Resource ID: <u>c_FN_MS_STND_FY19</u>							25714	286	500000				5000
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>			192	672	754	1423	439		288				38
Resource ID: <u>c_FNd_ELTN_DESIGN_EN</u>						260	364	24					
Resource ID: <u>FN_MS_EXMP_FY19</u>									227772				
Resource ID: <u>FN_U_PT_EXP_PHYST</u>						80							76
Resource ID: <u>FN_U_PT_EXP_RA</u>													296
Responsible Institution: <u>SM</u> Southern Methodist University			197	690	619	1739	895		578	267			560
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>			197	690	619	1739	895		578	267			560
Responsible Institution: <u>UN</u> Generic University ("UN" is a place Holder for appropriate code)													8
Resource ID: <u>CMS-HL_AVE_U_GRAD</u>													
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>													8
Responsible Institution: <u>UCSB</u> University of California - Santa Barbara													320
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>													320



Hour estimate from DEV6 plan

Activity ID	1-Jul-20	1-Oct-20	1-Jan-21	1-Apr-21	1-Jul-21	1-Oct-21	1-Jan-22	1-Apr-22	1-Jul-22	1-Oct-22	1-Jan-23	1-Apr-23	1-Jul-23
WBS: 402W-DEV-6.8.4.2.3 ETL - Frontend ASICs v2 development	---	---	---	---	---	---	---	---	---	---	---	---	---
Responsible Institution: FN Fermi National Accelerator Laboratory	---	---	---	---	---	---	---	---	---	---	---	---	---
Resource ID: <u>c_FN_MS_STND_FY19</u>							727772						
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>							240						
Resource ID: <u>c_FNd_ELTN_DESIGN_EN</u>													
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>			80										
Resource ID: <u>FN_MS_STND_FY19</u>	18000	3000	2000		41000								
Resource ID: <u>FN_MS_TRVL_FY19</u>		5400											
Resource ID: <u>FN_U_PT_EXP_PHYST</u>		64	16	200	313	66	53	135	14				
Resource ID: <u>FN_U_PT_EXP_RA</u>							112	580	68				
Resource ID: <u>FNd_ASIC_DESIGN_EN</u>	319	1867	936	2637	2025	11	54	186					
Resource ID: <u>FNd_ELTN_DESIGN_EN</u>		210	986	560	189	497	426	888					
Resource ID: <u>FNn_ENGNRING_PHYST</u>							219	673	68				
Responsible Institution: SM Southern Methodist University	564	1765	1523	1045	287		120						
Resource ID: <u>CMS-HL_FN_SM_P_ENG_GRAD_STUD</u>	564	1117	1068	420			120						
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_ASIC_DES</u>		76	227	625	287								
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>		572	228										
Responsible Institution: UCSB University of California - Santa Barbara													
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>													
WBS: 402W-DEV-6.8.4.2.4 ETL - Frontend ASICs v3 development	---	---	---	---	---	---	---	---	---	---	---	---	---
Responsible Institution: FN Fermi National Accelerator Laboratory	---	---	---	---	---	---	---	---	---	---	---	---	---
Resource ID: <u>c_FN_MS_STND_FY19</u>								26000		500000			
Resource ID: <u>c_FNd_ASIC_DESIGN_EN</u>							126	1776	651	552		280	3
Resource ID: <u>c_FNd_ELTN_DESIGN_EN</u>									183	637		496	444
Resource ID: <u>c_FNn_ENGNRING_PHYST</u>							36	576	1138	570		960	
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_ASIC_DES</u>													
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>													
Resource ID: <u>FN_MS_EXMP_FY19</u>										227772			
Resource ID: <u>FN_U_PT_EXP_PHYST</u>							7	115	134	50		34	8
Resource ID: <u>FN_U_PT_EXP_RA</u>												496	344
Resource ID: <u>FNd_ASIC_DESIGN_EN</u>													
Responsible Institution: SM Southern Methodist University							165	1398	660	257		600	
Resource ID: <u>CMS-HL_FN_SM_P_ENG_GRAD_STUD</u>							144	1024	432			320	
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_ASIC_DES</u>							21	374	228	257		280	
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>													
Responsible Institution: UN Generic University ("UN" is a place Holder for appropriate code)												32	8
Resource ID: <u>CMS-HL_AVE_U_GRAD</u>												32	8
Resource ID: <u>CMS-HL_AVE_U_POSTDOC</u>													
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>													
Resource ID: <u>CMS-HL_FN_SM_P_PHYS_GRAD_STUD</u>													
Responsible Institution: UCSB University of California - Santa Barbara													
Resource ID: <u>CMS-HL_AVE_U_SCIENTIST</u>													